

COLLECTOR'S EDITION

 **PURE PERFORMANCE**

THE BEST OF BMW



A CELEBRATION OF INCREDIBLE CLASSIC,
MODERN AND MODIFIED BMWs

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WELCOME

BMW: three letters that invoke such incredible feelings of passion from car enthusiasts the world over. With over 100 years of rich history, the Bavarian company has produced some incredible, truly iconic cars, and this special magazine is dedicated to celebrating some of those awesome machines.

Naturally, choosing just a handful of cars from BMW's rich and vibrant automotive production history was an incredibly challenging task, but within these pages sit some of the company's greatest highlights. These are cars that have become true legends, cars that anyone passionate about all things motoring would give anything to own and that excite enthusiasts like nothing else. Cars like the legendary E9 CSL and the absolutely epic E92 M3 GTS, or the iconic 2002 Turbo, which we pitch against the E34 M5 Touring in a battle of legendary classic purchases – which one would you choose?

Elsewhere, a turbocharged E46 M3 pushing out over 1000whp joins a similarly mind-blowing turbo S52-swapped E9 CSL Batmobile tribute to showcase some of the greatest modified BMWs we've ever encountered. The legendary M1 meets the mighty F80 M3 CS

as we see how far things have come in the 40 years that separate these two performance machines, while the E39 and E60 M5s face off in an epic 18-cylinder clash of the titans.

Beyond that, we take an in-depth look at the development history of the incredible Z8 and then look back at the life of Paul Rosche, the engine genius responsible for some of BMW's most sensational powerplants. And, of course, you can't have a celebration of BMW's greatest hits without arguably the greatest BMW icon of all time, the E30 M3, and here we bring you a supercharged S54-powered creation that is classic modified perfection, and there's still so much more to enjoy in addition to all that.

Whether you love M cars, rare icons, modern performance masterpieces, or modified monsters, the cars within these pages represent some of the greatest BMWs ever made. They span decades of incredible engineering and machinery and demonstrate exactly why car enthusiasts around the globe are so passionate about those three letters. If you count yourself among those with a true passion for BMW, you've come to the right place. Welcome to *The Best of BMW* ■

ELIZABETH DE LATOUR EDITOR





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 PURE PERFORMANCE

THE BEST OF BMW

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14



70



64



38

06



In automotive circles, two words never fail to pique the interest of the initiated: homologation special. These were models that were built with one thing in mind – to meet the road-going regulations and production runs necessary to be eligible for racing. By their very nature, this means most are pretty special machines indeed. They often feature lightweight bodyshells, potent powerplants and all manner of aerodynamically enhanced addenda making them infinitely cooler and way more aggressive than their more mundane road-only

counterparts. Think Lancia Delta Integrale, Mitsubishi Evo or Ford Sierra RS500 Cosworth. All wild machines, and all highly coveted among those both in the know and with petrol flowing through their veins. But for us BMW fanatics, it's a simple three-letter-moniker that gets our pulses racing: CSL.

Introduced in 1972, the 3.0 CSL was a homologation special to allow BMW to enter the E9-series coupé in the European Touring Car Championship. Competing in the Group 2 class of the championship, the be-winged CSL – which earned it the nickname 'the Batmobile'



– dominated the series through much of the '70s, securing the driver's title an incredible six times in the decade. It fared well in the other championships it contested too, and remains one of the most successful touring cars of its era.

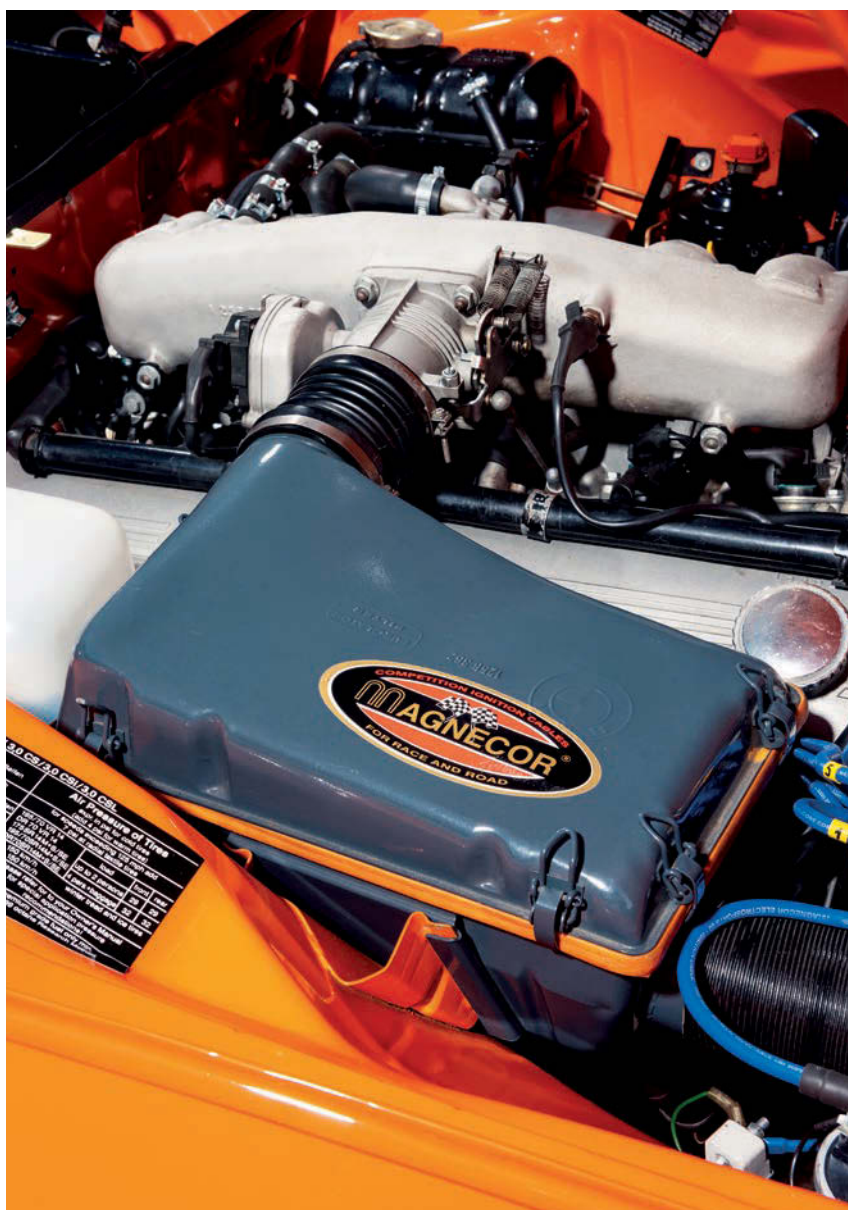
Based on the road-going 3.0 CS model, the homologation models of the CSL were far more focused machines with the 'L' in the designation meaning 'leichtbau' (lightweight). The reduction in mass (with a final weight of 1092kg in the full racing variant) was achieved through the use of thinner steel for the main body, judicious use of aluminium alloy for the doors, bonnet and →

RACE BRED

Wearing imposing Zender wide arches and resprayed in an eye-popping shade of Inka orange, Jayesh Patel's stunningly-restored E9 CSL is an exquisite example of BMW's iconic homologation special...

Words and photos **DAN SHERWOOD**





boot lid, deleting unnecessary trim and sound-proofing and replacing the glass side windows with featherweight Perspex items. A new four-speed gearbox, complete with a magnesium housing, also contributed to the CSL's lack of paunch. The stock CS engine was given a

E9 3.0 CSL

ENGINE: 3.2-litre straight-six M30B30

TRANSMISSION: Four-speed manual

EXTERIOR: Zender 'Group 2' front and rear wheel arches, front lower spoiler, and lightweight rear bumper

MAX POWER: 206hp @ 5600rpm

MAX TORQUE: 215lb ft @ 4200rpm

TOP SPEED: 138mph

0-62MPH: 6.8 seconds

ECONOMY: 21mpg

PRICE NEW: £9000 (1974)



Original 3.0-litre M30 engine has been completely rebuilt

makeover too, with displacement increased to 3003cc to allow the CSL to be raced in the 'over three-litre' class. Visually, the CSL was marked out from its non-competition brethren by black bumpers and the now-iconic side stripe which ran down the car's flanks, just above the shoulder line. In total, 1265 CSLs were built, of which only 500 were exported to the UK.

The gleaming tango-hued example you see on these pages is one of those very 500 and is owned by 53-year-old classic car enthusiast Jayesh Patel. "I bought the CSL in last 2019 after it weirdly seemed to be stalking me over the previous months," laughs serial collector Jayesh. "I first saw it at the London Classic Car Show, where it was one of the only cars that I'd actually taken a picture of. It was stunning. But at the time, it wasn't even for sale."

A few months later, the CSL reappeared on Jayesh's radar when he visited classic car specialists Total Head Turners in Essex to purchase a replica Lancia Stratos.

"I'M USED TO DRIVING CLASSIC CARS – I DON'T EVEN OWN ANYTHING MODERN – BUT THIS WAS A REVELATION!"

"They were storing the car for a friend and it was tucked away in one of their storage units," explains Jayesh. "It brought back the same feeling of excitement I experienced when I first saw it." But again, with no chance of a sale, Jayesh soon let it slip from his mind. That was until another few months passed and he stumbled across the car for a third time while it was surrounded by admiring crowds at the Silverstone Classic.

"This time, the car was up for sale," he remembers with a grin. "And after chatting with the sellers about the car, I was seriously tempted, but it just wasn't the right time for me to pull the trigger."

It wasn't until a few months later again that

fate finally stepped in and gave Jayesh the nudge he needed to seal the deal when the car cropped up in some old pictures he found. "I knew then that this car must be my destiny!" he chuckles. "So I made an enquiry to see if it was still available and to book a viewing."

At the time, the car was being sold through Boston-based Horsepower Hanger, so a fair distance from Jayesh's hometown of north west London. But, rather luckily, the firm offered to bring the car down to him to try out for the weekend.

Far from being a rash decision on behalf of the sellers, it was actually a pretty shrewd one, as, already smitten with the looks of the car, they knew all Jayesh needed was a little seat time →

3.0 CSL

“THE OVERALL QUALITY OF THE RESTORATION
WAS ONE OF THE THINGS THAT FIRST
ATTRACTED ME TO THE CAR”



The original
seats have been
re-upholstered
in period-correct
material





to finally get him hooked... and they were right!

"It was so much better than I ever anticipated," enthuses the classic car fan. "Having undergone an extensive restoration by the previous owner, it drives as well as the day it rolled off the production line, if not better!

"I'm used to driving classic cars – I don't even own anything modern – but this was a revelation!" he continues. "I used to own a CSA with an automatic gearbox, and thought the CSL would be similar, but it's in a different league completely. The lightness and agility combined with the powerful motor and slick-shifting manual 'box blew me away. I knew that, come Sunday, I wasn't giving it back," enthuses Jayesh with a grin.

As one of the limited run of 500 right-hand-drive cars imported into the UK, Jayesh's CSL isn't quite as light as its European-bound counterparts, being sold in 'City Pack' specification, which retained a few of the CS's luxuries such as electric glass windows, soundproofing and a few other interior upgrades. However, this was merely the car's starting point, as the previous restorative work has taken this icon to the next level.

Originally supplied in Chamonix white, the shell was initially stripped to bare metal and any defects and areas of corrosion were treated before being expertly repainted in this delicious shade of OEM Inka orange. The lightweight construction that so benefited the car's dynamics both on the road and circuit has, over time, become the CSL's Achilles heel, with many suffering badly with the dreaded red rot, meaning only relatively few examples have survived. To this end, the previous owner was particularly meticulous with the car's renovation, going as far as having both the front upper suspension mounting points fully rebuilt, which necessitated the removal of the front wings to gain access, plus both sills opened up to allow strengthening webbing to be installed before new sills were fitted. Once the shell had regained its structural integrity, the opportunity was taken to reinforce the car's racing heritage by installing some competition-developed modifications. These included the fitment of the Zender Group 2 wide arches, a matching deep front air dam and a lightweight GRP rear bumper.

"The wide-arch kit gives the car much more road presence," reckons Jayesh. "And combined with the flawless paint and re-chromed trim the car really stands out and is always the centre of attention."

Filling the swollen arches is a set of 16" Alpina multi-spoke wheels that retain the correct offsets and tyre profiles to perfectly match the rolling radius of the originals. This is a well-known and popular upgrade on CSLs as they just work so beautifully with the rest of the car, enhancing both its visual appeal and

its handling.

Other modifications that have improved how the car corners are a new set of bushes along with Bilstein progressive rate springs and shock absorbers, all set up in accordance with full German lightweight specifications.

"The braking system is another area that was well above my expectations," highlights Jayesh. "Sometimes classic cars can feel drastically under-braked compared to modern equivalents, but the CSL's braking system has been completely overhauled with reconditioned callipers, servo and master cylinder, along with a full complement of new pipework too, giving the stoppers real bite and power and inspiring much greater confidence."

Inside, the CSL's cabin is pure retro heaven with a heady mix of black leather and corduroy punctuated by highly-polished wood veneer. The deeply bucketed Scheel seats are the originals that the car was equipped with from the factory but have been tastefully re-upholstered in period-correct material while any dated vinyl trim has been replaced with sumptuous leather.

"The interior is a great place to be," Jayesh assures us. "Sinking into the hip-hugging driver's seat and gripping the chrome-spoked Moto-Lita steering wheel, it's the perfect environment to enjoy the thrill of stirring the potent potential of the modified engine."

The original 3.0-litre M30 engine has been retained but has been completely rebuilt using lightweight Mahle pistons, a re-ground and re-balanced crankshaft, all-new shell bearings, a new camshaft and rocker arms, and Bosch D Jetronic fuel injection. The whole valvetrain has also been upgraded with new components, as has the fuelling system and associated pipework, including replacing the old steel fuel tank with a bespoke aluminium alternative. A stainless steel exhaust system completes the extensive list of engine improvements and gives the car a soundtrack more in keeping with its in-your-face aesthetic.

But as impressive as the specification is, it's the immaculate presentation of the engine bay as a whole that is one of the most extraordinary aspects of the car. It's literally spotless, with each and every component looking like it was fitted yesterday. But then this level of detail extends to the rest of the car too, it's just at its most obvious here.

"The overall quality of the restoration was one of the things that first attracted me to the car," Jayesh says. "The previous owner had owned it for 20 years and you can tell it has been truly cherished in that time, with a lot of time and money invested in it."

However, nothing is ever perfect and, as a new owner, you can always find ways to improve your latest purchase, and Jayesh was no different.

"There were a few bits and pieces that →

I wasn't fully happy with when I bought the CSL so I sent it off to classic car specialists Webster & Lancaster in Watford to make some tweaks," he explains. "I use them to look after all of my classics, they do a great job and I can't recommend them highly enough."

Webster & Lancaster fitted new window rubbers, improved the gearshift and finessed the tune of the engine to add what Jayesh describes as 'the final 5%' of the restoration. And it's by going the extra mile on the details like this that Jayesh has really lifted this example to become what must be one of the finest in the country.

"It's certainly an excellent example," Jayesh beams proudly. "But that doesn't mean it gets locked away and not used. I drive all my classics on a regular basis as that's what I get the most enjoyment from. Unlike a modern car, driving a cool classic like the CSL makes every journey an experience and never a chore. In fact, I actively look for ways I can get behind the wheel and use them how they were intended, the CSL included."

One such trip was a recent blast down to the Cotswolds, where the searing orange BMW bruiser revelled in the tight and twisty lanes that are strewn throughout the picturesque countryside in the area.

"You really have to drive a car like the CSL, to take charge of it and show it who's boss," Jayesh says. "Be bold and positive with your inputs and the car responds with the delicate accuracy of a thoroughbred racecar, with very little in the way to numb the experience," he enthuses, and his passion for this car is clear to see.

But as incredible as his CSL undoubtedly is, Jayesh is not a man to be confined by sentiment and the car has actually been sold, despite his



love for it.

"I tend to continually evolve my collection, and I've been lucky enough to enjoy over 35 coveted classics to date," he explains. "However, I can't cope with what I currently own, so I'm trying to reduce that number to around 10 to make the logistics of driving and, ultimately enjoying them, much easier. For me, there are still so many great cars that I would like to experience owning, holding on to them for too long would only limit that. Yes, I do sometimes

miss the cars that I've since sold on, but the thrill of acquiring something new and exciting is of much more value to me, which is why I decided to let the CSL go," he says, and we totally understand where he's coming from.

So if this feature has given you the urge to get behind the wheel of one of these race-bred homologation specials, you really should go ahead and live out your dream and enjoy the spoils that come with owning a true automotive icon. Trust us, you won't be disappointed ■

"YOU REALLY HAVE TO DRIVE A CAR LIKE THE CSL, TO TAKE CHARGE OF IT AND SHOW IT WHO'S BOSS"



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It is pretty easy to make a case for each and every 3 Series that's been finely honed by BMW M's technicians to create an M3 being a modern classic, but it's safe to say that perhaps some are more highly revered than others. Or perhaps we just all have our own particular favourites? From the iconic E30 generation that started the genre to the recently departed F80, they've all been stunning drivers' cars, but it's perhaps the limited-edition models that have particularly caught the eye over the last 30 years or so.

E30 Evo IIs and Sport Evos, E36 GTs, E46 CSs

and CSLs, all seem to be nudging ahead of their 'run-of-the-mill' counterparts, and when it comes to the E9x generation of M3, there's no doubt that it's the GTS and the mechanically identical four-door CRT that have grabbed the headlines. Significant changes over the standard car, a lurid paint scheme and a production run of just 150 cars seem to have ensured the GTS's status as a guaranteed classic.

But were the changes really that significant, or rather, did they go far enough in justifying the car's considerable price tag back when it was new? It cost £117,630 when a standard M3 Coupé was less than half the price at £54,495 – many

contemporary road testers thought BMW was having a bit of a laugh when a Porsche 911 GT3 RS wasn't much more expensive than the GTS yet was more powerful and faster accelerating, too.

That's not to say that there weren't extensive changes for the GTS over the regular M3, it's just when viewed in the cold light of day, it didn't really seem to stack up – 30hp, some suspension tweaks and race seats for over £50k? So, what is it about the GTS that really caught the imagination and has seen its value and desirability increase since its launch? The bottom line is that while the on-paper updates



LIMITED EDITION MAXIMUM APPEAL

Despite its bespoke specification, the E92 M3 GTS had a tough time when it was launched thanks to its high price. Today it looks like a nailed-on classic that also happens to be brilliant to drive...

Words **BOB HARPER** / Photos **RICH PEARCE**

might not seem extensive, the GTS is an absolute riot to drive, the sort of machine you'd choose for the last drive when there's just one tankful of unleaded left.

At its heart is an enlarged version of the V8 found in the rest of the M3 range. And, while a capacity increase of just 362cc (achieved by increasing the stroke from 75.2 to 82mm) might not sound all that much, the S65 has a broader depth of talent in this form. There's a hunger to rev not matched by the standard machine and an even wilder soundtrack assisted by revised cats and titanium back-boxes. The vital stats are 450hp (up 30hp) at 8300rpm and 325lb ft

of torque (also an increase of 30) at 3750rpm. Thus endowed, the GTS sprints from 0-62mph in 4.4 seconds, a gain of 0.2 seconds over a DCT-equipped standard M3. The top speed was unfettered by a limiter at 190mph. It's an incredible engine and turned out to be the swansong for naturally aspirated M Power, and what a way to go.

While the standard M3 was available with a manual 'box, the only transmission option for the M3 GTS was the seven-speed M DCT. It shifts faster than the manual and suits the GTS's track ethos, and also came in for some electronic upgrades with shift points and speeds optimised

for the uprated engine.

There was much more to the GTS than just an engine upgrade, though, and the suspension came in for some serious revisions, too. Out went the standard springs and dampers, the optional electronic damper control was also dropped, and in came a coilover setup that's height adjustable (16mm at the front and 12mm at the rear) – additionally, it has dampers that can be adjusted for both bump and rebound. The front and rear camber can also be changed, and the rear subframe is mounted without rubber bushes to eliminate some of the movement that the standard car has. To make the most of →

the setup, the DSC, ABS and M Dynamic modes were recalibrated with the premise that the GTS needed to be a little bit more playful than the standard M3.

While some folk have often been somewhat disparaging of M cars' braking performance, there could be no such grumbling about the anchors on the GTS. Disc sizes were upped by 18mm up front and 30mm at the rear while

they were clamped by six-piston front and four-piston rear calipers to ensure stopping performance was up to snuff on both road and track. Covering the brakes were a set of 19" matt black 359M alloys – 9"-wide at the front and 10" at the rear – and these were wrapped in Pirelli P Zero Corsa rubber measuring 255/35 at the front and 285/30 at the back. Where the M3 used bolts to hold the wheels to the hubs, the

GTS used a stud and nut setup.

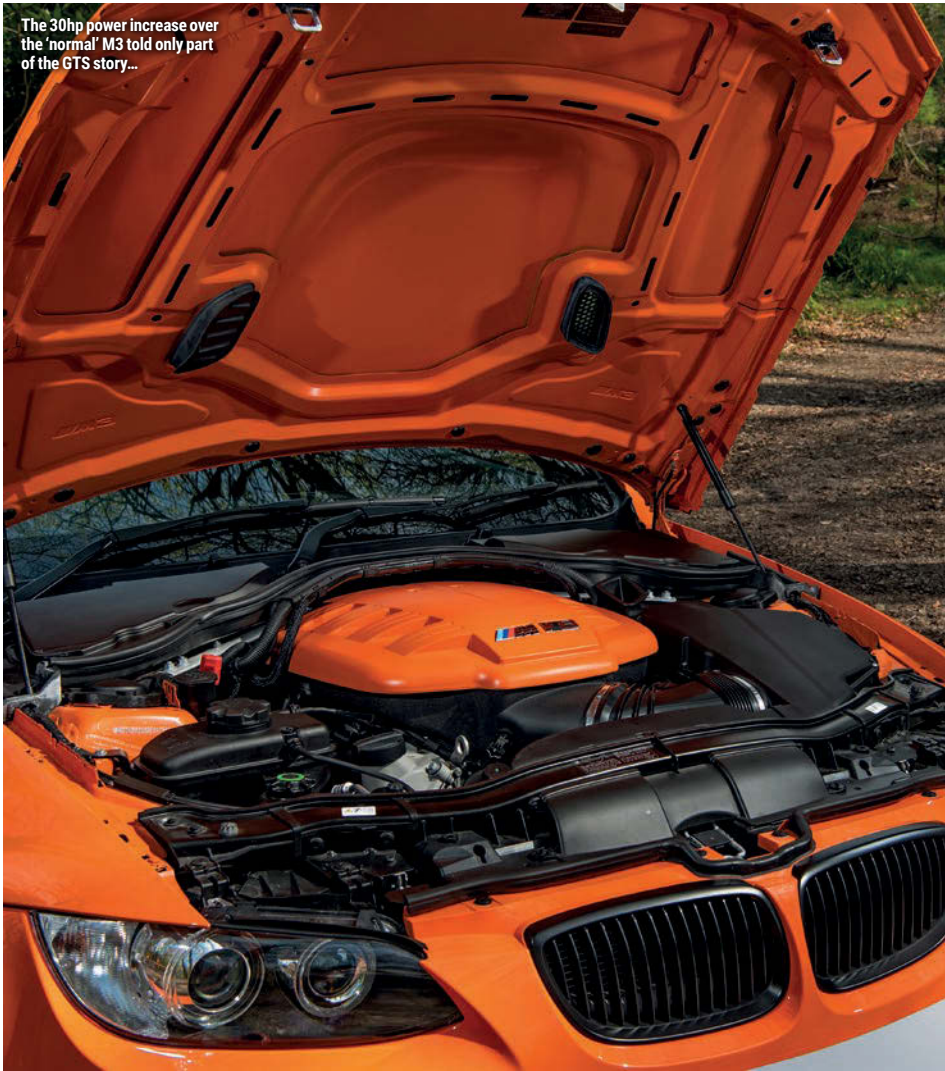
While the majority of what we've spoken about so far could be easily missed, there was no mistaking the GTS once you'd taken its Fire orange paint and aero addenda into consideration. Just the one hue was available, and the front splitter and rear spoiler were both adjustable depending on how much downforce you were after. After the glorious simplicity of

"THERE WAS MUCH MORE TO THE GTS THAN JUST AN ENGINE UPGRADE..."



the E46 CSL's ducktail spoiler, the GTS's WTCC-derived item isn't perhaps the most aesthetically pleasing aspect of the car, but originating from a successful race car, there's no doubting its effectiveness at speed.

Inside the track theme continued with Recaro buckets, Schroth harnesses and plenty of Alcantara and carbon trims. The Alcantara-clad steering wheel is a joy to hold, and while →



The 30hp power increase over the 'normal' M3 told only part of the GTS story...





The interior was devoid of fripperies – air-con was an option that could be reinstated



E92 M3 GTS

ENGINE V8, 32-valve, DOHC

CAPACITY 4361cc

MAX POWER 450hp @ 8300rpm

MAX TORQUE 325lb ft @ 3750rpm

0-62MPH 4.4-seconds

TOP SPEED 190mph

ECONOMY 22.2mpg

EMISSIONS CO₂ 295g/km

WEIGHT 1530kg

TRANSMISSION Seven-speed M DCT

STEERING Hydraulic rack and pinion

SUSPENSION Coilover suspension with dampers independently adjustable in compression and rebound; adjustable wheel camber

BRAKES Front: 378x32mm vented and drilled discs, six-piston calipers. Rear: 380x28mm vented and drilled discs, four-piston calipers

WHEELS Matt black 359M alloys, 9x19" (front), 10x19" (rear)

TYRES Pirelli P Zero Corsa, 255/35 ZR19 (front), 285/30 ZR19 (rear)

PRICE WHEN NEW £117,630



it's perhaps not as practical as the standard M3 thanks to the lack of door pockets and the stripped-out nature of the GTS – no iDrive, sat nav, air-con or radio – it smacks of being incredibly driver-focused with no unnecessary fripperies. The A/C and radio could be added as options, but the lack of rear seats and half-cage leave you in no doubt as to the GTS's primary objective.

And that was to go as fast as possible while ensuring the driver was having an absolute ball while doing so. It screams stripped-out racetrack refugee (but, in reality, was only 70kg less than the standard M3), and it doesn't disappoint on

the road either. Unsurprisingly it's less good at mundane tasks than the standard M3. The exhaust can drone on the motorway, and you hear every pebble being thrown up from the wheels onto the underbody, while that rear spoiler does hamper rear visibility – but it does just about everything else utterly brilliantly.

It's more raucous than the standard car on start-up, and you hear a slight metallic thud as you engage first, but this only heightens

your expectation as you move off. It's harder to drive smoothly at low speeds, which is just about all the excuse you need to go faster. The steering's nicely weighted and provides plenty of communication, and on smooth roads, grip is limpet-like. Even in its softest road setting, the ride's a little harsh, and broken-up tarmac can upset it a little, but perhaps the most crucial thing is that you always know exactly what's going on. It's predictable and linear in its →

“UNSURPRISINGLY IT'S LESS GOOD AT THE MUNDANE TASKS THAN THE STANDARD M3...”



responses, and you'd need to be doing something foolish for it to bite you back.

Perhaps by today's turbo standard, it initially doesn't feel as quick as the figures suggest, as it doesn't have that huge low-down torque thrust, but that's all the more reason to explore the higher ranges of the rev counter. And sitting behind this engine is to really experience greatness – the higher you rev it, the better it sounds and the harder it pulls – and a simple flick of your right-hand slots you into the next

ratio in the blink of an eye so you can experience it all again. It really is an absolute marvel and one that you would never tire of experiencing. The whole car has a wonderful flow to it – engine, gearbox, suspension and brakes all working in harmony – and exhibits a perfect blend of power and grip for you to enjoy. We can't think of many cars produced since that have a better balance of abilities.

So, ultimately the GTS certainly deserves its status as one of the finest creations to emerge

from Garching's hallowed halls for many a year. A bespoke power unit, special suspension setup, and unique looks: the M3 GTS has it all, and, most importantly, it's a stunningly rewarding machine to drive, and most certainly a much greater creation than its on-paper spec (and ludicrous initial price tag) suggested. Perhaps the only downside was its limited production run – wouldn't a series of 1000 examples at a slightly more palatable price point have been an even greater achievement? ■

On the road the GTS has real racetrack refugee character – it's a surefire future classic M car



“THE GTS DESERVES ITS STATUS AS ONE OF THE FINEST CREATIONS TO EMERGE FROM GARCHING”



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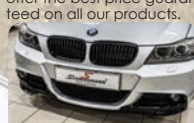


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“We build the best turbo engines in the world,” quipped Alpina’s founder, Burkard Bovensiepen, in an interview with *Auto Motor und Sport*, and there’s no doubt this was a direct dig at Porsche and its 911 Turbo. Alpina’s 3.0-litre unit was more powerful than Stuttgart’s machine and offered greater flexibility, too, accelerating from 60 to 120km/h in fifth gear 3.3 seconds faster than the Porsche, too. Sounds like Bovensiepen wasn’t wide of the mark at all.

The arrival of the 5 Series-based Alpina B7 Turbo in late 1978 – along with the mechanically identical E24 6 Series version and the 3 Series-based B6 2.8 – marked a step change for Alpina as these three models were the first that were offered as complete conversions. In the past, customers had been able to add various Alpina accoutrements to a variety of BMWs, but these

new models represented a new direction for the company. It was keen to move away from being a tuning company to being recognised as a fully-fledged manufacturer, which it achieved in 1983. And the B7 was quite an awesome way of announcing your intentions to the world.

However, producing full-on models rather than a range of tuning parts brings its own problems as Alpina had to ensure its enhanced BMWs weren’t then going to be eclipsed by a regular production BMW being offered at a more down-to-earth price point. And that’s one of the reasons Alpina turned to forced induction. Thanks to its close links to BMW, Alpina was often aware of what was going to be launched in the coming years, and with the E12 5 Series not only was BMW already offering the pretty potent 528i but there was going to be an M535i in the offing too. This meant that Alpina’s

traditionally finely fettled naturally aspirated six-cylinder M30-engined models might struggle to find buyers when the factory’s standard machinery was already pretty sporting.

Alpina knew its take on the E12 5 Series was going to have to be pretty spectacular, so turbocharging was the obvious route to take. BMW’s own 2002 Turbo hadn’t been a huge success – it was no faster than a naturally-aspirated Alpina version and wasn’t the last word in power-delivery finesse. But Porsche’s 911 Turbo and Saab’s Turbo models had proved that turbos could be successfully used in road car applications. Alpina’s engine guru, Fritz Indra, set about developing an engine that would produce the required performance but would also be tractable and not highly strung.

Thus, the original Alpina B7 Turbo was born. Initially, it was called the Alpina 530 Turbo, →



SEVENTH HEAVEN

Alpina's B7 Turbo saloons were the fastest four-door cars of their era, offering stunning performance and a heavy dose of 1980s charm...

Words **BOB HARPER** / Photos **GUS GREGORY**



and that moniker gave a clue as to what was under the bonnet, as rather than use the 3.2- or 3.5-litre versions of the big 'six, Indra opted to modify the 3.0-litre unit as its shorter stroke was better suited to a turbo application. The first job was to reduce the compression ratio to 8.0:1, which was done with bespoke Mahle pistons. The combustion chambers in the head were reshaped, although the standard-sized valves were retained along with a 272° BMW camshaft. The Kühnle, Kopp und Kausch (KKK) K27 turbo was fitted alongside the engine, just downstream from the exhaust manifold, and incorporated a wastegate and bypass valve.

Where Indra's genius really lay with this engine was in the use of a Pierburg Zenith

DL continuous flow injection system that was hooked up to a Hartig distributor-less computerised ignition system. This was able to react to the air temperature that the engine was being force-fed, and could advance or retard the ignition depending on requirements. Vital stats from the enhanced M30 were 300hp at 6000rpm and 341lb ft of torque at 2500rpm.

As this was one of Alpina's first complete conversions, there was far more to the B7 than bolting a turbo to its engine, and, to ensure a supply of cool air to the engine, an air-to-air

ALPINA E28 B7 TURBO

ENGINE M30 straight-six, SOHC, 12-valve

CAPACITY 3430cc

MAX POWER 300hp @ 6000rpm

MAX TORQUE 370lb ft @ 2500rpm

0-62MPH 5.9-seconds

TOP SPEED 161mph

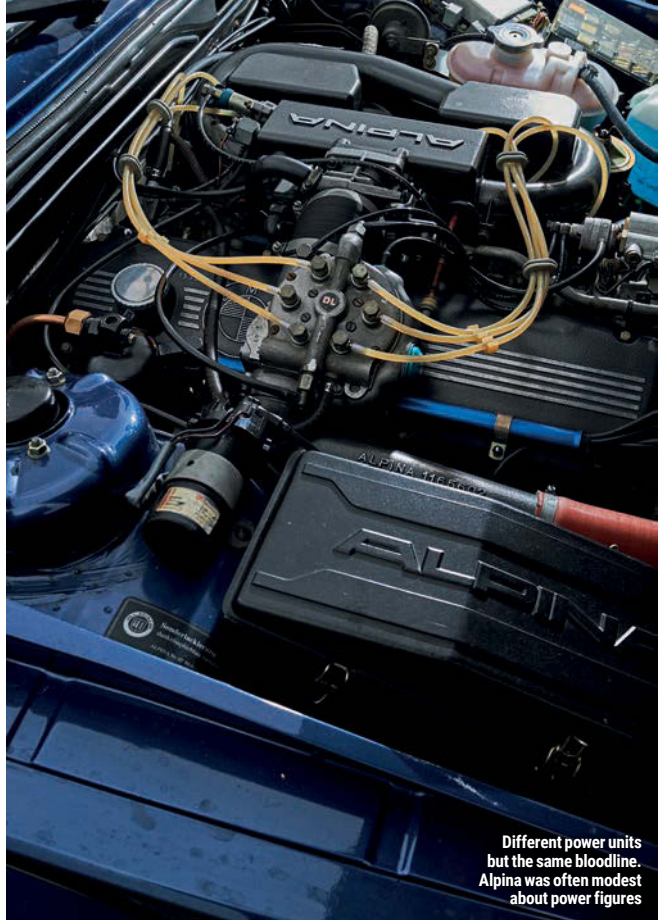
ECONOMY 17.0-33.2mpg

NUMBER MADE 236

“IN TYPICAL ALPINA FASHION IT QUOTED AN UNDERSTATED 0-62MPH TIME...”



The interiors of both classics are in remarkable condition – both speak of their period...



Different power units but the same bloodline. Alpina was often modest about power figures



intercooler was installed to the right of the radiator. The standard 5 Series transmission wasn't deemed to be up to the job, so the five-speed Getrag unit that had been developed for the BMW 745i turbo was installed, along with a limited-slip differential with its own oil cooler and electronically controlled pump. Alpina had already garnered a reputation for being suspension gurus, and the B7 featured Bilstein progressive-rate springs and dampers along with adjustable anti-roll bars. Wheels were the trademark Alpina items – 16" in diameter and seven and eight inches wide (front and rear, respectively). Brakes featured 528i vented discs clamped by four-pot callipers up front.

Externally you could opt for the stealthy de-striped version, but it would seem that the decal set was in vogue at the time, and most B7s had the traditional Alpina pinstriping to go with the deeper front air dam and rubber boot lid-mounted spoiler. Inside, the standard 528i armchairs were ditched in favour of some grippy Scheel sports seats, which were clad in Alpina cloth, and along with the lovely Alpina four-spoke steering wheel, there were Alpina-logo'd dials with red needles. An additional gauge pod sat on top of the dash in front of the passenger and monitored turbo boost and various temperatures. Down by the handbrake, meanwhile, was a knob for adjusting the boost pressure – around 250hp at 0.55 bar and the full monty of 300hp at 0.85 bar.

And there's no doubt the B7 was a devastatingly quick car. In typical Alpina →

ALPINA'S OTHER TURBOCHARGED MASTERPIECES...

E24 B7 TURBO

Produced at the same time as the E12 and E28 versions, the 6 Series models utilised the same formula that was so successful with the saloons. Initially based on the 630CS, the first B7 Turbo used the 300hp 3.0-litre unit and offered very similar performance to the E12 B7. The B7S Turbo also made the leap to 3.5-litre power with 330hp; this was even rarer than the saloon, with just 30 examples being manufactured, all in Alpina green with checked upholstery. Once BMW had made the switch to basing the E24 on the E28 rather than the E12 chassis, Alpina followed suit, using the 3430cc version of the M30. Always slightly more expensive than the four-door and produced in fewer numbers.



E34 B10 BI-TURBO

At the time of its manufacture, the B10 Bi-Turbo was the fastest car Alpina had made, with a top speed just north of 180mph thanks to an output of 360hp and 384lb ft of torque. It was introduced in 1989 and lasted until BMW stopped producing the M30 straight-six in 1994, by which time Alpina had manufactured 507 examples – an impressive feat given it was almost twice the price of BMW's own E34 M5!

Its engine was a masterpiece, and reportedly development of the B10 Bi-Turbo cost USD \$3.2 million. The engine was completely stripped, and all moving parts were balanced along with re-machined combustion chambers and bespoke Mahle pistons. New exhaust manifolds featured twin Garrett T25 water-cooled turbos. As you'd expect, performance was immense – 0-62mph in 5.6 seconds and 0-124mph in 19 seconds. The ultimate Alpina 5 Series? It could well be.



ALPINA E12 B7S TURBO

ENGINE M30 straight-six, SOHC, 12-valve

CAPACITY 3453cc

MAX POWER 330hp @ 5800rpm

MAX TORQUE 369lb ft @ 3000rpm

0-62MPH 5.9-seconds

TOP SPEED 162mph

ECONOMY 16.7-32.1mpg

NUMBER MADE 60

fashion, it quoted an understated 0-62mph time of 6.5-seconds, but, when tested by *Auto Motor und Sport*, it recorded 6.1-seconds for the benchmark sprint, a top speed of 155mph and 0-124mph in 23.6-seconds. Comfortably the fastest four-door on the planet and quicker than contemporaries, such as a Ferrari 308 GTB which was over two seconds slower to 124mph. When Fritz Indra used to accompany journalists on road tests, he famously used to say: "Just leave it in fifth," and the said scribe would be shocked that it would pull strongly from 1000rpm with a seamless surge of acceleration.

Alpina manufactured the B7 from December 1978 until February 1982, when a total of 149 examples rolled out of its hallowed halls in Buchloe. But those of you with eagle eyes will have noticed that the machine we have here today, resplendent in 'Dunkelsaphirblau' metallic with contrasting gold stripes, isn't one of those common B7s, this is the daddy of E12s, the even rarer B7S. Just 60 were made between November 1981 and May 1982.

It's a bit of an oddity, really, as by the time it was launched, BMW was already selling the E28 5 Series and, presumably, the B7S was a last hurrah for the Alpina E12 while the company was busily readying its E28 version. To justify its place, it had to be a bit special and offer more than the original did, so Alpina dropped the 3.0-litre M30 and went the whole hog with the 3453cc version. Changes were broadly similar to those made to the B7 – the KKK turbo was retained, but there was a new ignition system by AST. Cosmetic changes were few and far

between – black door handles and B-post trims were the exterior clues, while black sun visors and headlining were the interior giveaways.

Its performance was sensational, though, firmly eclipsing the original B7 thanks to an output of 330hp at 5800rpm and 369lb ft of torque at 3000rpm. Alpina quoted a 0-62mph time of 5.9-seconds, but once again, *Auto Motor und Sport* recorded a faster time – 5.8-seconds – but it was the 0-124mph time of just 20.3-seconds that was a true indicator of how much further Alpina had taken the B7 theme. The top speed was up to 162mph.

And sitting in the Sussex sunshine, exhaust quietly ticking after short but entertaining blat from Munich Legends' HQ, it looks utterly sublime. The E12 shape seems to have aged very gracefully, and compared to the E28 we've brought along for comparison purposes, it looks smaller and has a delicacy of touch to its styling that's missing from the newer car. The drive over might have been relatively short, →

"THE E12 SHAPE SEEMS TO HAVE AGED VERY GRACEFULLY, AND COMPARED TO THE E28..."



but it's already demonstrated that the B7 still drives very well indeed, with a supple ride and nicely controlled body movement. It's the engine that dominates proceedings, though, with a wonderful linearity to its performance. There seems to be very little in the way of turbo lag, just a strong build in power as if it's just fully filling its lungs before the main event, but as it's not yet thoroughly warmed through, we've taken it easy so far.

Comparing notes about the E28 we've brought along – an Alpina B7 Turbo/1, no less – it seems as if the bloodline runs true despite these cars having different engines. While both use a 3.5-litre big 'six, the one in the E28 is based on the 3430cc unit that was current when the E28 version of the B7 went on sale back in 1984. The modifications wrought by Alpina followed the established path, with a reduced compression ratio and a KKK turbo, but now the engine management system was via Bosch Motronic and L-Jetronic fuel injection.

Similar changes were made to the rest of the E28 as per the E12 generation. There was a five-speed Getrag gearbox (with a dogleg pattern – the E12 used a traditional H-gate), a limited-slip diff with oil cooler, Bilstein suspension to Alpina's specification, uprated brakes, subtle exterior upgrades and the expected Alpina alloys. Inside there was perhaps slightly less pizzazz than there was in the E12. The Scheel

seats had made way for Recaro items, and the bold stripes of the previous generation had given way to more discreet Alpina branding. The additional dash pod sported by the E12 was replaced by a more high-tech set of digital gauges which slotted into one of the dash vents.

While the E28 B7 Turbo was no slouch – it had 300hp and 370lb ft of torque – it couldn't quite match the B7S. We're talking about a tenth of a second here or there, and it was still the world's fastest four-door – and inevitably, the magazines quoted figures that were slightly better than Alpina claimed. In total, Alpina produced 236 examples and 46 with catalytic converters, which actually used a detuned version of the engine fitted to the more expensive B7 Turbo Coupe, which offered 320hp.

In typical photoshoot fashion, by the time we've got the static and detail images in the bag, the weather's taken a turn for the worse and, being realistic, we don't have the space to really put this duo through their paces. There's also a distinct lack of Autobahns in Sussex. What does shine through, though, is how cultured and well-mannered they are – no histrionics or peaky power units here, just thoroughly and beautifully engineered machines as we've become accustomed to from Alpina.

Many years ago, though, we did have the opportunity to fully sample the performance

of a B7 – an E28 model that had admittedly been slightly enhanced in the power stakes – and to this day, it remains the quickest machine from the era that we've ever driven. Come to think of it, there aren't many cars we've driven since that have seared such a vivid picture into our memory bank. Like these two we have here, it pulled strongly from low down in the rev range, but the constant build of thrust was simply sensational until, at around 4500rpm, it was utterly ballistic. You really did have to recalibrate your senses and hang on for dear life. Contemporary road tests do make mention of slightly wayward handling, especially if you have to come off the power mid-corner, but that's endemic to any powerful machine with semi-trailing arm rear suspension rather than a criticism of the Alpina.

Ultimately this brace of fast four-doors is a brilliant example of the engineering integrity that runs through all Alpinas. It had to do something different to what BMW was offering, and the world would have been a poorer place if Alpina hadn't had the foresight to create these marvellous machines. In fact, we think Bovensiepen was selling his B7s a little short when he said he made the world's finest turbocharged engines. He should have said the world's finest turbocharged cars ■

THANKS Munich Legends, www.munichlegends.co.uk













“BOVENSIEPEN WAS SELLING HIS B7S A LITTLE SHORT WHEN HE SAID HE MADE THE WORLD'S FINEST TURBOCHARGED ENGINES...”



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SUPERCHARGED S54 E30 M3

GO BEYOND

Combining monster power from its fully built supercharged S54 with subtly enhanced styling, iconic wheels and a spectacular interior, this sensational E30 M3 reaches new heights of modified magnificence

Words ELIZABETH DE LATOUR / Photos JAPE TIITINEN



The E30 M3 is a true performance icon, an absolute motoring legend. When it arrived in 1986, it was an instant success, and there are plenty of reasons why it's so popular. It's a car that any M fan, any BMW enthusiast, would love to own – it delivers such a pure driving experience, it's so perfectly balanced, so exciting, it looks so good, and everything about it is sheer perfection. No wonder it is still considered to be one of the greatest driver's cars of all time, and no wonder it is so incredibly sought-after. The thing is, being an icon means

that the E30 M3 is not exactly an attainable purchase for most fans. There aren't that many cars left after over three decades, and prices have been soaring in recent years and show no signs of stopping. An E30 M3 is not a casual purchase, but if you could, then you absolutely would, and Jason Debono (@jason_gti) did.

Jason has long been a BM fan, ever since he owned his first, an E46 M3 (one hell of an introduction to the brand), so he's clearly a guy with taste, but he's also a guy with a penchant for a particular kind of car. "I have a thing for '80s/'90s wide-bodied cars, so had to have an E30

M3," he smiles, and he's not kidding about his love for retro performance icons. His current stable is a dream garage for anyone who can appreciate the classics and includes an Escort RS Cosworth, a stunning Lancia Delta Integrale Evo 2 and a Fiat Uno Turbo along with more modern machinery like a MK4 Golf and an Audi RS4.

Jason bought his E30 from a friend of a friend and describes it as being in fair condition, but he already had some big plans and knew exactly what he wanted to do with the '80s icon. "I planned to do a full bare-metal respray and extensively mod it," says Jason, and →





SUPERCHARGED S54 E30 M3

ENGINE Straight-six S54B32 from E46 M3, fully stripped and aqua blasted, bore increased to 87.5mm, stock compression JE forged pistons, VAC Motorsport forged rods, all weight-matched, balanced crank, all bearings .25 oversized, new oil pump with VAC upgrade, uprated cut-ring head gasket, ARP head studs, stock head with uprated Supertech valves, double valve springs, Beisan Systems Vanos seals and new Vanos coil pack, uprated upper chain guide, new gasket, seals and chain, custom-made LHD E46 M3 sump, VF Engineering VF570 supercharger kit with custom billet compressor wheel, custom heat exchanger, radiator and oil cooler, remote air filter, ceramic-coated custom exhaust manifold with 2.5" exhaust with X-pipe, MSS54 ECU with custom tune, semi-smoothed engine bay

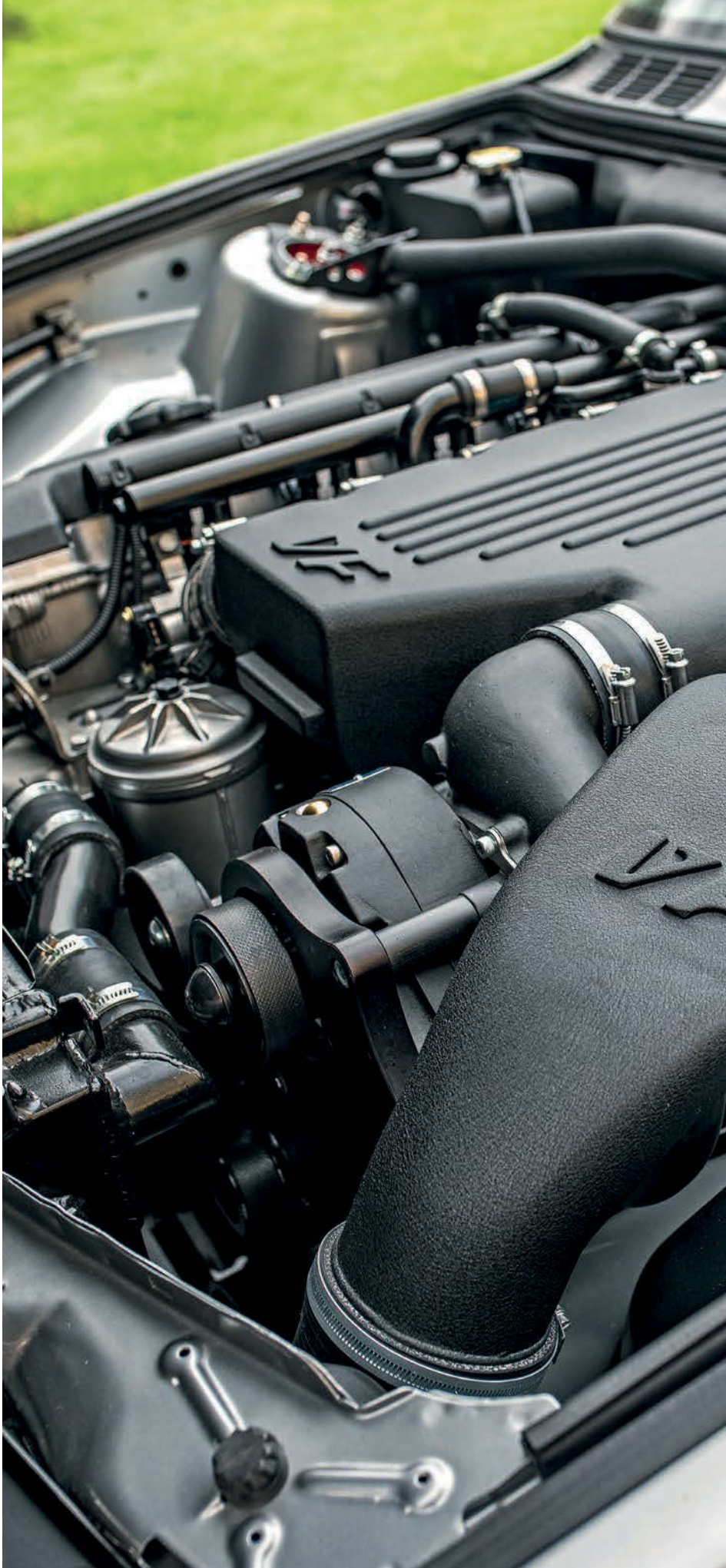
POWER AND TORQUE 585hp and 420lb ft

TRANSMISSION Getrag Type D six-speed manual gearbox from E46 M3, custom propshaft, Sachs performance paddle clutch, performance dual-mass flywheel, heavy-duty clutch cover, custom-made gear linkage and quick-shifter, Wavetrac LSD Type 188 diff with stock 3.25 pinion and crown wheel, new diff bearings and seals

CHASSIS 8x18" (front) and 9x18" (rear) BBS RS wheels with triple-plated chrome faces and polished lips, 215/35 (front) and 225/35 (rear) Continental tyres, full undercarriage restoration back to bare metal with all-new bearings, bushes, nuts and bolts etc., Raptor coloured coating applied, BMP front subframe with purple tag steering rack, Air Lift struts and air bags, AccuAir eLevel+ management and ENDO-CVT tank, Wilwood calipers and two-piece discs (front)

EXTERIOR Full bare metal respray in original colour, all-new OEM glass and rubbers etc., tinted headlights, Evo 2 matt carbon front lip, Sport Evo matt carbon rear spoiler, Startec rear lights

INTERIOR Recaro A8 Gen 1 front seats with exterior colour-coded seatbacks, front and rear seats, dashboard, centre console, gaiters and door cards retrimmed in black leather with silver stitching





he wasted no time, getting the car stripped and sprayed in its original factory shade, and this was the perfect time to get started on the interior. The cabin of this E30 M3 is simply magnificent, and it's dominated by the awesome front seats, a pair of Recaro A8 Gen 1s with backs colour-coded to the car's paintwork, and both they and pretty much the entire interior have been treated to a custom retrim. Everywhere you look, from the rear seats to the centre console, the door cards to the gaiters and even the entire dashboard, everything has been finished in black leather with contrasting silver stitching. It makes this interior something seriously special and sets the standard for the rest of the build.

While the car was being resprayed, it was the perfect opportunity to also restore and renew anything that required attention. That included the entire chassis and undercarriage, with the car being treated to new bearings, bushes, nuts, bolts etc. Coloured Raptor coating was applied to prevent rust in the future and keep everything sealed and clean, and with that taken care of, the upgrades could begin. As you can see,

this E30 M3 is on air suspension, and it looks awesome. Jason is running Air Lift Performance struts and bags, combined with AccuAir e-Level+ management and the company's very clever ENDO-CVT tank. This incorporates the compressor into the air tank itself, allowing for a much neater, cleaner install. Aired out, this M3 looks epic, and those iconic box arches just manage to slide over Jason's stunning wheels.

Much as with his decision to go for air, when it came to wheels, Jason knew what he wanted for this build. "I'm just a huge BBS fan, so that was the only choice for me," he smiles, and he didn't cut corners when it came to choosing his perfect set of wheels, and they are absolutely awesome. These 18" RSs have triple-plated chrome faces with polished lips, and it's an absolutely dazzling combo that makes this M3 stand out even more than it already does. They are the perfect accompaniment to the air ride, with the classic styling suiting the car so well. These wheels really were the perfect choice, and they set this build off like nothing else.

There's more to the looks than just the wheels and the drop delivered by the air, →

"POP THE BONNET AND, SITTING IN THE SEMI-SMOOTHED BAY, YOU WILL FIND ONE OF BM'S GREATEST STRAIGHT-SIXES, BOLSTERED BY THE ADDITION OF A CENTRIFUGAL SUPERCHARGER, AND IT IS ONE HELL OF A SETUP"



Custom radiator



VF supercharger setup has a chargecooler in the intake manifold



This E30 M3 has been fully restored and the underside is immaculate



Dash has been fully trimmed in leather



Awesome Recaro A8s



Black leather with silver stitching throughout

“THE CABIN OF THIS E30 M3 IS SIMPLY MAGNIFICENT, AND IT’S DOMINATED BY THE AWESOME FRONT SEATS, A PAIR OF RECARO A8 GEN 1S WITH BACKS COLOUR-CODED TO THE CAR’S PAINTWORK, AND BOTH THEY AND PRETTY MUCH THE ENTIRE INTERIOR HAVE BEEN TREATED TO A CUSTOM RETRIM”

though, and while Jason has kept the styling enhancements very subtle, this M3 definitely serves up a bit more visual clout than it did in standard form. Jason has opted for a combination of Evo 2 and Sport Evo styling additions, with a matt carbon front lip and rear spoiler, and they just add that extra hint of aggression. They are joined by tinted headlights and a set of genuine Startec rear lights for those finishing period touches.

If that was the end of this build, then no one would be complaining because it’s an awesome-looking E30 M3 that’s been masterfully enhanced with the perfect selection of period additions to get it looking absolutely spot-on. But we’re far from done because there’s a lot more to this project than meets the eye. Jason did say that he’d always planned to extensively mod the M3, and after he’d taken care of the styling and the chassis and got the car looking exactly how he wanted, he had the idea to fit a fully built S54

with a VF supercharger into his E30 and that’s exactly what he’s done. Pop the bonnet and, sitting in the semi-smoothed bay, you will find one of BM’s greatest straight-sixes, bolstered by the addition of a centrifugal supercharger, and it is one hell of a setup, and the amount of work that’s gone into it is just insane.

The S54 chosen for this swap was fully stripped, all the parts were aqua blasted, and then its bore was increased to 87.5mm. Jason is running stock compression JE forged pistons, and VAC Motorsports forged rods, all of which have been weight-matched. There’s a balanced crank, .25 oversized bearings, an uprated cut-ring head gasket, ARP head studs, uprated Supertech valves and double valve springs, along with an uprated upper chain guide, while a custom left-hand drive E46 M3 sump was made in order for the engine to fit into the E30’s bay. Of course, the most exciting part of this engine swap is the supercharger setup, and this →







is a VF570 kit, except that simply running an off-the-shelf kit would never have sufficed for Jason, so it's been enhanced with a custom billet compressor wheel. In addition to that, you've got the custom heat exchanger, radiator and oil cooler, and there's also a custom ceramic-coated exhaust manifold and a 2.5" exhaust with an X-pipe. That's a serious amount of work that's gone into this S54, and the result is a serious amount of power. Running a custom tune on the engine's original MSS54 ECU, Jason's E30 is making a massive 585hp with 420lb ft of torque; that has turned this M3 into an absolute monster, and it was worth all the effort that went into building that epic S54.

While an E46 M3 Getrag Type D six-speed manual gearbox has also been installed, it has naturally had to undergo some enhancements to ensure that it would be able to cope with the massive amount of power that it is now having to put to the tarmac, and the whole transmission has been updated. The gearbox has been fitted with a Sachs performance paddle clutch and performance dual-mass flywheel, along with

a heavy-duty clutch cover, and then there's the custom-made gear linkage and quick-shift. On top of all that, this E30 is running a custom propshaft and a Wavetrac LSD in a Type 188 diff with a stock 3.25 pinion and crown wheel, plus new diff bearings and seals. The brakes have also been updated to ensure that this M3 has the stopping power to match all that go. Jason has fitted a pair of hefty Wilwood calipers with two-piece discs up front, and they deliver the sort of serious braking performance he now needs.

Two years of work have gone into this E30 M3, and the results are simply staggering. Everything has been done right, starting with the comprehensive restoration that was carried out before any modding was done, which gave Jason the best possible starting point for the whole project. From the outside, it's such a clean build, so subtle, with those matt carbon Evo additions enhancing the styling perfectly, while the air-ride and those dazzling RSs set it all off. Then you've got that stunning, fully retrimmed interior, those seats, and, to top it all

off, that incredible full-on supercharged S54. This E30 M3 ticks so many boxes it's unreal, and it's dream car goals and modded inspiration all in one – Jason can be hugely proud of what he's created here.

Of course, there's always something left on the to-do list, and, for Jason, it's more power because while 585hp is a serious number, with the amount of work that's gone into building that S54, it can deliver a hell of a lot more. "Currently, the engine is being run-in, but after that's done we will switch to a standalone ECU and push the car to around 650hp," he smiles, and that will really take this already epic car to the next level. We're sure that some people might not like the direction this E30 M3 has taken, but we reckon that with all these mods and especially that supercharged S54 on board it perfectly embodies the glorious excess of the '80s. We can't think of a more fitting way to celebrate and commemorate this motoring masterpiece ■

THANKS Allmotion Tuning & Performance, SFP Design UK and Restore44



Matt carbon Sport Evo spoiler



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BLUE BLOOD BROTHERS

We sample these two iconic BMW M cars, back-to-back, but separated by 40 years of engineering know-how

Words SHANE O' DONOGHUE / Photos GUDRUN MUSCHALLA



What an experience awaits us as we stroll towards this fascinating pair of Munich's finest. One is a low-mileage and highly original example of the BMW M1, the first official M-badged production car, while the other is a 2018 M3 CS. The latter was the swansong for the F80-generation M3 saloon, and we're eager to compare and contrast both cars.

The M1 was first unveiled at the 1978 Paris Motor Show, so there are 40 years of BMW M division development expertise separating these two desirable machines. Things have come a long way, haven't they?

The M1 borrowed for this feature – from BMW Classic in Munich – is actually one of the earliest cars made; the ninth ever built in fact. Its early history is a little hazy, and though

the records indicate that it never left BMW's ownership, it wasn't actually registered until 1991, by which time it was 13 years old. At that point, its glass-fibre reinforced plastic bodywork underwent some restoration, but it's otherwise untouched.

Since then, it's been used regularly on classic car events and photoshoots such as this, but it's hardly wrapped up in cotton wool and trucked everywhere. The odometer shows over 27,000 kilometres (nearly 17,000 miles), and during our two days with the car, we covered well over 150 miles at the wheel – not all of it at low speeds.

Officially, BMW Motorsport GmbH came into existence in 1972, kicking off with a mere 35 employees, led by Jochen Neerpasch – an ex-Porsche works driver and Ford's Racing Manager in Cologne, before he moved to Munich.

It initially focused solely on developing and building race cars, then took over BMW Driver Training, before, in 1974, its staff started to work on the occasional road car for enthusiastic customers.

Until this point, all the racers were based on existing BMW models in production, but then the decision was taken to create a bespoke vehicle designed to compete in Group 4. To satisfy the FIA's homologation rules, a minimum of 400 road cars would have to be produced, and so the BMW M1 was born.

Not without a few hiccups, we might add, notably on the production side. Lamborghini was initially contracted to supply the body and spaceframe chassis but ran into financial difficulties, which caused a delay in the project. So BMW switched the chassis production to



There are 40 years of BMW M division development expertise separating the M1 and the F80 M3 CS

Marchesi, and the bodywork to T.I.R. (both in Modena, Italy), before sending them to Giorgio Giugiaro's company, ItalDesign, for assembly of the interior.

After this, the cars were shipped to Baur in Stuttgart to be joined with the BMW-produced mechanical components. It's a wonder that the M1 was as highly regarded as it was, given such a convoluted chain of production.

Nonetheless, and aside from the M1's use on track, BMW M had clearly hit upon a winning formula for the road. Demand for the M1 outstripped supply, and this encouraged the division to look a lot more seriously at ramping up its road car operations. Today, from those small beginnings, BMW M, employing about 800 people, is a very different beast, as are the cars it makes. That's immediately obvious when you

park the current M3 CS next to the M1.

For a start, the new car appears to tower over the old one; in fact, it's more than 300mm longer, 50mm wider, and nearly 300mm taller. In fairness, at 1140mm high, the M1 is a very low car by any measure. And you feel it when you ease yourself into the cabin. Even those under six feet tall will find the windscreen header rail uncomfortably close to their head, and you feel like you're sitting on the ground. In contrast, the door opening in the M3 is generous, and anyone can easily step into it and have stretching room in most directions.

Next, you'll notice how drastically offset the pedals are in the M1, making room for large wheel wells. And there's nowhere to put your left foot when it's not in use on the clutch pedal. The black leather of the M1's seats is well-preserved,

but the bolstering was never as figure-hugging as those in the M3, which could be taken as a clear sign of the differences in cornering speeds and forces between these two cars.

The M1's steering wheel is sublime, though, even if the leather on the rim is well-used. It's small in diameter, simple in design, free of clutter and has a delicately cross-sectioned rim; something that we've reckoned that BMW M has needed to remedy in its cars for some time. The M3's wheel is beautifully made (and has a wonderful Alcantara wrapping in the CS), but the rim is far too thick. What's more, the overall diameter of the wheel is large, no doubt to allow a decent view of the instruments beyond.

As clear, precise and stylish as the CS's grey clocks are, there's real charm to the M1's simple dashboard layout (even if it does cause a →

nasty reflection in the windscreen in bright sunshine). The Jaeger analogue instruments are compact, and there's little distraction. Saying that, we couldn't make head nor tail of the German air conditioning controls, and soon discovered that – in the height of a hot summer – and even with correct operation, this particular car only has air conditioning in theory. The flimsy air vents in the doors don't seem to do anything at all to help keep the occupants cool!

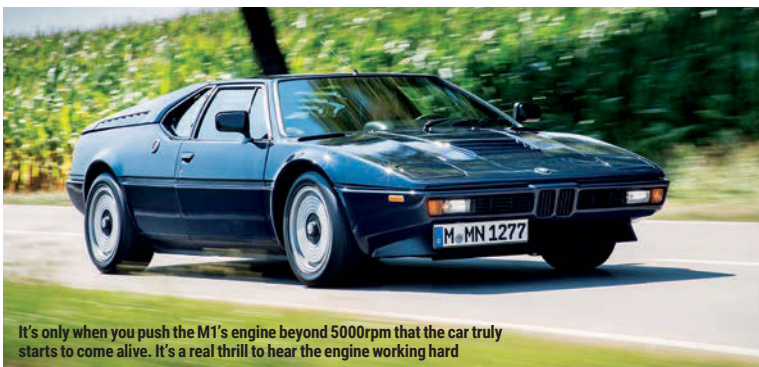
Elsewhere, the switchgear dates the M1's cabin with its chunkiness, but there's a solidity to the interior that's a little surprising. Exposed screw heads give it a vaguely motorsport feel today, and, for some reason, the cover in front of the storage box between the seats is made of heavy, indestructible-feeling metal. Odd in a car that was designed to be a lightweight racer. The cabin of the M3 is more luxurious, obviously, even in CS guise, with its minimised centre console.



Despite its age, this BMW Classic-owned M1 has only covered about 17,000 miles. The side bolsters on the seats are decidedly lacking by today's performance car standards



Despite its greater weight and overall size, the F80 M3 CS is faster and quicker than the M1. Both cars use straight-six engines, but the M3's produces 174hp more



It's only when you push the M1's engine beyond 5000rpm that the car truly starts to come alive. It's a real thrill to hear the engine working hard



The F80 M3 CS's dynamics come at a price; while the M1 flows over and works with the road, the M3 is rigid and less compliant

The switchgear certainly dates the M1's cabin with its chunkiness, but there's a solidity to the interior that's a little surprising



The M1's mid-engined layout leaves space at the back for a small boot area, much of which is occupied by the spare wheel



“WE’RE ENCOURAGED TO EXPLORE THE UPPER REACHES OF THE REV COUNTER, DESPITE THE THEORETICAL £650,000 VALUE OF THIS CAR”

While the CS's exterior is bristling with aggression and presence, it's nevertheless based on the silhouette of a mass-market, four-door saloon – the 3 Series – so it can't hold a candle to the iconic design of the M1. Penned by Giorgetto Giugiaro, the M1's shape owes much to the 1972 BMW Turbo concept car, but the production model shuns much of that show car's extravagance for a simple delicacy of line and little in the way of unnecessary add-ons.

The M1's pop-up headlights and small kidney grille are complemented by the impossibly raked windscreen, while the rear features those unmistakable louvres and distinctive double BMW badges. Where the M3's lightweight alloys measure 20" at the back and 19 at the front and have more space than metal in their design to aid brake cooling, the M1's flat, 16" Campagnola rims barely have any venting, and are shod with modest, 205/55 Dunlop Sport Maxx tyres. The M3

CS, meanwhile, rides on track-focused Michelin Pilot Sport Cup 2 tyres, measuring 265/35 up front and 285/30 at the back, so there's a lot of extra sidewall on the M1!

Walking around both cars to drink in the details, it's difficult not to be impressed by the sculpted bonnet and carbon fibre boot spoiler on the M3 CS. They look good and are beautifully made. However, the M1 holds your attention for longer, even if its build quality isn't a patch on the new car's. We discovered that you can pop open the little glass windows aft of the door glass; they're hinged at the leading edge, so can open wide.

This isn't for cabin ventilation, though, as the opening is 'outside' of the rear window, accessing the top of the engine cover. Even our BMW Classic hosts were scratching their heads over the reason for this, as they don't offer noticeably easier access to any aspect of that engine, either.

Both these M cars feature straight-six petrol engines, but the M1's M88/1, naturally aspirated unit shares little else with the modern-day, twin-turbocharged S55 powerplant in the M3 CS. A little obscure detail we uncovered, however, is that the S55's bore of 84mm is the same as the M88/1's stroke. The M88/1 is termed an 'oversquare' engine, where its bore (93.4mm) is longer than its stroke. This makes for a lower engine to help with the centre of gravity and is also better suited to high-revving, naturally-aspirated applications, such as the M1.

However, you don't need to rev the M1's engine to keep up with free-flowing traffic. →

1978 E26 M1

VALUE TODAY £650,000

ENGINE Straight-six M88/1

DISPLACEMENT 3453cc

POWER 286hp at 6500rpm

TORQUE 243lb ft at 5000rpm

TOP SPEED 162mph

0-62 MPH 5.6 seconds

UNLADEN WEIGHT 1300kg

GEARBOX Five-speed manual

2018 F80 M3 CS

VALUE TODAY £86,425

ENGINE Twin-turbo straight-six S55B30

DISPLACEMENT 2979cc

POWER 460hp at 6250rpm

TORQUE 442lb ft at 4000-5380rpm

TOP SPEED 174mph

0-62 MPH 3.9 seconds

UNLADEN WEIGHT 1585kg

GEARBOX Seven-speed dual-clutch automatic



Even drivers less than six feet tall will find the windscreen header rail uncomfortably close to their head in the M1, and you also feel like you're sitting on the ground

It's quite tractable at low speeds and, despite the heavy clutch and slightly recalcitrant manual, five-speed gearbox (aside from getting used to the 'dogleg' position of first gear), it's not at all difficult to drive. Given its original 'supercar' billing, it feels remarkably docile and normal, actually. The compact footprint helps enormously, and thin windscreen pillars help with visibility, too, which isn't as poor as the flat shape might have you believe. Naturally, if you leave the M3 in its default Comfort mode, it's even more civilised, and its dual-clutch automatic transmission takes the strain in stop-start traffic as well.

Speaking of which, when the heat of the day increased, the M1 became very difficult

“WHERE THE M1 FLOWS OVER AND WORKS WITH THE ROAD, THE M3 IS RIGID AND LESS COMPROMISING”



The M1 is truly unmistakable; the distinctive louvres and twin rear badges are unique features

to manoeuvre at low speeds, as the engine had difficulty idling. BMW confirmed that this particular car is known to be running rich, but fixing it isn't just the work of an hour in the workshop. Indeed, the set-up and maintenance of the Kugelfischer mechanical fuel injection is one of the M1's only weak points.

Out on the open road, however, there are no problems with the car's performance, and we're encouraged to explore the upper reaches of the rev counter, despite the theoretical £650,000 value of this car. Indeed, only when you hold the throttle pedal down past 5000rpm, does the M88/1 engine truly come alive.

Accompanied by the distinctively BMW straight-six howl, it suddenly begins to live up to its performance car billing, and it's a real thrill to hear this engine working hard. At 1300kg, the M1 isn't a complete featherweight, but 286hp and 243lb ft of torque make light work of that, and the car is pleasingly fast on the move – albeit more quick, modern hot hatch than a ballistic rocket ship.

The latter words could undeniably be applied to the M3 CS. Its peak power figure of 460hp is

sensational enough, but it's the 442lb ft of torque that defines this car's performance, especially as it's available across a wide band of revs. It means that it takes no effort at all to drive the M3 CS quickly (indeed, we hit an indicated 160mph on the autobahn on the way back to the airport with ease). The modern electronics and injection system mean that throttle response in the turbocharged CS is sharper than that of the old car, too, so it feels more immediate at all times.

The downside is that the M3's dynamics come with a price, and it's a hard-edged ride. Where the M1 flows over and works with the road, the M3 is rigid and less compromising. Sure, it's a far superior car when it comes to tackling corners, but the M1 isn't too shabby, either.

Getting the two cars together was a wonderful illustration of how far BMW M has come in the 40 years that separate these two. From the M1 which, as a road car, was built to justify the existence of a bespoke racer, to the M3 CS. It's still a road car, but one that aims to give its owner the feel and performance of a racer. Both are fascinating machines in different ways, and both are truly exceptional M cars ■



Chalk and cheese, but these two products of BMW's famous M division both have high performance in their DNA

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Being responsible for 150 F1 and F2 race wins and having designed the M88 straight-six, the S14 four-cylinder and the stunning V12 in the McLaren F1, Paul Rosche will always be remembered as BMW's engine guru



A QUIET GENIUS

We look back at the life of Paul Rosche, BMW's legendary engine guru

Words **BOB HARPER** / Photos **BMW**

“Congratulations on the magnificent success in Montreal. I am so pleased for you, that your persistence and your engineering genius have finally triumphed.” This was the text of a telegram waiting for Paul Rosche when he returned to Munich on 14 June 1982, the day after the turbocharged BMW F1 engine had triumphed for the first time at the

Canadian Grand Prix in Montreal. Its author? None other than the great Enzo Ferrari. And, to a certain extent, this sums up Paul Rosche – not only was he an amazing engineer but he was also respected throughout the entire engineering community in both racing and production environments.

But we're getting ahead of ourselves a little. For those who don't know, Paul Rosche

was BMW's engine guru for 45 years and was responsible for a vast number of the iconic engines the company produced from the 1960s through to the dawn of the 21st century. Born on 1 April 1934 in BMW's home town of Munich, Rosche was educated locally, then enrolled at Munich Polytechnic to get himself an engineering degree. Newly qualified in 1957, he headed straight for BMW, where he was immediately allocated to the engine design department, then run by the legendary and influential Alex von Falkenhausen.

Things were a little quiet in the engine department at that time. The ageing V8, as fitted to BMW's flagship models, was coming to the end of its life. The units used for its bread and butter machinery – such as the Isetta and diminutive 700 – were motorbike engines that simply needed to be churned out as quickly, and as cheaply, as possible.

Despite this, von Falkenhausen immediately recognised Rosche as being a talented engineer and set him to design a camshaft. Rosche admits that at the time, he didn't have the faintest idea what a camshaft should look like, but he threw himself into the project and would later become so adept at camshaft design that he earned the



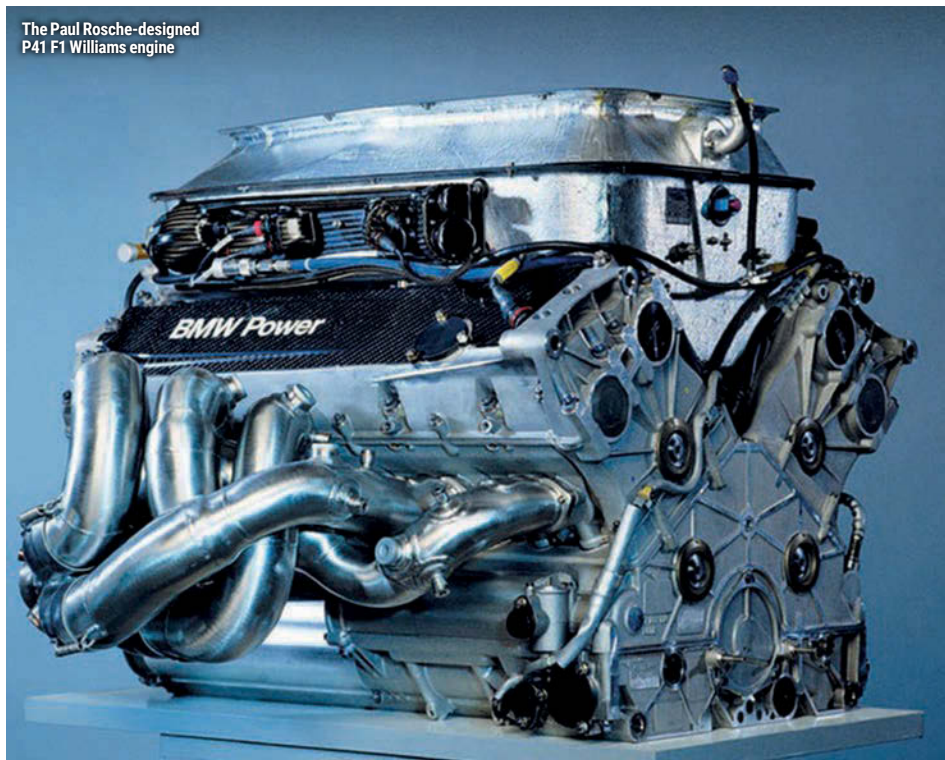
nickname 'Nocken- Paul' (Camshaft Paul).

Once BMW had been rescued from the brink of financial collapse and von Falkenhausen's four-cylinder engine had been put into production, it was time to get serious and extract more power from that unit. Rosche was involved in creating the 130hp TISA motor for the competition Neue Klasse, then turned his attention to BMW's F2 engine programme.

The first competition engine ran in a Lola chassis in 1967. Based on the latest 1600cc production engine, its bottom end was by Rosche, while its innovative top end had been drawn up by Ludwig Apfelbeck just before he retired from BMW. Formula 2 rules of the time insisted on a production block but allowed infinite flexibility in the design of the cylinder head. So Apfelbeck had improved the engine's breathing by giving each cylinder four valves, and this also entailed the addition of twin overhead camshafts.

However, the 1967 season wasn't good for the BMW Formula 2 engine, as the valvetrain design caused problems at high revs. But, convinced that it could be made to work properly Rosche was given permission to redesign the top end. By September 1968 – too late for BMW to make →

The Paul Rosche-designed P41 F1 Williams engine



much impact on Formula 2 that year – he'd come up with an engine that delivered a reliable 235hp at 10,200rpm. From that point on, the competition four-valve engine became Rosche's baby.

Despite this, the BMW board decided to pull the plug on the F2 project for cost reasons, but with von Falkenhausen's blessing, Rosche hired a lock-up close to BMW's HQ and continued to work on the project in secret. Once BMW engines started winning races, the board changed its mind, and the F2 engine project could be brought back in-house. Good job it did, as BMW engines won six F2 championships in the 1970s!

At the same time, Rosche and his team had experimented with turbocharging, and this resulted in a turbocharged 2002 winning the 1969 European Touring Car Championship. It also led to the development of the 2002 Turbo road car. The production model may not have lasted long, but Rosche and his team could see plenty of advantages to turbocharging for race engines when the regulations were in favour of a turbocharged motor over a naturally aspirated unit. By the end of the 1970s, the 1.4-litre turbocharged engine in the E21 race car was making 570hp, and Rosche wanted to push for an F1 campaign with a forced-induction motor.

History relates that Rosche's turbocharged F1 unit went on to win the Formula 1 world championship in 1983, the season after its debut win in Canada, but the engine hadn't had an easy gestation period. It's also interesting to note that turbocharged engines weren't really Rosche's thing, and he much preferred working

on naturally-aspirated power units. Despite this, he relished the challenge of making the BMW F1 engine work properly, and, as with the F2 campaign, Rosche actually had to work on the project in his spare time in the early days of its development.

BMW's first foray into the F1 world almost didn't come about at all, as the BMW board more or less pulled the plug on the project in 1979/1980. This was a time when the M1's costs had been spiralling out of control, and BMW Motorsport's influential leader, Jochen Neerpasch, had jumped ship at the prospect of BMW abandoning its F1 aspirations. However, Rosche and BMW's motor racing director, Dieter Sappert, managed to convince the board to continue the project.

It's a tribute to Rosche's tenacity that his team managed to get the BMW F1 motor to its winning ways. Rosche related that there were many failures along the way and tells a story of development work in 1981. "During tests in France, Brabham owner Bernie Ecclestone was forced to watch how we destroyed nine engines. At this time, I was deeply ashamed, but, nevertheless, I was never in doubt that we would achieve our goal."

Eventually, Rosche did reach his target, partly thanks to BASF rustling up some special fuel for

the engine, which prevented the pinking that it had been suffering from. He related afterwards: "After BASF had developed special petrol for us, we started to get scared of our engine; on the dyno, it was pushing out 1380hp... and it wasn't even peaking." Years later, Rosche was credited with answering a question about the power output of the F1 engine by explaining: "It must have been around 1400hp; we don't know for sure because the dyno didn't go beyond 1280hp." The two quotes don't quite align, but, either way, it was an incredibly potent power unit!

Given that Rosche had his roots firmly based in the 1950s, one might have thought that he would have found the growth of electronics in vehicles to have been a bit of a stumbling block, but nothing could have been further from the truth. While BASF's fuel was crucial to the F1 project, it was also Rosche's willingness to work with Bosch to develop a digitally-controlled engine management system for the engine that sealed its success. In a further refined form, this entered production as the Bosch Motronic system for road cars.

While many might see Rosche's turbocharged M12 engine as his crowning glory, this would be selling his achievements very short indeed. He was instrumental in the design of legendary BMW six-cylinder units, both the M30 'big-six'

"PAUL ROSCHE WAS BMW'S ENGINE GURU FOR 45 YEARS, AND WAS RESPONSIBLE FOR A VAST NUMBER OF THE ICONIC ENGINES"



and the M20 'small-block' six-pot. As you'd expect from a man who had high-octane fuel flowing through his veins, he was instrumental in tuning the M30 for its motorsport applications. Thus he developed the four-valve head for the 3.5-litre racing CSLs, then went on to refine the unit to be suitable for its first road car application, the M1.

While the M1 project had been Jochen Neerpasch's baby, he'd left BMW Motorsport in disgust at the board's initial refusal to back an F1 programme. So, as the most senior man left at Motorsport, it fell to Paul Rosche to see the project through to fruition. The M1's production problems led Rosche to be less than enamoured with the car. He had no experience of getting a road car into production, but it was typical of his considered approach to problems, that he saw the finished product through and that it was so well received.

"I lost many a night's sleep because of this project, and because of the responsibility I had been given for its success," said Rosche. "This had clearly been defined for me by Eberhard von Kuenheim [BMW's MD at the time]; 'Mr Rosche, you are personally responsible for the M1, so make it work.' As I stood there in front of him, I thought, 'This is pay-back time for all the trouble I caused him with the F1 engine.'"

The M1's chassis and body were made in Italy, then shipped to Baur, who fitted the engine and transmission, and, in theory, the cars were then sent to BMW Motorsport for final checks. However, as Rosche recalled, this wasn't actually the case. "The M1s were nowhere near →



Paul Rosche (right) and Alex von Falkenhausen, who was running the engine design department when Rosche first joined BMW



Hans Stuck driving a March F2 car powered by a BMW engine



Paul Rosche and Nelson Piquet in 1984

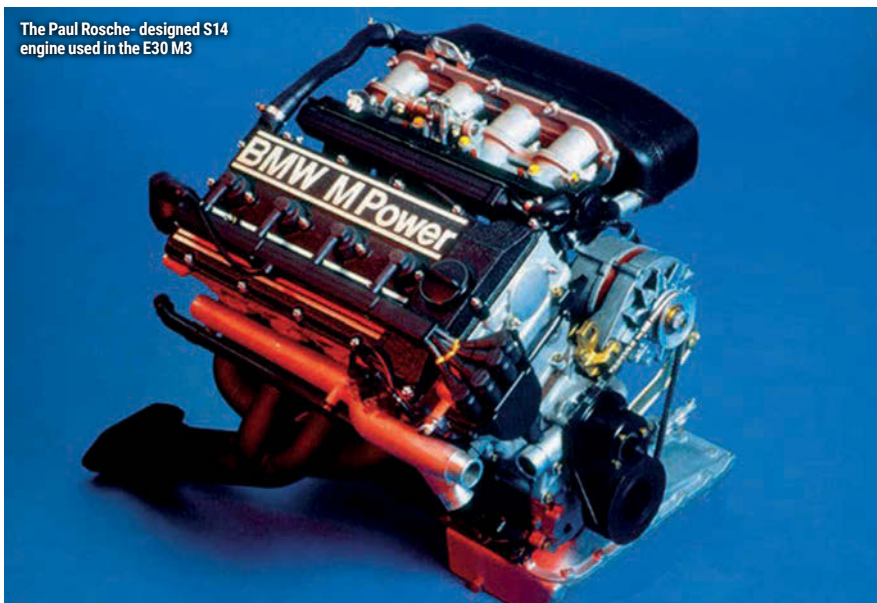
ready as we were so far off the BMW quality standard. We took the cars completely to pieces in our workshops, and I must emphasise the word 'completely'. Afterwards, they were rebuilt to the guaranteed standard of a BMW."

Rosche's engine for the M1 – the mighty M88 – was used not only in the M1 but in the E28 and E34 M5s. However, by the time it found its way into the latter, its nomenclature had changed to S38. The engine also had a part to play in another of Rosche's defining moments, the S14 engine for the E30 M3. Rosche used to tell of how von Kuenheim popped into BMW Motorsport's HQ and said: "Mr Rosche, we need a new sports engine for the 3 Series."

"We immediately got down to work," recalled Rosche. "We reminded ourselves that the six-cylinder engine was developed originally from a four-cylinder, so we removed two of the cylinder pots from the M88 engine and bolted a plate over the hole in the engine casing. Believe it or not, within two weeks, we had a quality, four-cylinder engine for the 3 Series. The following Sunday, I drove to von Kuenheim's apartment and gave him the car for a test drive. When he came back, he said, 'I like it.' And that's how the M3's S14 engine came about."

In the late 1980s and early 1990s, Rosche developed the S50 engine for the E36 M3 and also worked on the stillborn M8 project, for which he created a 500hp V12. This came in useful when Gordon Murray came knocking for an engine for his McLaren F1 road car project. The engine for that car needed to be a certain size and weight and produce over 550hp. Rosche dusted off the S70, tweaked it here and there and *voilà*, the world's finest-ever road car engine emerged. The 6064cc V12 developed 627hp and 480lb ft of torque – it may have been 16kg heavier than Murray envisaged, but this was more than made up for the fact that it was 14% more powerful than he demanded! The engine went on to win Le Mans in the McLaren F1, and also in BMW's

The Paul Rosche- designed S14 engine used in the E30 M3



own V12 LMR.

By now, Rosche had been at BMW for nearly 40 years, but far from being an engineering dinosaur, he was seen as the ideal man to develop a new Formula 1 powerplant for the company when it decided to re-enter the fray with the Williams Team for the 2000 season. He'd obviously been hoping for the call, as he'd been working on several potential F1 engines during the 1990s and, for the 3.0-litre V10 for the Williams, he brought together a team of 200 engineers to make it happen.

The engine helped Ralf Schumacher finish third in the car's debut race in 2000. Ultimately, though, BMW's return to F1 wasn't glorious... but the pundits always reckoned it was one of

the most powerful engines on the grid – it was a Paul Rosche design, after all.

The great man finally retired in 1999 but continued to be involved with BMW in a consultancy capacity, and, no doubt, plenty of his ideas would have found their way into the engines of the '00s. He was even called back by BMW to assist in the rebuilding of Piquet's championship-winning BT52 that ran at Goodwood in 2013.

Paul Rosche died in 2016, and perhaps it's fitting to leave the final words in this story to Eberhard von Kuenheim who, in a letter to him in 2000, wrote: 'You should be personally proud, as the credit for all BMW's achievements in racing over many years is essentially yours.' ■

"GORDON MURRAY CAME KNOCKING FOR AN ENGINE FOR HIS MCLAREN F1 ROAD CAR PROJECT"

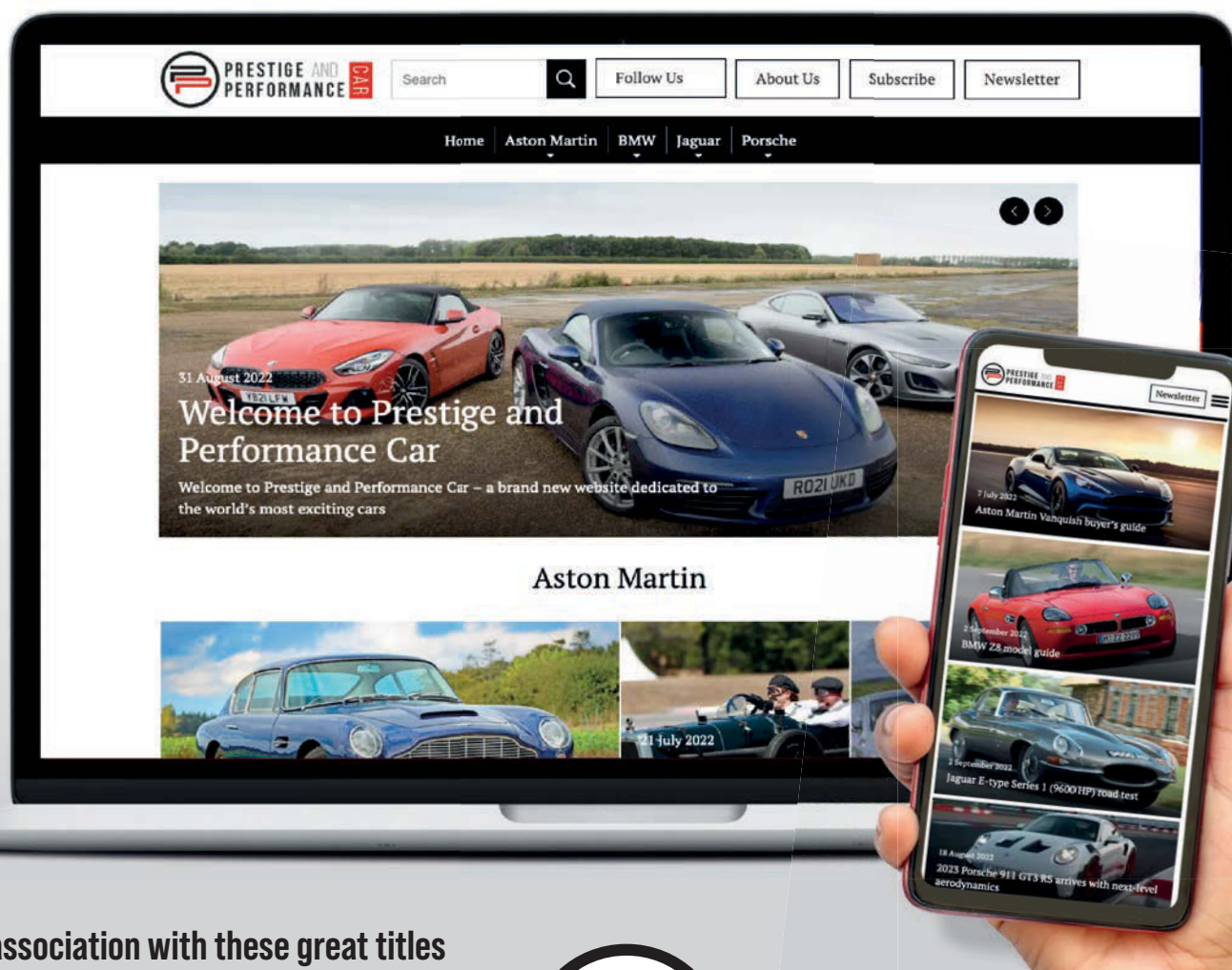
McLaren's BMW V12-powered Le Mans winner; the engine used in this car was another of Rosche's mechanical masterpieces.



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Just when you think you've seen it all, someone builds a wide-body, single-turbo S55-swapped 2002 that obliterates your senses and makes you realise otherwise

Words ELIZABETH DE LATOUR / Photos VIKTOR BENYI



When it comes to next-level builds on a scale that you can't really wrap your head around, the SEMA event takes the cake. Every single car on show there is absolutely incredible, it's a non-stop assault on the senses, and when SEMA rolls around we always brace ourselves because we know we are going to see some of the best

BMWs anywhere in the world, and we know they are going to blow us away. To stand out from a crowd of that calibre, then, really takes some doing, and even on the scale of SEMA projects, George Dalmakis' (@m3ane30) truly astonishing 2002 left us absolutely breathless with its levels of sheer insanity, ambition and attention to detail. This is a car that is the very definition of a custom build and it's really unlike anything you've ever seen before. Strap yourselves in, this

is going to be one hell of a ride...

George and his 2002 arrived at SEMA from Toronto, Canada, where he works as a Master Technician for Parkview BMW, so it's safe to say that not only is he a big BMW fan, but he also knows his way around one and then some. "I've been interested in BMWs since I started working on cars. I realised very early on that the engineering and design that went into them was the best, bar none, so that's what I decided to specialise in," he smiles as we chat, and begin to learn about what makes the man behind this machine tick. "My first BMW was a →



2006 E90 325xi with a blown engine – the price was right,” he laughs, and this was followed by several Bavarian machines over the years. His current fleet is comprised of an S54-swapped E30, an E53 X5, an E60 535xi and the 2002 you’re looking at here.

The 2002 is iconic, a beloved BM classic and a machine most of us would love to own, so it’s no surprise that George found the draw of one irresistible. “I was always a fan of the 2002 model, and felt that the whole idea with the powertrain would suit the car and keeping every component BMW would make it stand out,” he says and he’s not wrong. The powertrain in question? Just an S55, no big deal... “I found the car through a friend who had seen it outside an old body repair shop, it had been outside and hadn’t been driven for years. The condition was extremely rough,” says George, which would have put a lot of people off. But a man of his talents was undeterred and, in fact, it

was perfect for a build that would leave almost nothing of the original car behind. George made the 2002 his and set about creating his show-stopping machine.

Looking at the photos on these pages, you can instantly see just what an insane amount of work has gone into this build, but, before George could get started on bringing his vision to life, he first had to bring the car up to standard. With the 2002’s body being in terrible condition from sitting outside for all those years, there was no way he could do any work on it as it was. The first step was the complete disassembly of the car and disposal of any parts that were unusable or that were simply not needed. With the shell prepped, it was then mounted to a rotisserie and media blasted, and now the real work could begin. First of all, the complete underside of the car was cut, including the floor, firewall and boot, and then the chassis work started. “The new tube chassis of the car was built by Chassis



Dakota Digital cluster



Wilwood pedals



“THE NEW TUBE CHASSIS OF THE CAR WAS BUILT BY CHASSIS STOP AROUND THE POWERPLANT, AND, AS WELL AS FITTING E9X SUBFRAMES, THE TRACK WAS WIDENED BY 4” IN THE FRONT AND REAR”

Stop around the powerplant, and, as well as fitting E9x subframes, the track was widened by 4” in the front and rear,” explains George. “The suspension components all come from the E9x M3, from the bushes, control arms and thrust rods to the sway bars as well as the LSD. The shocks and springs are from Air Lift as this car is fitted with air-ride; the management system is AccuAir ENDO-CVT as it is the quietest, has the cleanest look, and the ride height sensors make for a better ride and adjustability,” he says. Also worthy of note is the fact that a Z8 hydraulic steering rack has been fitted, and it’s powered by a rear-mounted electric power steering pump and reservoir.

With the subframes and custom tubular chassis in place, the 2002 was looking a little naked as its stock bodywork had no hope of being able to cover up those massively wide underpinnings. A custom metal wide-body was constructed along with the front lip, side skirts, side-exit exhaust and diffuser, and the whole lot was then mounted to the shell. The custom cooling, exhaust and turbo setup were then →



Custom-trimmed Recaro Sportster GT seats



M4 steering wheel and Motorsport golf ball gear knob

assembled and installed before the body panels were restored, painted and the finished car was fully assembled.

We often say that it's hard to know where to start when faced with builds of this scale, but in the case of this 2002 even more so, because the whole thing is simply a masterpiece, and everything about it is nothing short of breathtaking, but let's start with that dazzling exterior. The presence that this 2002 exudes thanks to those absolutely vast arches is absolutely incredible, and it almost doesn't look real, more like a computer render than a real car, and there's actually a good reason for that. "A lot of inspiration came from the well-known artist @the_kyza; his 2002 render was a big inspiration for the initial designs and planning," says George. A quick browse of @the_kyza's Insta account and the insane renders therein instantly makes it easy to understand why George was so inspired and why his 2002 looks so unreal. The work that's gone into the wide-body is insane, the quality is just mind-blowing, and the stunning San Marino paint pops like you wouldn't believe and sets the whole thing off

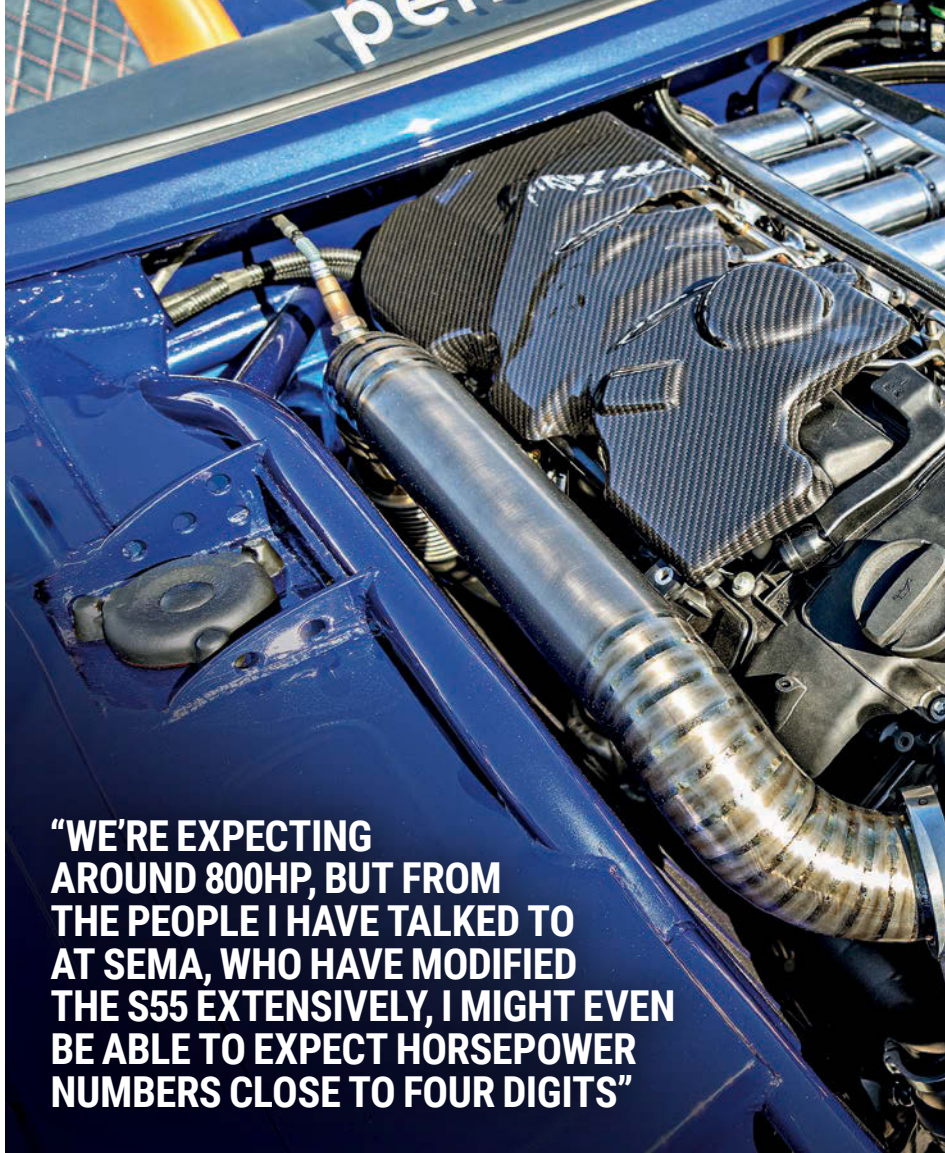
WIDE-BODY S55 2002

ENGINE AND TRANSMISSION 3.0-litre straight-six S55B30, ported head, keyed hub, custom aluminium alternator relocation bracket, port fuel injection, Custom Plenum Creations carbon fibre intake, BorgWarner 8374 turbo, 2x Tial 44mm wastegates, 50mm Tial BOV, custom Vibrant Performance titanium 3" exhaust with side-exit, MoTeC M142 ECU and 15 output Power Distribution Module, Radium custom fuel cell, twin fuel pumps, single lift pump, dual OEM high-pressure fuel pumps, flex-fuel capable with sensor. Six-speed manual gearbox from F82 M4, custom brackets, custom Cardanic propshaft, E92 M3 LSD

CHASSIS 10x17" (front) and 12x17" (rear) custom BBS E55 centrelock wheels with 235/40 (front) and 275/40 (rear) Toyo Proxes R888R tyres, Chassis Stop custom tubular chassis, E9x subframes, 4" wider track front and rear, E9x M3 bushes, control arms, thrust rods and anti-roll bars, Air Lift Performance air-ride, AccuAir ENDO-CVT management, hydraulic Z8 steering rack, rear-mounted electric power steering pump and reservoir, custom Forge Motorsport BBK with six-piston calipers and 356mm discs (front) and four-piston calipers and 330mm discs (rear), braided hoses

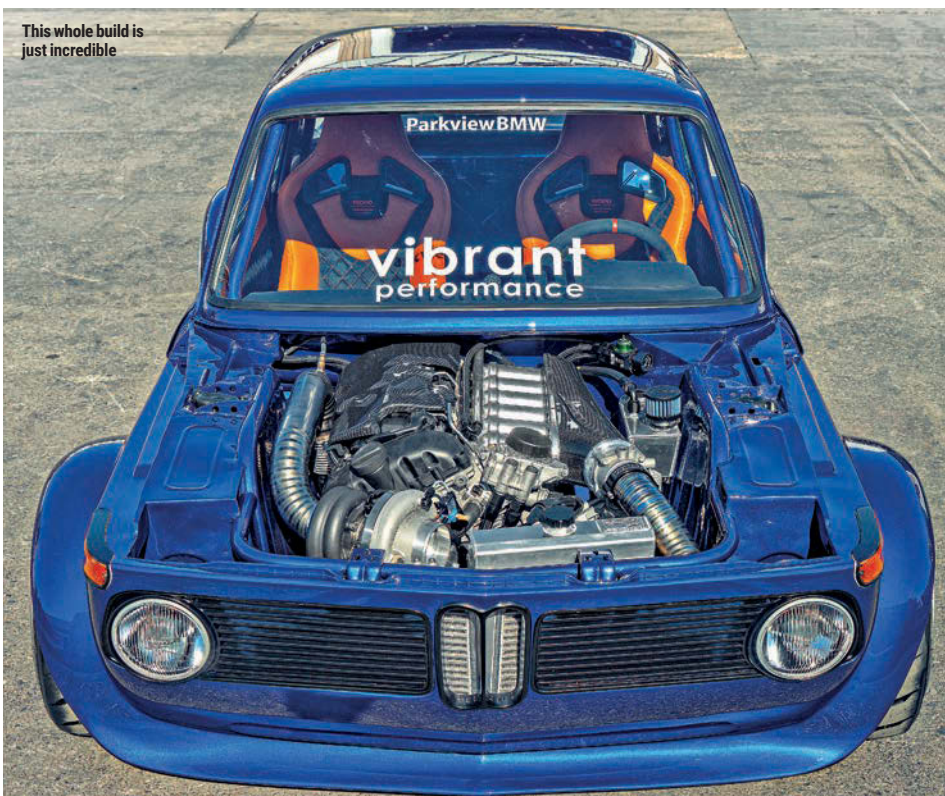
EXTERIOR Custom metal wide-body with integrated front lip, side skirts and rear diffuser built by Kyle and Warren Scaife (@MustangKyle), full respray in San Marino blue

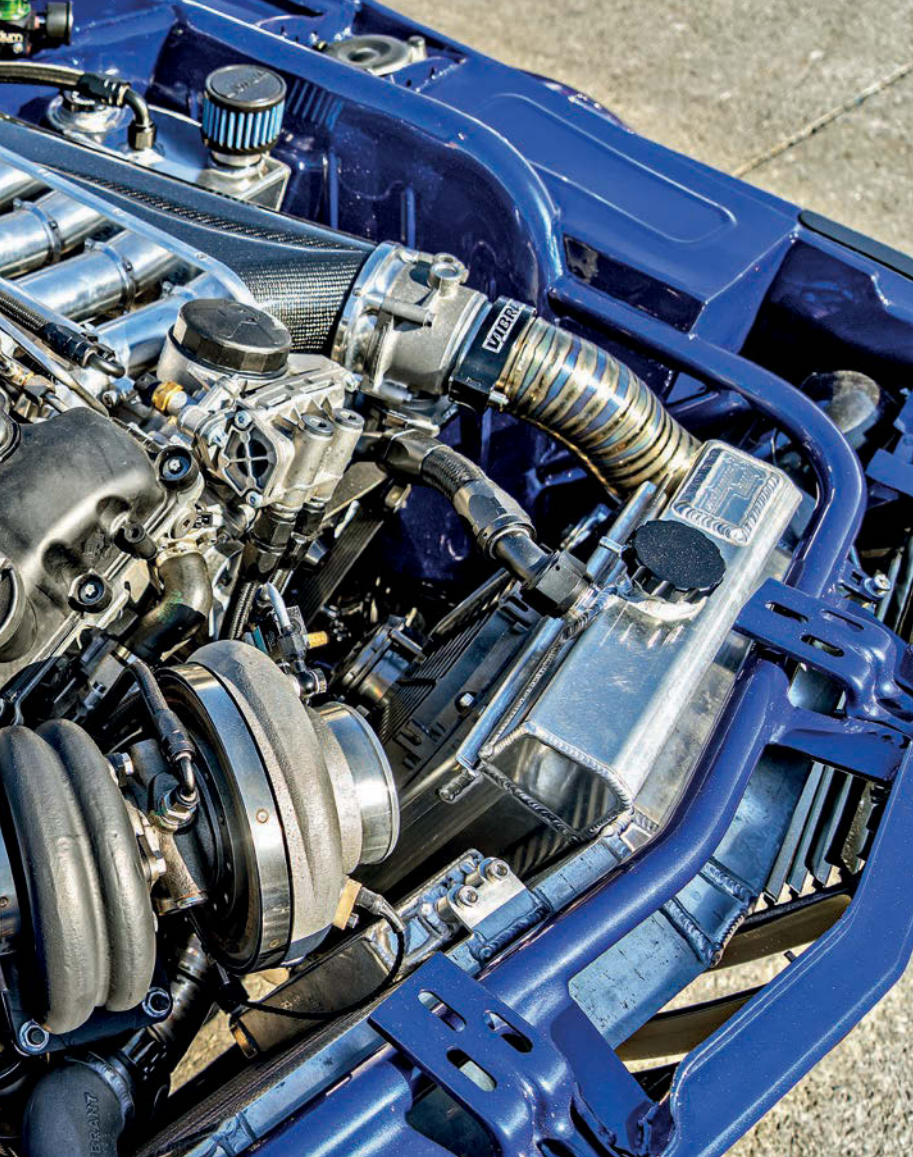
INTERIOR Full custom retrim in orange Nappa leather and black Alcantara including new interior panels, Recaro Sportster GT seats, custom-fitted Dakota Digital cluster, F82 M4 steering wheel, BMW Motorsport golf ball gear knob



"WE'RE EXPECTING AROUND 800HP, BUT FROM THE PEOPLE I HAVE TALKED TO AT SEMA, WHO HAVE MODIFIED THE S55 EXTENSIVELY, I MIGHT EVEN BE ABLE TO EXPECT HORSEPOWER NUMBERS CLOSE TO FOUR DIGITS"

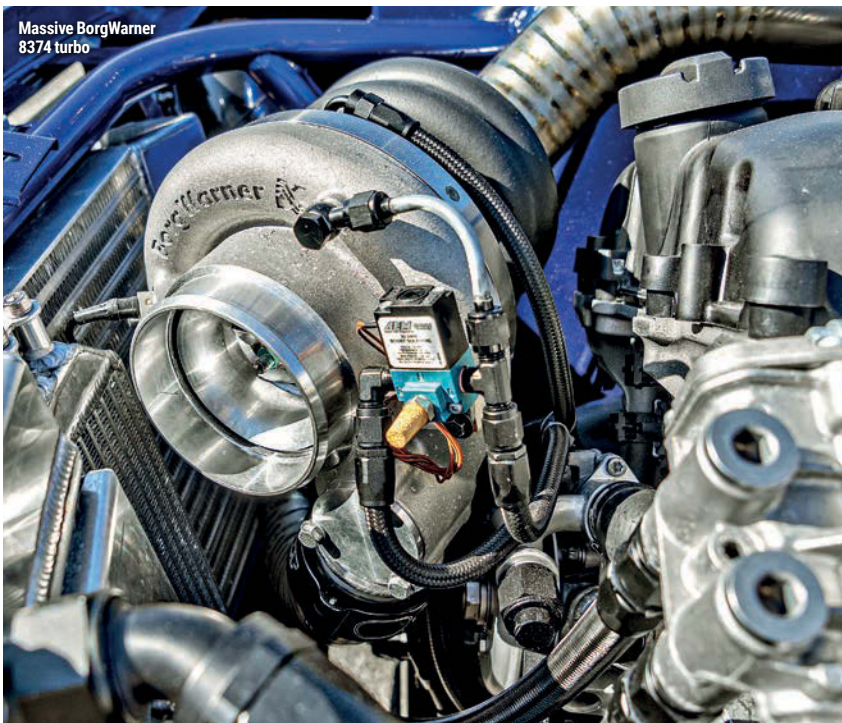
This whole build is just incredible





perfectly. Then there are all those details – the way that front lip flows from the arches and blends seamlessly into the front end, the shape of those side skirts, the simple aggression of the rear diffuser – it’s all art.

With those massive arches and air on board, George needed wheels that would wow wherever he went and he knew what he wanted for this build. “BBS has been a long-time manufacturer of race wheels for BMW, and the classic E55 centrelock wheel was the perfect blend of a modern look but with a timeless style,” he smiles, and we can only agree. “Through the major sponsor, JRP Online, I was able to convince the BBS Motorsport division to pull out their old moulds and sketches and make a brand new set of E55 wheels to my exact specifications. Initially, four BMW steel rims were used as test wheels with the tyres, they were widened in place of the BBS wheels so that the wide-body could be matched to the nearest mm,” says George, and the end result is sheer perfection. Persuading BBS to make a one-off set of wheels for this build? That’s the sort of thing that takes it to the next level. The resulting 17” E55s look incredible – you’ve got those mirror-polished stepped lips and gold centres, and they measure 10” up front and 12” wide at the rear and the fitment could not be more perfect. Also, not that you can see them through that incredibly tight mesh, but this 2002 is packing some serious stopping power in the shape of a Forge Motorsport BBK all-round. It boasts 356mm discs with six-pot calipers up front and 330mm discs with four-pot calipers at the back, and that’s not overkill when you understand what’s going on in the engine bay.



Massive BorgWarner 8374 turbo

We’ve already mentioned that this 2002 is running an S55, but you can very quickly see that this is no ordinary S55, and, even by the standards of modded S55s, this is something serious, as George happily explains. “Aside from building the custom engine mounts, firewall, transmission tunnel and floor to house the engine and transmission, the engine had a keyed hub installed and was fitted with a twin-scroll BorgWarner 8374 turbo,” and it’s a beast capable of producing some serious numbers. “The entire cooling system and exhaust system were custom-made with Vibrant Performance parts and the entire exhaust system is full titanium with a side exit,” says George with a grin. “The carbon fibre intake is a custom one-off piece built by Custom Plenum Creations in Australia. It was quite a process to ensure fitment, 3D files were exchanged, it was 3D-printed in Canada for test-fitting, and revised until the final product was built in Australia. A custom alternator relocation bracket was also designed locally and machined out of aluminium to shift the alternator down and allow room for the custom intake. Port fuel injection was also added to spray additional fuel under high boost,” →

which lets you know that George is gunning for some serious power with this engine.

The mods he has mentioned are just scratching the surface, however, and there's even more to this S55 than meets the eye, which is really saying something. The head has been ported, and there are twin Tial 44mm wastegates, and a 50mm Tial BOV. In the boot sits a Radium custom fuel cell with two pumps and one lift pump feeding the dual OEM high-pressure fuel pumps, and, in addition to that, there's a MoTeC PDM 15, which replaces all the traditional relays and fuses in the car's wiring, and everything is looked after by a MoTeC M142 ECU. So, just how much power does this full-on S55 make? "It's unknown at this time," says George; "we need to do some fine-tuning and adjustments to get some dyno pulls and see if it exceeds expectations. Jim Colley from Fast Attack Motorsports has developed custom firmware and will be fine-tuning the engine. We're expecting around 800hp, but from the people I have talked to at SEMA, who have modified the S55 extensively, I might even be able to expect horsepower numbers close to four digits," he grins, and that much power in something as small and light as a 2002 is going to be simply insane.

After all that there's just the interior to talk about and, as you will have gathered going by the rest of this build, it's as special as the rest of the car. "Through the main sponsor JRP and Recaro's involvement, I secured the Recaro Sportster GT seats, which were the number one choice due to size and design," George tells us. "They were re-upholstered along with the dash and all-new interior panels. A Dakota Digital cluster was fitted and paired with a modern M4 Alcantara steering wheel. The interior is a minimalist race-inspired design yet comfortable enough, and shows off the incredible metalwork that went into creating the new floor of the car," he says, and while it may be sparse, what's there has been beautifully executed. The seats and door cards are absolutely stunning, and that vibrant leather colour is the perfect contrast to the deep blue that's visible on all that exposed metal throughout the whole interior. The floor is an absolute work of art, we love the golf ball gear knob, the attention to detail is just stunning and it looks incredible. It somehow manages to stand out and grab your attention, despite everything that's going on outside, and that's no mean feat.

There is a lifetime's worth of work in this 2002 and yet the whole thing went from its original abandoned state to the car you see before you today in just 10 months, which makes the whole thing even more incredible. The most satisfying thing about this astonishing machine is that George built it exactly as he wanted it, and the whole thing is just breathtaking. "I don't have one specific modification that I would say is my favourite. I think the sum of all the parts and



This 2002 sits on Air Lift air ride



BBS E55 17s
hide a custom
Forge BBK



Radium custom fuel cell
with twin pumps and a
single lift pump

modifications speaks so much more than one specific thing," he says, and that sums up this build perfectly: the whole thing, all of it, is just amazing.

While to the casual observer, this car might appear to be finished, George is clearly a passionate perfectionist, and there are some bits and pieces still left to finish off. "Some more time still needs to be spent on the car to get it to a point where I am happy to call it completed. The interior needs some more work, the wiring needs to be completed," he says, and then there's the small matter of finding out just how much power this thing will make – it's going to be a lot. This 2002 is truly something special, an incredible achievement, and a simply epic build on every level. ■

THANKS @The_Kyza for initially inspiring the look with his aggressive car designs, @Blastforceinc for going out of his way to get the car media blasted, @Chassisstop for putting in a lot of hours and making a few design modifications to the full tube chassis they built and keeping everything functional and accessible, @MustangKyle for designing and building a custom wide-body for the car, @Schmuckbuiltllc for putting together the cooling and entire exhaust

system, @JRP_Online for being on board with the project very early on and securing multiple sponsorships, @Vibrant_Performance for their support and amazing high-quality performance parts, @ParkviewBMW for providing a space to assemble the car, @bbs.wheels for manufacturing a very custom E55 race wheel, @formotorsportusa for building an incredible custom big brake kit for the car, @recaro for their amazing Sportster GT seats, @accuar for their customer support and top-quality air management system, @AG.Designs.cnc for the extremely detailed centrelock adapters, @wyfromtoronto for help with getting the car to SEMA, Jim Colley, owner of @Fast_Attack_Motorsports, for developing custom firmware to run the S55 on the MoTeC ECU, @daemonblitz for helping me with the project from day one, @stay_woke_im_rossi_gix_god and @wing_k_lam for putting in sleepless nights to get the car assembled for the SEMA deadline, @alilamaa15 for running around and picking up parts so I could stay working on the car, @adcsta and @theodore404 for helping with transporting the vehicle around, @S65M3nas for designing & building the rotisserie and helping with all the custom machining/welding needed, @Mstamkos for stickers, Cardanic Driveline for the one-off driveshaft, @SEMAshow for being a gracious host



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LICENCE TO THRILL

Appearing in showrooms over 20 years ago, the E52 Z8 was a coveted modern classic the moment it was first revealed in concept form. We revisit the unique story behind this star of motorshow and silver screen...

Words **SIMON JACKSON** / Photos **HEXAGON CLASSICS**



The BMW Z8 was initially intended to be nothing more than a design study. Penned by chief designer Chris Bangle's team, and importantly Henrik Fisker too, as an out-of-hours project, it was first mooted as far back as the early 1990s. The concept – named the Z07 at the time – first saw the light of day at the 1997 Tokyo Auto Show. The car, shown in roadster and coupé forms, drew heavy inspiration from the BMW 507 produced between 1956 and 1959 – one of the most sought-after BMW roadsters of all time. Indeed it's popularly believed that the car's genesis came after one BMW board member drove a 507 and raised the question of why the marque did not produce a modern equivalent. The concept's retro-modern styling

cues received a rapturous reception from critics and public alike. BMW responded, and the Z8 would enter limited series production in 1999.

The first drive of the E52 Z8 went not to a seasoned automotive journalist but to actor Pierce Brosnan in his third outing as James Bond in 1999's *The World Is Not Enough*, which featured a Titanium silver pre-production car. Rumour has it that when Bond producers visited Munich, they clapped eyes on the Z8 in the BMW design studio, and the rest, as they say, is history. Of course, the Z8 wasn't complete, so fibreglass-bodied mock-ups were built for filming. One such example was cut in half during one of the film's more memorable scenes.

Intended as a collector market car from the outset, only 5703 examples would ever be produced in total (all left-hand drive), though that seems like plenty when compared with the number of 507 Roadsters built – just 252. Yet this modern take on the 507 of old was impressive, to say the least, and pretty faithful to its concept relation. Classic design cues were joined by the S62 4.9-litre naturally aspirated V8 from the E39 M5 (BMW's first M Power V8 and its most powerful engine at the time) – producing 400hp and 369lb ft of torque. With individual

electronically actuated throttle butterflies, crankshaft, pistons and con rods unique to it and with double variable valve timing (Vanos), the BMW M department's influence was clear. But it wasn't all quite so impressive – cast iron exhaust manifolds built by robots, not human hands also featured. All the same, it was impressively powerful, with torque aplenty and a soundtrack to die for. The 4941cc unit was coupled to a six-speed manual Getrag gearbox. All this translated to a 0-62mph time in the sub-five-second region.

The Z8 utilised the best technology and production methods available at the time; an aluminium monocoque and space-frame chassis design assisted rigidity and, therefore, handling prowess. In conjunction with the eight-cylinder engine, mounted aft of the front axle to achieve 50:50 weight distribution, the hand-built Z8 lapped the Nürburgring Nordschleife in 8 minutes 15 seconds – still impressive even today.

While the M5's limited slip differential was missing, the brakes came from the 750i and, for the first time on a BMW, came McPherson front struts and a multi-link suspension arrangement out back. Also breaking with BMW convention came rack and pinion steering, used for the →





**"IT WAS PLANNED TO BE A B-ROAD
HAND GUN NOT AN A-ROAD
AUTOMATIC WEAPON..."**



E52 Z8

ENGINE 4.9-litre V8 S62B50

POWER 400hp @ 6600rpm

TORQUE 369lb ft @ 3800rpm

0-62MPH 4.7 seconds

TOP SPEED 155mph (restricted)

ECONOMY 19mpg

PRICE WHEN NEW £86,650

first time on a V8 BMW in place of the traditional recirculating ball setup.

Make no mistake, though, the Z8 was no parts bin affair – the interior, in particular, was utterly unique. A curved dashboard angled towards the driver and a noteworthy wire-spoked steering wheel (commonly believed to have been the work of one dedicated designer), were joined by a centrally-mounted instrument cluster. This all gelled together in a successful fusion of retro influence without appearing passé – quite the

balancing act. However, it was arguably the aforementioned exterior styling which stole the show. That the twin grille up front and striking wing-mounted vents on each side were highly reminiscent of the 507 and its 1950s period siblings was no accident. Like the chassis and engine, the bodywork was crafted from aluminium in a bid to keep the overall weight to a minimum (it tipped the scales at 1585kg). The electronics were anything but 'retro'; in fact, much of it was cutting-edge. Traction control,



and stability control, together with front and side airbags kept occupants safe, GPS navigation, climate control and electrically-operated seats, steering wheel and convertible top added to the comfort and convenience features.

The Z8 appeared in showrooms in 2000, and it wasn't cheap (especially given that it wasn't available in right-hand drive). Priced at £86,650, it made many an eye water, though almost everything came as standard issue, so there were few optional extras to hike the price

further still. And BMW's promise of making parts available for 50 years after launch gave owners some peace of mind. Despite its cost, early demand for the Z8 was high, promoting a war among collectors, many of whom ended up paying a premium over list to obtain an example. You might assume that this clamour for cars was encouraged by positive reviews, but the initial reaction from the automotive press was somewhat middling. Those in the know criticised the Z8's driving experience,

all the more frustrating given that all the right ingredients were present and correct – they were just perhaps not utilised to best effect. The presence of understeer, lack of an LSD to smoothly control slip, and a slightly long-throw gearshift were the three biggest factors for which the Z8 received denunciation. But then perhaps that is to miss the point of the Z8? Never was this car intended as an out-and-out sports car; rather, like the 507 from which it took so much inspiration, it was planned to →



be a B-road handgun, not an A-road automatic weapon. Roof down, V8 burbling away, this is an old-fashioned occasion – something special to drive – not a formidable, precision, contemporary driving tool.

Whatever your view on the driving experience here, the Z8 has fulfilled its original mission objective, quickly becoming a collectable BMW that reminds you of a golden age of motoring when this kind of power was not commonplace and technology not quite so nanny-ing. Was it ahead of its time? Quite possibly... Z8 production ended in 2003, and today, starting prices have reached in the region of £160,000, meaning that the Z8 remains a somewhat indulgent collector's car – exactly as BMW intended.

When this feature was originally published, the 2001 Z8 Roadster you see in the photos was being offered by Hexagon Classics in north

London. It was finished in "James Bond" Titanium silver with black and red Nappa leather. Coming to the UK, having been first supplied in Europe, it had covered just 10,500 miles from new. Factory-fitted options included a hardtop with stand and cover, plus the additional fitment of Alpina suspension.

This car was a European-supplied example, complete with its spare keys, leather handbook wallet, BMW Audiophile Demonstration Disc and portable telephone. Interestingly, it received an Alpina suspension upgrade (and a new CD changer unit) at BMW Niederlassung Dortmund in June 2018 at 8465 miles, at a cost of €6000. The original BMW suspension was supplied with the Z8, and this exceptional example was priced at £209,995.

Unsurprisingly, this particular car has since sold, but Hexagon currently has another Z8 up for sale, a 2001 UK example. This car has

covered 23,400 miles, is finished in black with cream leather and is advertised for £199,995.

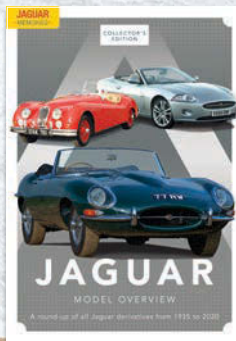
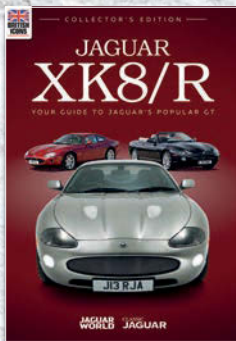
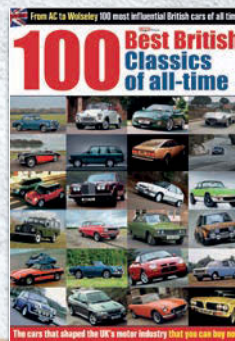
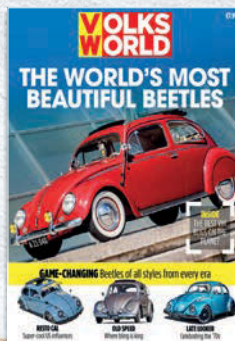
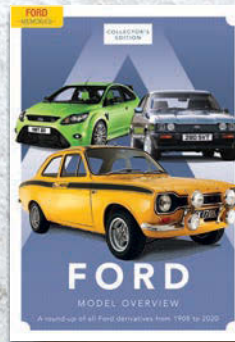
Today the Z8 creation is quite rightly highly regarded and perhaps even more desirable than it was at launch in 1999. As the E52 gets older it's difficult not to see it further appreciating in value and attracting the attention of ardent collectors. A coveted BMW from birth, this is a unique model that could be argued to have been somewhat ahead of its time in 2000, blending the best bits of a classic roadster with modern technology and construction techniques. Arriving on the cusp of the analogue world meeting its digital future, the Z8 remains an important part of BMW history and a car that undoubtedly helped inform the shape of contemporary roadsters and coupés for decades after its retirement ■

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BOX 1
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BOX 2
TÉCNICA

As of now, there have been six generations of M5, and while the current F90 is an incredible machine, it owes it all to its varied predecessors, and the M5 bloodline is filled with truly iconic machines.

There was the almost skunkworks-like origin of the sports saloon in E28 form, and while that car still engages, it doesn't feel at all fast anymore. The M5 then evolved into a mainstream product, in its second generation E34 guise, which even sired a 'sensible' Touring estate. Although the Touring has never been a major part of the M5 offering, the E34 certainly can be credited with defining the template for

the M5 ever since.

And then came the third generation, the E39 M5. If anything, this model is even more subtle looking than its predecessor, especially when finished in the Avus blue metallic paint of our test car. This vehicle was registered in 1999 and has been in BMW's collection ever since.

The bodywork is pleasingly smooth and free from much in the way of additional adornment, save for the tiniest of integrated boot spoilers at the back (which buyers could delete for no cost when ordering). There are the subtlest of M5 badges on each of the front doors and another on the back, though, once again, buyers could →



BLASTS FROM THE PAST

We sample E39 and E60 M5s, back to back, to assess how these performance icons have stood the test of time

Words SHANE O' DONOGHUE / Photos BMW





Things look decidedly more modern inside the E60 M5



The E60 M5 marked the start of BMW M's strategy to allow drivers to customise their cars' settings to their liking and the situation



The E39 M5's interior highlights include electrically-adjusted and heated sport seats, an alloy foot rest, unique instruments and an illuminated gear knob

opt not to have these.

Looking deeper into the design, it turns out that the kidney grilles up front are larger on the M5 than on the regular 5 Series of the day, while the front and rear bumpers are unique, too. Obviously, the most dependable visual cue is the presence of four exhaust outlets, though all E39 M5s got clear indicator covers as well. We've saved the best until last, however, as the M5 also featured the simply gorgeous Style 65 'M Parallel Spoke II' alloy wheels; 18" rims with a smoky finish that still look fabulous today. They're shod with Dunlop SP Sport 8080 tyres on this BMW Classic example, measuring 245/40 up front and 275/35 on the back (on wheels that are eight and 9.5" wide, respectively).

When you start the engine, you'll instantly be glad of that extra rubber at the back. For this M5, BMW shifted away from straight-six power to a naturally-aspirated V8, the 4.9-litre S62. Based on the 4.4-litre V8 used in the E39 540i, BMW M made extensive modifications, increasing the bore, stroke and compression ratio for a start.

For the E39 M5, BMW shifted away from straight-six power, to a 400hp, naturally-aspirated V8, codenamed S62



Along with the dimension changes and further strengthening, oil-cooled pistons were fitted, as was an uprated oil supply system, hollow camshafts, VANOS continuously-variable valve timing on both the intake and exhaust, plus an upgraded cooling system. Finally, a Siemens MSS 52 Motronic digital engine control system was drafted in, and individual, electronically-controlled throttle bodies were fitted for each cylinder. The numbers tell you this engine produces 400hp at 6600rpm and 369lb ft at 3800rpm, but they can't convey how rousing this engine sounds on the move through its free-flowing exhaust.

At lower speeds, it rumbles along smoothly and doesn't intrude when you're cruising on the motorway. But find an open road and use the full, long travel of the accelerator pedal, and it really lets loose, coming noticeably alive at about 4000rpm, emitting an unmistakable V8 roar that's overlaid with quite a mechanical cacophony. The two sounds combine to make a very serious-sounding noise indeed.

The car may look subtle, but once you hear it in action, you'll be in no doubt it's the real thing. And that's despite a cabin that is restrained in the extreme. There were a few different upholstery and colour options for the interior, but all were relatively sombre. Highlights include electrically-adjusted and heated sport seats, an alloy footrest, unique instruments and an illuminated gear shifter. The button designs and graphics in the digital part of the instrumentation look out of date today (as does the bricklike integrated phone), but the clocks are crystal-clear, and everything feels solidly put together.

Indeed, the test car is like new, with not much more than 4000 miles on the odometer. That shows in the way the chunky six-speed manual lever moves between ratios and in the way the dampers crisply deal with body movements; there's no floppiness in this car's chassis, a shortfall that often betrays a classic car's age. Instead, it moves fluently and predictably through the corners, and, what's more, it proves

to be remarkably supple over undulations and poor surfaces – a truly excellent all-rounder.

The E39 M5's suspension featured lots of detail changes from the standard car's, but nothing too drastic. Notable differences included a modest drop in height, firmer springs and dampers, thicker anti-roll bars, bespoke front wheel bearings and steel ball joints instead of rubber rear suspension bushings.

The recirculating ball power steering system was reinforced and made a little more direct, too, and it features Servotronic, altering the assistance between two levels depending on the speed or if you've got the Sport button pressed. That also adjusts throttle response, and it's particularly keen in its sportiest setting. Surely nobody needs more performance than this car delivers; a perfect blend of response, flexibility and usability?

But engineers at BMW M don't think like that. Why else would they decide that the next iteration of the M5, the E60 variant, needed a stonking great V10 engine, with some 25% →

**“M PARALLEL SPOKE II' ALLOY WHEELS;
18" RIMS WITH A SMOKY FINISH THAT
STILL LOOK FABULOUS TODAY”**



The E39 M5's suspension featured lots of detail changes from the standard car's, but nothing too drastic



“THIS M5 MARKED THE START OF BMW M’S STRATEGY TO ALLOW DRIVERS TO CUSTOMISE THEIR CARS’ SETTINGS”

improvement in performance? Of course, the high-revving V10 concept was straight out of Formula One (though it shares no components with actual race cars), and it set the theme for the E60 M5, which also got a sophisticated paddle-shift gearbox for the first time, with no fewer than 11 different modes of operation, plus a variable locking rear differential.

The tech-fest didn’t end there, though, as this M5 marked the start of BMW M’s strategy to allow drivers to customise their cars’ settings to their liking and the situation. The Electronic Damper Control (EDC) button allowed three levels of damping, and the Power button switched the car from the default 400hp mode to release the full 507hp (and throttle response could be further sharpened by programming the M button on the steering wheel). In addition, the new Dynamic Stability Control (DSC) system came with a mid-level M Dynamic Mode (MDM)

to allow keen drivers to have more control over the car’s attitude through a corner before the electronic nannies intervened. The test car may be one of several E60 M5s that BMW Classic has on its books (and it was specifically bought by the division to allow people to drive it), but we didn’t intend to trouble the DSC. Saying that, it didn’t take long behind the wheel to become intoxicated by this car’s performance.

The 5.0-litre S85 V10 (a blank sheet design) is visceral and aggressive, and we’d forgotten just how melodious a tune it sang at low revs, as well as in the mid-range. It truly is a special engine, even if its bespoke and highly-strung nature does mean incredibly high running costs. But we trust that owners agree with us that it’s worth every penny just to hear it strung out to that 8250rpm rev limiter! No fewer than three 32-bit processors were required to enable its wide band of operating conditions, along with

The E60 M5 pushed the performance bar even higher, with a screaming V10 producing 507hp



advanced ion-current tech that allows running maximum spark advance without running into knock issues.

While time has been kind to the engine itself (it stands out in a world of turbocharging as something truly memorable), transmission development has moved on considerably from the Sequential Manual Gearbox (SMG) fitted to the E60 M5 – and this one has some 40,000 miles under its belt. This is the third generation of the SMG concept, using a robotised clutch, but it shares nothing with the previous iterations of the gearbox.

Though it was some 20% faster at changing gear than the previous SMG, its age is showing now. Compared with the latest dual-clutch units, or even just well-developed torque converter automatics, it feels surprisingly slow-witted, leaving chasms of time between gears. That's even the case in the most extreme of the 11 settings. It's better going down through the seven ratios than up but, even so, it dates the car. Only North American markets received a manual gearbox option.

Regardless, this M5 is still great fun to drive. We were advised that the test car sits lower than standard, as BMW Classic hasn't had a chance to change it back following its purchase from a private owner. But, even so, the E60 rides remarkably well on its 19" wheels. As with its predecessor, there are mixed tyre sizes front and rear, but unlike the standard E60 5 Series, the M5 didn't get run-flat tyres. The Style 166M wheels are wonderfully detailed and dished when you inspect them, but there were similar alloys available at the same time for the regular

5 Series, so it can be quite difficult, even today, to spot the M5 model.

That continues the trend for subtle visual upgrades. The unique M5 'gills' aft of the front wheels give the game away, of course, as do the obligatory quad exhaust outlets. But when you take a closer look, you'll realise that the front end is all-new (the test car features non-standard black kidney grille surrounds), with larger air intakes and wider wings. The rear bumper houses an aerodynamic diffuser as well, and there's a slender boot spoiler. But, even so, the E60 M5 isn't always immediately discernible as just that.

Inside, it's more obvious, thanks to lots of M badges, a sporty three-spoke steering wheel and the distinctive stubby SMG lever in the centre console. That's flanked by big buttons for Power, EDC and DSC, plus the Drivelogic toggle behind to alter the transmission settings. The iDrive rotary controller almost appears as an afterthought, though that's required to customise which settings you'd like to store in

the M button on the steering wheel.

What may not be immediately obvious are the active seat bolsters that automatically move to hold you in place during cornering. We remember thinking these were a bit of a gimmick when driving the car at its launch back in 2005, and their operation hasn't aged well, distracting you from the driving experience rather than enhancing it. Thankfully they can be switched off.

While the E60 M5 is far from perfect, it's perhaps the most interesting generation of the nameplate, as BMW M no doubt spent a heinous amount of money developing a car packed with several bespoke high-tech components that more than justified a marketing link with motorsport. It also signals the last naturally-aspirated engine in an M5, and, for that V10 alone, it will go down in history as a landmark car. Sure, its successors have moved the sports saloon game on considerably since, but that doesn't make the E60 obsolete, that's for sure ■

1999 E39 M5

ENGINE V8 S62B50
DISPLACEMENT 4941cc
POWER 400hp at 6600rpm
TOP SPEED 155mph
0-62MPH 5.3 seconds
UNLADEN WEIGHT 1795kg
GEARBOX Six-speed manual

2005 E60 M5

ENGINE V10 S85B50
DISPLACEMENT 4999cc
POWER 507hp at 7750rpm
TOP SPEED 155mph
0-62MPH 4.7 seconds
UNLADEN WEIGHT 1830kg
GEARBOX Seven-speed SMG III





It seems fitting that the BMW with the longest production run is one of the models that seem to be most coveted among both fans of the marque and the wider classic car community. The E24 6 Series is one of BMW's greats that is seemingly loved by all and is being increasingly sought after as a useable and entertaining classic. It was, of course, the successor to the much-loved E9 CS Coupé, and when the Six was initially introduced, there were some concerns

that the newer, bigger, heavier machine might have traded some of its sporting prowess for more of a GT approach. The same reservations were raised at the launch of the E24's successor, the mighty 8 Series...

Despite these worries, the new 6 Series was heartily lauded on its arrival in the UK in 1976. The great Mel Nicholls writing in *Car Magazine* said, "A sporting coupé with handling second to none; better and more refined and more enjoyable than any other BMW yet. This one, for

me, is the definitive BMW." Praise indeed from someone happy to admit he wasn't BMW's most ardent fan.

After setting solid foundations in the 1960s, expansion into the luxury sector seemed to be the way forward for BMW, and the 6 Series was its first foray into the upper echelons of motoring. BMW in-house designer Paul Braccq, whose elegant design was chosen over Giugiaro's proposal, created the distinctive styling that has found so many fans over the years. The



STILL GOT IT

It might be over 30 years since E24 production ended, but it's still got Six appeal by the barrel load, is this one of the best classic BMWs ever made?

Words **BOB HARPER** / Photos **JASON DODD**

energy crisis of the early '70s saw many car manufacturers cancelling plans for large luxury cars, but BMW was, by now, accustomed to looking beyond the immediate situation and planning for the future.

Unveiled to the public in March of 1976 at the Geneva motor show before its launch in the summer, the 6 Series was unmistakably a BMW, with its narrow kidney grille and prominent quad headlights. The design element that would endow the E24 with its "shark" nickname was

Bracc's reverse angle front grille area, which, when combined with the long and lithe coupé body, gave the 6 Series an appearance rather similar to the predatory fish. The overall exterior design was very clean and simple, with a swage line running from nose-to-tail along the car's flank, visually lengthening the profile, while tasteful chrome detailing added a touch of visual flair. Inherently coherent, the E24 was undoubtedly one of BMW's best pieces of design and even today, it's hard to find any fault with

the car's styling.

By today's standards, the interior may look somewhat spartan, but in the '70s, this was the height of luxury, and UK cars were well-specified with electric windows and air-conditioning on the range-topping models. Rear seat accommodation was a trifle tight but far better than the 8 Series that followed it. A commodious boot could swallow plenty of luggage for that week in the South of France.

Beneath the surface, the 6 Series used →



several elements from the E12 5 Series, though slightly updated for this new model – fuel injection made an appearance in the two larger capacity six-cylinder engines, and the recirculating ball steering reduced the amount of assistance as speed increased. The 6 Series was also the first model to feature BMW's check control, with its bank of warning lights for various systems. The first few months of production were difficult for BMW, as assembly at the Karmann works had resulted in sub-standard levels of quality. BMW brought assembly in-house, to the newly refurbished Dingolfing plant and decided to just use Karmann for the supply of unpainted bodies in white.

At its launch in 1976, the 6 Series range-topper was the 633CSi utilising the venerable M30 straight-six mated to Bosch L-Jetronic fuel injection. This meant 200hp and 210lb ft of torque – good enough for an 8.1-second 0-60mph

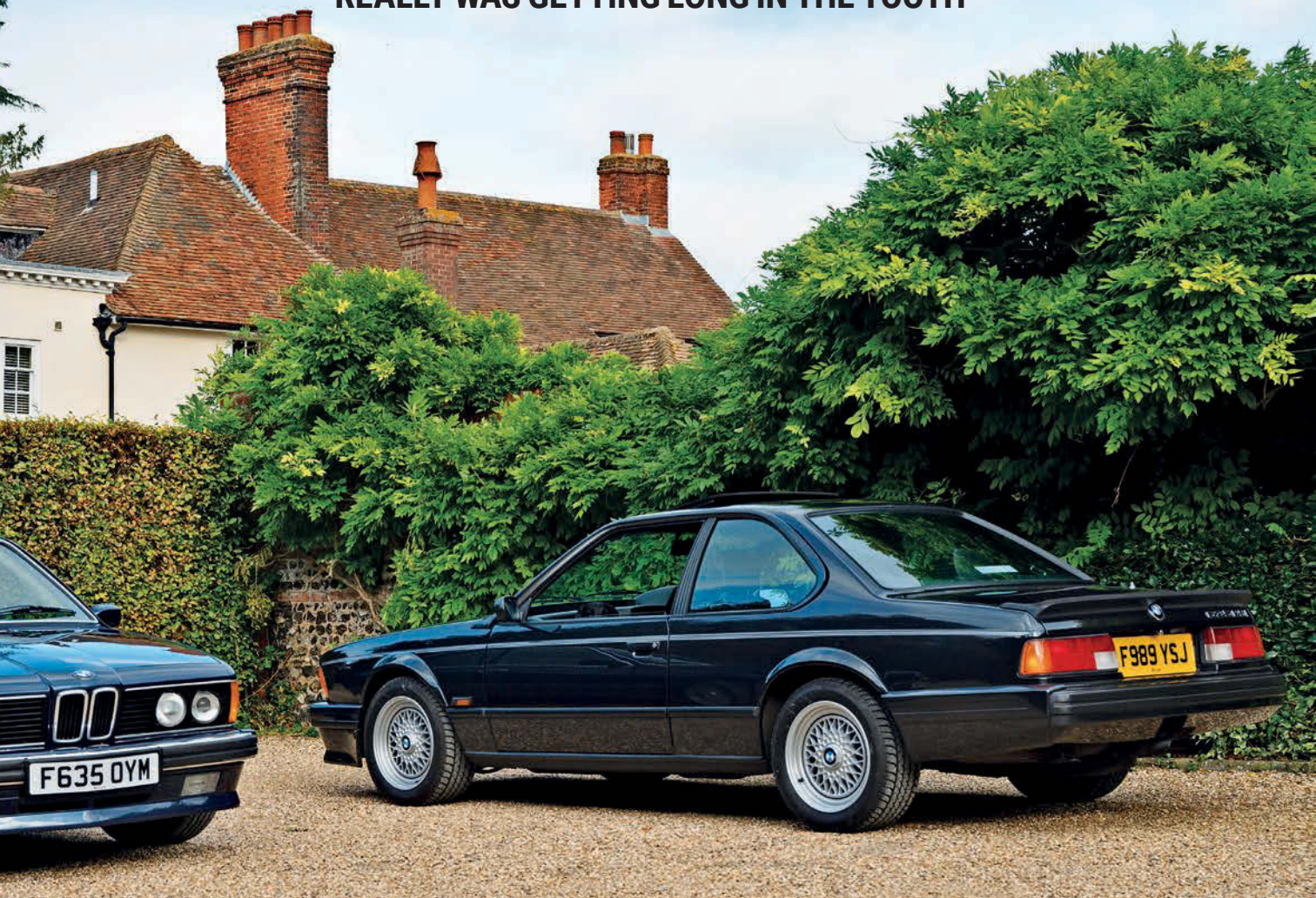
time, according to *Autocar*, for the four-speed manual model. The magazine was hugely impressed, summing the big Six up thus; “BMW are, with this new model, moving into the sort of market where buyers will justifiably expect great things. We can only say on conclusion of a test we have thoroughly enjoyed, that owners are not likely to be disappointed. It is a very impressive car indeed.” And so it should have been with an on-the-road price of £14,163 – the average UK house in 1976 was worth around £11,000!

Despite the plaudits, BMW uprated the E24 after a scant couple of years, releasing the 635CSi in 1978, the most overly sporting non-M E24. With a 3.5-litre engine retaining the 12-valve SOHC layout of the previous models the extra capacity giving 218hp and an equally impressive 224lb ft of torque. A further update occurred in 1982 when the 6 Series moved from the E12 chassis to that of the then-new E28 5 Series, and

these revised models can be spotted by their wrap-around rear bumpers, updated suspension and the fitment of the service indicator board along with a host of other revisions.

The last update for the E24 occurred in the latter part of 1987 for the 1988 model year with the launch of the ‘Highline’ 6 Series that we have here today. But before we have a look at these two gorgeous examples, it's also worth noting that while the 635CSi was obviously designed as a road car, it's important not to forget that it was a very competitive race car too. It had big boots to fill as its predecessor, the iconic 3.0 CSL Batmobile, won umpteen Touring Car titles, many of which were run several years after it had ceased production. Some had hoped that the M635CSi would be BMW's weapon of choice, but it was never produced in large enough numbers to meet homologation requirements, which left the 635CSi as BMW Motorsport's weapon of choice. →

“BY THE TIME OF THE E24'S SECOND MAJOR UPDATE, IT REALLY WAS GETTING LONG IN THE TOOTH”



In reality, it was a trifle underpowered and relatively heavy for a Touring Car, but nevertheless, the 635CSi was a great stopgap while BMW Motorsport readied the E30 M3 for its glittering competition career. In total, the 635CSi won three European Touring Car championships, two DTM titles and occupied the top step of the podium at the Spa and Nürburgring 24-hour races, twice at the 'Ring and three times in the Ardennes. Not bad for what was essentially a luxury GT.

So to the Highline models. By the time of the E24's second major update, it really was getting rather long in the tooth, having been soldiering on for nigh on 12 years, but that didn't stop BMW from majoring on the luxury side of things for the car's last hurrah. Externally there were larger impact bumpers and the large metric-sized alloys that had previously been the preserve of the M635CSi. Inside, it was a vegan's nightmare with swathes of leather – it literally adorned virtually every surface, including the seats, door cards, dashboard and headlining

– and BMW claimed that each 635CSi used 27 square metres of the finest Bavarian hide.

Under the bonnet, there had been some changes too with a further updated version of the M30 straight-six, as fitted to the E32 735i. Capacity was now 3430cc and thanks to the latest version of Motronic power was rated at 220hp along with 232lb ft of torque. The standard transmission was a ZF four-speed switchable auto, with the five-speed manual being a no-cost option. Most things were standard including electric sports seats with driver memory, metallic paint and air-conditioning, and if you opted for the manual a limited slip diff was fitted too. If you went for the auto an LSD was available for an additional £402. Other options of note included heated front seats (£226), Servotronic steering (£189), cruise control (£324) and a hands-free car phone for an eye-watering £1668.

In keeping with the car's upmarket feel, the price had taken a considerable hike from 1976 levels, with the Highline 635CSi weighing in at £36,860 in 1988 – BMW almost sticking with

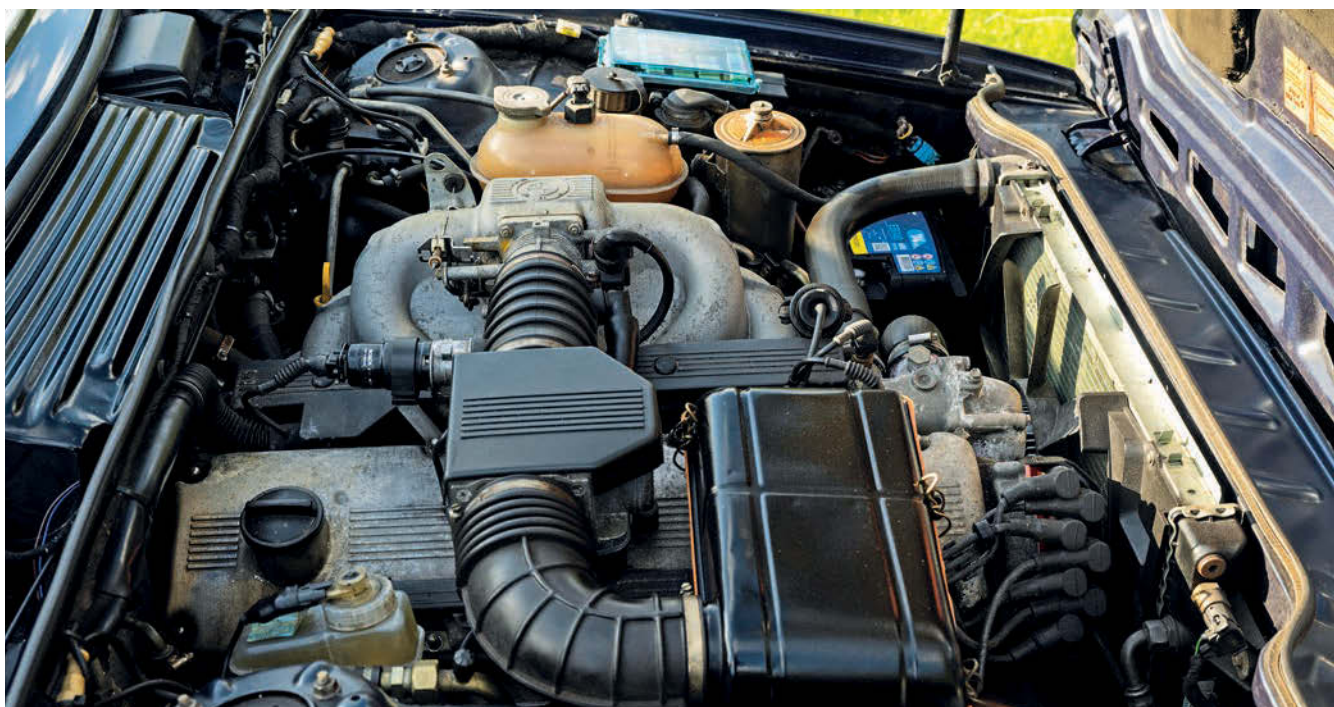
the 'car costs the same as a house' theme as the average house price in '88 was around £43k. Performance was impressive for its day, with 0-62mph coming up in 8.4 seconds for the auto, with the manual shaving a second off that time. Top speed was a decent 140mph, while BMW claimed an average economy of 24mpg under the less stringent testing regimes of the good old days.

But what about the two examples we have here? They're both owned by Sam Pitchford from Elms Automotive, with the Diamond Black car being his own personal machine. They're both low-mileage minters with a combined mileage of less than 100k – no wonder they look so perfect!

Sam explains how they came to be in his possession; "I've always wanted a 635CSi, and I went to Scotland to buy it in 2014. I'd just been left a little bit of money when my grandmother passed away, and I thought I'd like to do something with it rather than putting it towards the mortgage, and I bought the Six from a guy

"THEY'RE BOTH MINTERS WITH A COMBINED MILEAGE OF LESS THAN 100K – NO WONDER THEY LOOK SO PERFECT!"





E24 635CSi HIGHLINE

ENGINE 3.4-litre straight-six M30B35

MAX POWER 220hp @ 5700rpm

MAX TORQUE 232lb ft @ 4000rpm

0-62MPH 8.4-seconds

TOP SPEED 140mph

ECONOMY 24.6mpg

WEIGHT 1575kg

PRICE WHEN NEW £36,860 (1988)

who'd owned it for 24 years and had loved it but didn't use it any more as he was getting on in years. My maiden voyage was central Scotland back to Kent, five or six hundred miles – it could have ended very badly, but it was absolutely brilliant. So, I've had that one for seven years, and I've done a fair bit to it, although it was in a nice state of repair anyway, it's got super low mileage, and that was one of the things that really appealed to me.

"It's one of the best-looking BMWs," says Sam with a grin, "And they're just such fun to drive. I do use mine – I think I've done the best part of 1000 miles this year, I've taken it on holiday and plenty of other places. I keep it nice, but I have it to use it, not store it like a piece of art. I think they're all the better for it when they are used," he says.

Through being involved with the BMW Owner's Cub, Sam heard about the Royal blue example – another low mileage car that had originally been owned by an MP who had been in Mrs Thatcher's cabinet. "It was →



a London car, so it was quite good in terms of the usual problems like corrosion, it didn't suffer from that, but it had a few of the London parking dings and scrapes, so I suppose I've recommissioned it."

Sam admits that he was lucky with his black 635CSi, buying at a time when the E24 wasn't quite as coveted as they are today. For many years the Six was undervalued, but they've come into their own in the last few years with values rising significantly for good cars. And when you take into account the car's merits and attributes, it's not hard to understand why.

It's an old-school bruiser with a huge amount of charm. It looks sensational, especially today when so many cars have the same homogenous look, and it really stands out from the crowd. Despite having been conceived in the 1970s, it still feels modern enough to be perfectly at home with modern traffic conditions and entertaining when you want it to be. There's a real sense of occasion when you slip behind the wheel with the cossetting cockpit and that long sculpted bonnet stretching away in front of you.

The M30 straight-six is a peach, too, packing a decent punch and making some glorious noises while doing so. Of course, its performance would be put to shame by a 120d these days, but when you're piloting a classic, there's far more to the experience than outright speed. And that's where the Six's chassis comes into play with nicely weighted steering, which, while not the fastest, is full of feel and feedback, especially when compared to more modern machinery. BMWs from this era are known for being playful, and the 635CSi is no exception – grip was lacking back when it was new thanks to

the woefully inadequate TRX tyres, but more modern versions are much more suited to giving some more grip before they start to slip. The bottom line is that it's a hugely entertaining car to drive, whether you just want to sit back and cruise while enjoying the decent ride and the tuneful engine or you ramp it up and delve a little deeper into its performance portfolio.

When the Highline was new back in 1988, it was tested by *Autocar*, and while it could have been dismissed as a creature from a bygone age – the E24 was 12 years old by then – the magazine was hugely impressed with the car's continual development. The handling was judged to be "well-balanced," the ride was

"impressively supple at speed," and the engine's performance was "effortless". It summed up by saying: "As a mile-eater, the 635CSi is a superb car. It handles well, cruises quietly and comfortably all day at autobahn speeds, and detail development over the years has kept it competitive." And that résumé still stands today. A good E24 is a glorious machine – both to look at and to drive – and it's great to see it finally receiving the sort of recognition it richly deserves ■

THANKS

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Web: elmsautomotive.co.uk



PSDESIGNS

DESIGN, SUPPLY AND MANUFACTURE
OF QUALITY PERFORMANCE PARTS



- TITANIUM WHEEL HARDWARE - PSD SHIFTERS - STYLING - TUNING
- PERFORMANCE PARTS - HANDLING - CARBON FIBRE AERO

For some people, the E46 M3 is the ultimate incarnation of this most iconic of performance cars, equal to or perhaps just half a rung down from the legendary E30 M3. It ticks just about every box imaginable and, in standard form, it's a sensational car, but Michael Karas's (@karasm395) incredible turbocharged build takes everything to the next level.

This is one of those cars that absolutely floored us when we first set eyes on it, and it's a build that just keeps on giving. The more you delve into it, the more incredible details and mods you find, and it really is something seriously special, an absolute masterpiece of an M machine. To build something so epic on such an incredible scale is not something one does lightly, and Michael has been a BM fan for many years and is no stranger to modding anything with wheels. "I've been interested in BMWs for over 20 years," he says with a smile. "The performance and driving experience left an impression on me at an early age, and I've been a diehard enthusiast ever since. My first BMW was a 1997 Estoril blue M3. I fell hard for the appearance, performance, power, and the colour remains one of my all-time favourites," he grins. As for modding, well, we weren't kidding when we said he's no stranger to it. "I can't leave my cars alone," Michael laughs. "Every single vehicle I have ever owned, even as a teenager, has been modified from minor cosmetics to full race builds. From BMWs to Volkswagens, Acuras, Toyotas, and Subarus, I've never been able to leave my cars stock," and he's clearly not about to slow down.

"I looked for this particular car for quite some time," he continues as we turn our attention to the magnificent M3 before us. "I knew exactly what I wanted and had to find it. Laguna Seca just pops like no other colour, and the M series acceleration and handling were something I had to have and wanted in a newer model at the time. I fell in love with every aspect of the car – the colour, body lines, and superior performance. It's still one of the best-looking M cars, in my opinion," he adds, and we know of millions who would agree. As for what the future held for →

Pushing out over 1000whp, this stunning Laguna Seca E46 M3 is a simply staggering performance build that's on a whole other level

Words ELIZABETH DE LATOUR / Photos JOSH COLE

POWERH



AUS

TURBO E46 M3

ENGINE 3.2-litre straight-six S54B32, VAC Motorsports sleeves, Carrillo rods, CP Carrillo pistons and wrist pins, VAC Motorsports high-performance coated main bearings and high-performance coated rod bearings, custom-made crank girdle with ARP hardware, VAC Motorsports high-volume oil pump, ported and polished head and ported throttle bodies, ARP L-19 head studs, Athena cut-ring head gasket, Ferrea valves, brass valve guides, springs and titanium retainers, VAC Motorsports billet Vanos hub, new BMW timing chains, chain guides, gaskets and seals, DrVanos upgraded Vanos, Beisan Vanos solenoid, FSR turbo manifold, Precision 6870 dual ball-bearing turbo, dual Tial 44 wastegates, custom-made 4" exhaust and wastegate dumps, HPF intake manifold, twin Walbro E450 pumps, Fragola -8 PTFE fuel lines and fittings, dual Radium fuel filters, Radium fuel rail, ID2000 injectors, Aeromotive fuel pressure regulator, Fragola -10 PTFE return fuel line and fittings, Powerhouse billet high-flow dual-passage flex fuel sensor adapter, AEM flex fuel sensor, HPF stage 4 intercooler, dual Tial 50mm blow-off valves, HPF oil cooler and piping, AEM Infinity with custom harness and sensors, RallyRoad motor mount bracket, custom-made billet motor mounts

POWER AND TORQUE 1021whp and 784lb ft wtq @ 29 psi

TRANSMISSION Stock Getrag Type D six-speed manual gearbox, Spec twin-disc carbon clutch, HPF solid transmission mounts, Driveshaft Shop Chromoly propshaft, Driveshaft Shop driveshafts, Wavetrac LSD, 3.46 final drive

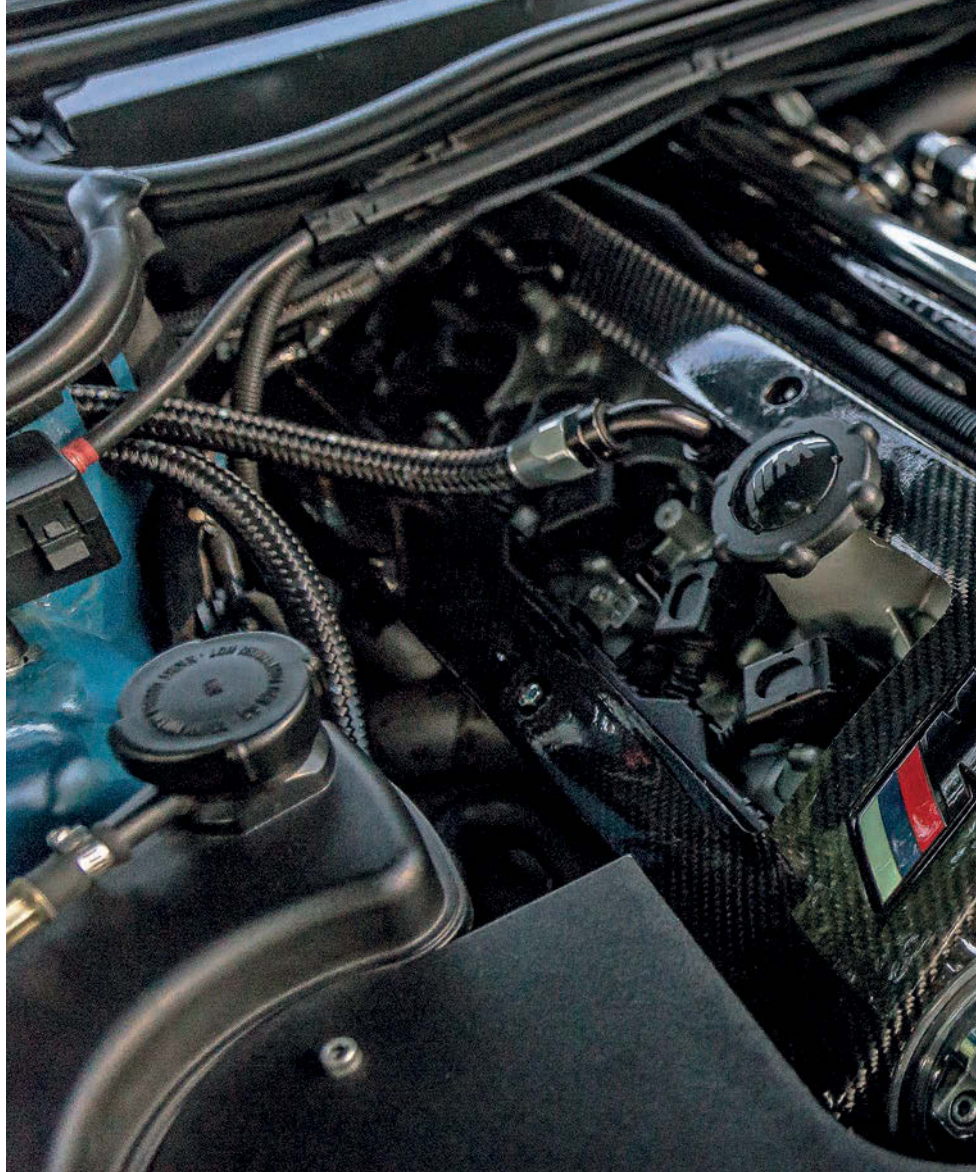
CHASSIS 9x18" (front) and 11x18" (rear) CCW LM5 wheels with 255/35 (front) and 295/30 (rear) Toyo R888R tyres, Bimmerworld stud kit, KW V3 coilovers, Turner Motorsport anti-roll bars, AKG Motorsport front control arm, rear control arm, subframe and differential poly bushes, Porsche 996 911 Brembo brake calipers (front and rear), RallyRoad BBK adapters, Turner Motorsport 345x28mm (front) and 328x28mm (rear) two-piece discs, Hawk ceramic pads, Bimmerworld stainless steel brake lines

EXTERIOR Factory Laguna Seca blue, colour-coded Strassentech front lip and Hamann brake ducts, custom-made inner carbon headlight shrouds, Bimmerworld carbon kidney grilles and side vents, colour-coded Vorsteiner carbon fibre CSL-style boot lid and diffuser

INTERIOR Carbon dash pieces, Recaro Sportster GT seats, Schroth Profi 2 harnesses, custom-made 10-point Chromoly roll-cage, carbon steering wheel, AEM CD-7 digital dash display

this E46, there was never any doubt about that in Michael's mind: "I knew from the beginning that I wanted a fully dedicated street beast. It was going to be my project car," he smiles, and it's that and so much more.

Michael's approach to this build has been measured and methodical, a steady process of enhancing absolutely every aspect of the car

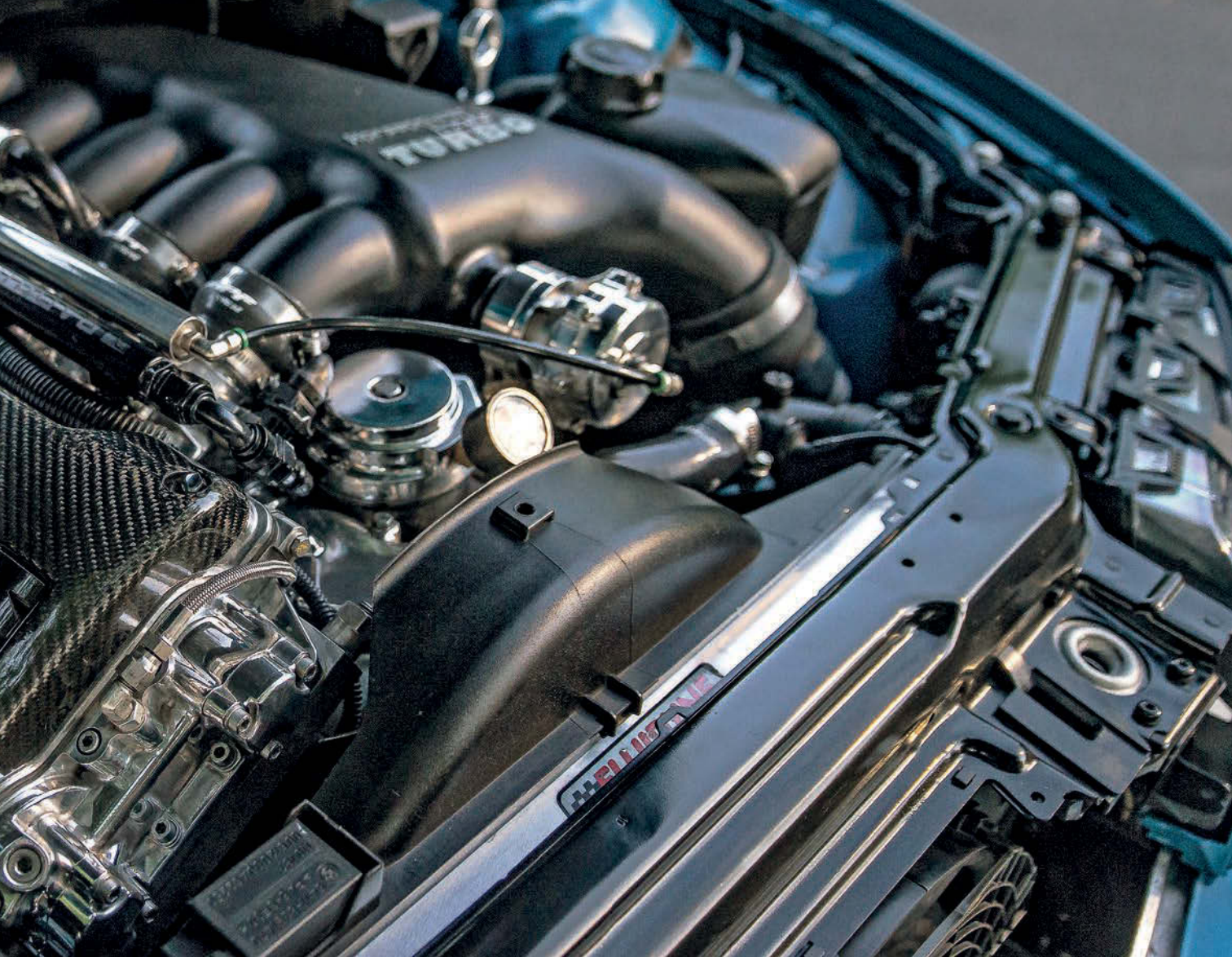


“HE WANTED A RELIABLE 1000WHP, BUT HE’S ACTUALLY ENDED UP WITH A LITTLE MORE – 1021WHP, NOT FAR OFF 1200HP AT THE CRANK, AND 784LB FT WTQ. THAT IS ONE SERIOUS BUILD”

over six years, and while this car might floor you with the extraordinary numbers it's producing, it's the complete package on every level. "I began with exterior cosmetics," Michael tells us, and while the changes he's implemented are subtle, they're extremely purposeful and combine to give this E46 a serious sense of presence and aggression. "I should also mention my wife, who was my girlfriend at the time, is also a BMW enthusiast and loves this car," Michael adds with a grin. "I would narrow options down, and she chose the final aesthetics. Over a few months, I did the work myself for the most part and shopped out the paint and bodywork to a few local shops."

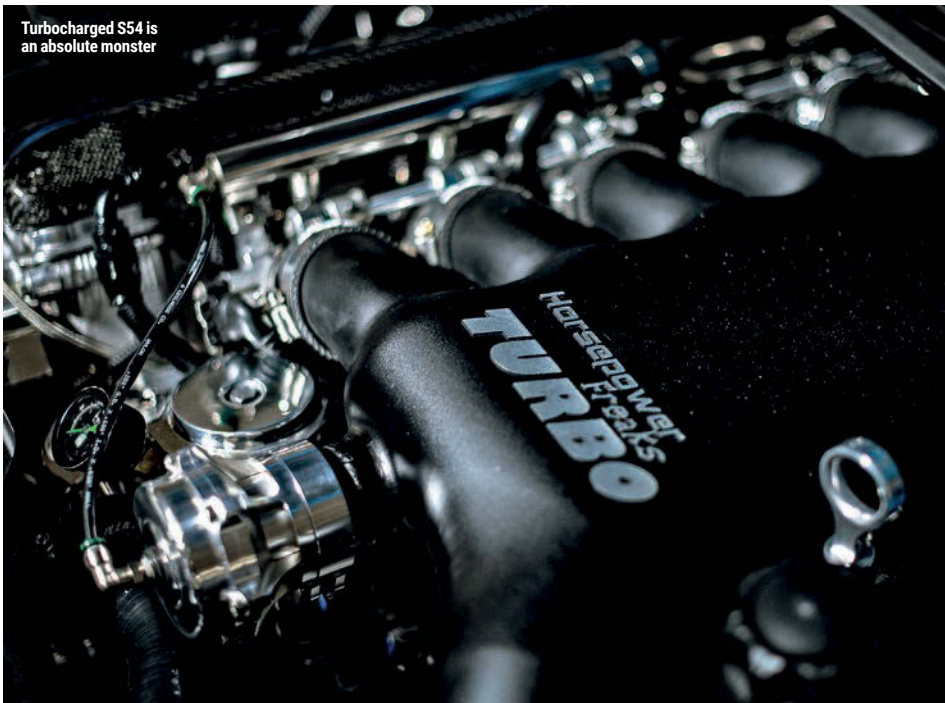
If you were to – very briefly – see this M3 in your rear-view as it comes tearing up behind you, you would immediately be struck by the

combo of Strassentech front lip, and Hamann brake ducts, both finished in body colour, plus the Bimmerworld carbon grille. You might not have time to notice the custom-made inner carbon headlight shrouds, though, an extremely subtle but exceedingly stylish addition. As you pull over to let this Laguna Seca beast pass, you'd catch a glimpse of the Bimmerworld carbon side vents. Then you'd get a quick glance at that shapely rear as it rapidly disappeared ahead of you, perhaps giving you just enough time to admire the Vorsteiner CSL-style boot lid and diffuser, both in carbon and both finished in body-matching Laguna Seca blue. Individually, the additions are subtle but, altogether, they combine to deliver the perfect sense of purpose, and they ensure this M3 looks simply magnificent.



The next area that Michael turned his attention to was the whole of the chassis, because if you've got an E46 M3, then you've got to make sure all the underpinnings are nice and solid before you go and start having fun. "All the bushes were changed to AKG Motorsport poly bushes, and then KW V3 coilovers were swapped in. I removed the rear subframe and replaced it with a brand new BMW subframe, and Turner Motorsport subframe reinforcement plates were added," says Michael, and that's one way to ensure that you're not going to have anything to worry about. "A custom 10-point Chromoly roll-cage was made to tie in the rear subframe for added strength, safety, and reliability, and Turner Motorsport anti-roll bars were also added," he says, all of which makes for a seriously impressive selection of chassis and suspension enhancements. Not only do they ensure that the E46 M3's already legendary handling is elevated to an even higher state of sublimity, but those V3s have also allowed Michael to get his M3 sitting perfectly.

As we all know, styling alone can only go so far, and you've got to get the wheels →



Turbocharged S54 is an absolute monster

right, which Michael absolutely has. “I knew I wanted something stylish, but that would also hold up to the performance demands,” he says. “I started off with 19” RH Phoenix wheels and later changed over to durable 18” CCW LM5 wheels to accommodate a stickier and taller tyre that could stand up to the increase in power,” he explains, and the CCW 18s look so good. The deep-dish design really suits the E46 shape, and the fat tyres look so meaty and suit the whole build. Peer behind the spokes, and you will spot the hefty brake setup, with Porsche 996 911 brake calipers and Turner Motorsport two-piece discs all-round, with 345mm items up front and 328 rears, paired with Hawk ceramic pads and Bimmerworld stainless brake hoses.

“I FELL IN LOVE WITH EVERY ASPECT OF THE CAR – THE COLOUR, BODY LINES, AND SUPERIOR PERFORMANCE... I KNEW FROM THE BEGINNING THAT I WANTED A FULLY DEDICATED STREET BEAST. IT WAS GOING TO BE MY PROJECT CAR”

We can almost hear your impatience bubbling over at this point because we’ve talked about pretty much everything apart from the engine, but it was worth the wait. “I originally had purchased a Horsepower Freaks (HPF) Stage 1 turbo kit making 460whp,” Michael begins. “I wanted more power, so I upgraded to the Stage 2 kit, adding methanol injection, bumping the power up to 540whp. The car ran at this stage for a year, but I felt it could handle more. I pulled the motor out in my garage and was ready to send it to HPF for a full motor build (Stage 3). The day the shipping company came to pick up the motor, my salesperson for HPF called and told me not to send the engine as the company had shuttered its doors for an unknown reason at

the time,” he says. “I then reached out to Marcus from Lab22 via an online BMW community; he had experience with HPF, so I sent the motor to him for the build. With this new engine, the car ran at 720whp until the motor blew at Pocono Raceway. Thankfully, the engine was under warranty due to a cam bolt backing out and taking out the oil squirter in piston number one. Once I had the repaired engine back, I installed it and had it tuned for max power on E85. This motor made 820whp, and I was happy with the power initially. After about six-to-nine months, I was addicted and needed more power,” he laughs, and what was it they say about absolute power corrupting absolutely...? “I pulled the motor out and had a friend from the BMW community, Anthony, build it from the ground up to make a reliable 1000whp,” smiles Michael.

“The block was line honed, and a custom girdle was made and added; VAC Motorsports sleeves were machined and installed, and Carrillo rods and CP pistons filled the holes. All parts were balanced and blueprinted. A VAC Motorsports high-volume oil pump and all new timing chains and gaskets sealed up



Custom carbon steering wheel



Custom-mounted AEM water temp gauge



Awesome AEM CD-7 digital dash display



Yes, it spits flames...



Custom Chromoly roll-cage



Alloy pedals



Recaro Sportster GT seats and Schroth harnesses

the short block with all ARP hardware, along with an ATI harmonic damper," Michael tells us. "The head was lightly ported and polished, and Ferrea valves with brass valve guides, springs, and titanium retainers were fitted. A VAC Motorsports Vanos hub was also installed with DrVanos upgraded Vanos. An Athena cutting head gasket was used to seal everything up with L-19 head studs. An FSR turbo manifold was fitted along with a Precision 6870 dual ball-bearing water-cooled turbo.

"Anthony made a custom wiring harness for the AEM Infinity that would control and keep this engine running without issues," he continues. "I installed every possible AEM fail-safe sensor including oil temp, exhaust backpressure and barometric pressure. If any of the thresholds are reached in the AEM, the engine shuts down," Michael explains. A custom two-pump fuel hanger was made, which holds twin Walbro E450 E85 pumps, and there are dual Radium fuel filters and a Radium fuel rail and ID2000 injectors. The engine is also equipped with an Aeromotive fuel pressure regulator and a Powerhouse billet high-flow dual passage flex fuel sensor. Power is sent to the wheels via a stock Getrag six-speed gearbox, which has been upgraded with a Spec lightweight flywheel and ST twin-ceramic clutch. Further transmission enhancements include a Driveshaft Shop Chromoly propshaft, Wavetrac LSD running 3.46 gears from a 7 Series and Driveshaft Shop driveshafts. "The exhaust note pours out of a custom 4" exhaust made by Joe from AIM Performance, throwing flames and popping noises," grins Michael, →



“while dual Tial 44 wastegates dump to the atmosphere,” and we can only imagine the sheer noise and fury of this M3 at maximum attack.

“The entire engine process took four years to complete,” he says, and we’re not surprised. The specs are absolutely insane, with a dream list of engine upgrades onboard, and this was a real money-no-object build. Except it wasn’t just one build, it was multiple engine builds, and Michael’s commitment to power is truly admirable. He wanted a reliable 1000whp, but he’s actually ended up with a little more – 1021whp, not far off 1200hp at the crank, and 784lb ft wtq. This is one serious build and no mistake.

After completing his epic engine, you might think that Michael was done, but the interior remained untouched thus far, which would never do, and it’s no less spectacular than any other part of the car. “Safety was first and foremost of importance, especially with the

amount of power this car puts out,” he explains, hence the comprehensive roll-cage, but there’s an awful lot more than that going on in here. The rear seats have been removed, and up front are a pair of Recaro Sportster GTs, along with a set of Schroth Profi 2 harnesses. The dash, centre console and door trims are all carbon fibre, as is the handbrake handle, while an RTD shifter makes swapping cogs a joy. The custom steering wheel is not only heavily sculpted, but also features extensive carbon, and then there’s the driver’s vent-mounted AEM water temp display. The star of the show, however, is the custom-mounted AEM CD 7” digital display, that replaces the traditional BM four-gauge cluster. It not only gives Michael the essential info he needs, as well as allowing him to monitor absolutely any parameter imaginable, but it also looks amazing and makes the cabin look ultra-modern, and it’s an achingly cool addition.

So, after six years of build time, Michael is done, and we’re not surprised because he’s

done everything imaginable, and then a bit more than that, and the M3 he’s created is something truly incredible. The engine alone is just astonishing, the work that’s gone into it, the numbers it makes – it’s hands-down the star of the show. “The engine is my favourite mod. Nothing compares to the adrenaline rush when the boost kicks in,” grins Michael. There’s so much more going on here, though, and this build is just so complete, and every aspect of it, every element, every mod is awesome. All that’s left to do now is drive it. “Now’s the time to enjoy all the hard work put into it,” says Michael with the sort of grin that only a 1000whp+ turbocharged E46 M3 can generate, and this is a car that’s going to be keeping him happy for a very long time indeed ■

THANKS I want to thank George Soda from Shine Techs, Anthony Cafik, Jeff from Evans Tuning, Bill Mason from BMB Motorworks, Joe and Ryan from AIM Performance



CCW LM5 18s



Porsche 996 911 calipers front and rear

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2002 TURBO VS E34 M5 TOURING

These two compelling BMWs come from very different eras – which makes the better classic buy? That's the £65,000 question...

Words GUY BAKER / Photos HEXAGON CLASSICS



Classic BMWs are enjoying something of a renaissance at the moment, with cars built in the 1970s, 1980s and 1990s most in demand. More affordable than many older classic BMWs, finding parts is often less problematic too, and if you invest in a performance model – like these two engaging contenders – then you can enjoy driving your classic BMW every bit as much as you would a more contemporary BMW. These two stunning-looking classic BMWs command different price tags, but good examples of both are set to appreciate in value over the next few years. And whether you choose the introvert M5 Touring or the extrovert 2002 Turbo, every journey will put a smile on your face.

CLASSIC HERITAGE

Only ever produced in left-hand drive form, BMW's E34 M5 Touring is the last hand-built M car and provides a relatively affordable route into classic BMW ownership. The first M5 to appear in Touring estate form, BMW's E34 was also the last six-cylinder M car to be made with an estate body, and it's a rare beast, too, with just 891 examples produced between 1992 and 1995. Relatively understated angular styling with only subtle M5 badging means many other road users simply aren't aware of the car's potential performance, and that adds to the E34's appeal.

With a 3795cc S38B38 inline 340hp six-cylinder engine, originally developed from the unit in BMW's M1 supercar, a bespoke M suspension, and an enhanced braking system,

the E34 M5 Touring offered power and driving pleasure beyond anything else in its class at the time. Top speed was limited to 155mph, while the benchmark 0-62mph time was just 5.9 seconds, making the E34 M5 the quickest estate car in the world, at the time. This rev-happy S38B38 motor produced 295lb ft of torque at a heady 4750rpm.

With no proper production line set up, the car had to be hand-assembled in Garching and came with a rear limited-slip diff, a compound braking system and a durable five (or six-speed from 1994) manual transmission. In addition, BMW also fitted a bespoke adaptive suspension as standard.

Compared to lesser E34 models, the M5 also claimed unique front and rear bumpers →





and side rocker panels, plus a range of interior upgrades including a unique gearshift surround and rear headrests. Some first owners also opted for a Nürburgring Handling Pack, which included switchable dampers, wider rear wheels, and a thicker rear anti-roll bar. And although the M5 is all about performance, there's plenty of rear passenger and boot space, making the E34 Touring one of the most capacious M5s.

20 years older than the E34 M5 Touring – and only produced in two-door Coupe form – the 2002 Turbo is everything the M5 isn't.

Unashamedly outgoing, its boy-racer looks, angular shark-nosed silhouette, go-faster stripes, riveted-on arch extensions, big kidney grille and boot spoiler all say 'look at me'. And with a 'Turbo 2002' front bumper sticker mounted backwards so that it can be read by the car in front, this BMW's intentions couldn't be clearer!

And woe betide anyway who didn't get out the 2002's way because it was one of the fastest accelerating cars around in the early 1970s. As the first European turbocharged production car, its performance was comparable with the Porsche 911 of the day, and the turbocharged

1991cc four-pot motor that was good for 170hp at 5800rpm and 178lb ft at 4000rpm. Produced with both four and five-speed manual gearboxes, standstill to 62mph arrived in just 7.3 seconds, while the 2002 Turbo's top speed was 130mph.

But the 1973 world oil crisis ensured that the 2002 Turbo's production run was short-lived, with only 1672 cars built worldwide. And that means it's nearly as rare as hens' teeth – we believe there are only 20 left in the UK, making it one of the rarest BMWs you can buy. And that scarcity has driven values sky-high: expect to





pay well over £100,000 for a decent example.

BMW only produced the Turbo in two colours - Chamonix white and Polaris silver – and its seminal KKK (Kuhnle, Kopp and Kausch) turbocharger kicks in at 4000rpm, adding plenty of excitement. BMW also added an oil cooler, bigger brakes, an LSD, and high-speed tyres – but still kept the kerb weight down to just 1080kg.

OWNER'S DELIGHT

Both our classic contenders hark back to yesteryear when everything was simpler – and that's especially true of these cars' interiors.

Settle down into the driver's seat of the E34 BMW M5 Touring, and you're faced with a sea of 1990s black leather and hard plastics – with plenty of ashtrays! And though at first sight, it's not as inviting as more modern fare, all the controls are obvious, with simple instruments and chunky switchgear that's easy to use and feels like it will last forever.

The driving position is actually very good, with supportive seats that keep you in place, and the plain steering wheel means your focus is always on the road ahead. More engaging to drive than many modern BMWs, in Touring

guise the E34 M5 is refreshingly low profile, while the manual transmission doesn't like to be rushed. But the throttle response and growling performance at the higher end of the rev range are still very much there, with plenty of grip when needed – and a rear end that can be easily controlled if you choose to step out. And the steering really lets you know everything that's going on.

Our Diamond black 1994 shoot car – which was for sale at Hexagon Classics for £39,995 at the time of writing – is a great example of what you could buy, although cars like this don't →



appear for sale that often. Recently restored it comes with black leather, a sunroof, the Nürburgring Handling Pack, heated seats, the six-speed manual gearbox, headlight washers, an LSD, and those definitive throwing star M alloys. It also has the interior light package, BMW Business radio/HiFi, and was originally supplied new by BMW Munich before coming to the UK in 2012.

If you tend to shun the limelight, then the 2002 Turbo probably isn't the classic BMW for you. One of the most recognisable BMW designs, the external 'boy-racer' styling, with those Motorsport stripes, a boot spoiler, wide arches and an aggressive bumper-less front spoiler, leaves other road users in no doubt as to the car's intentions. But driving one on the road these days invariably provokes admiration rather than envy. Just 43 official UK cars were imported.

The classic 1970s cockpit is even more rudimentary than that of the E34 M5 Touring and is dominated by the red trim surrounding the three main circular instruments. There are also two additional displays in the middle of the dashboard – clock to the left, turbo pressure to the right – while perfectly placed sports seats and a leather steering wheel were standard.

Needless to say, you won't find a digital trip computer or any drink holders in the 2002 Turbo, and the controls are all simple to use, but showing its age the car does claim three



ashtrays! The ride is fairly firm and the steering quite heavy, but the 2002 is wonderfully engaging to drive, with the whistle of the turbocharger dominant as you push beyond 4000rpm. And you can enjoy steering on the throttle whenever the mood takes you.

Our stunning Polaris silver metallic 1975 shoot car is in mint condition and claims a five-speed gearbox and black leatherette upholstery. With a lowly 41,000 miles, it has been maintained with no expense spared and was advertised for sale at Hexagon Classics for

£109,995 at the time of writing. Accompanied by an original handbook, brochure and workshop catalogues, it is an exceptional example, and worth every penny.

BUYER BEWARE

Owning either of these classic BMWs would be a highly-rewarding experience, but buying the best example you can is essential if you want to see a return on your investment. Wise buyers always research any potential problems first (we'll give you all the major issues you should be aware of), and befriend a trustworthy BMW specialist to help them inspect potential purchases. The latter can also provide expert ongoing maintenance, and advise you on how best to store your classic BMW once you've bought it. Set aside a fighting fund to deal with any maintenance and repair issues, too, and only ever buy a rust-free example, with a pristine provenance.

That said, if you have the wherewithal you can pick up an E34 M5 Touring in need of restoration for less than £25,000 – but if you don't have restoration expertise, then stick to mint examples, which currently start at around £40,000. Recommissioning a tired M5 can cost as much, if not more, than the car itself, with rust and corrosion potentially affecting almost all areas of the car.

And it's not just the bodywork that could need attention. Would-be E34 buyers should also look out for timing chain issues and failing steering linkages, as well as perished bushes, warped discs and misbehaving electrics. Make sure that everything functions as expected, including the ventilation controls and seat adjustment, and check that the M5-specific instrument cluster is present and correct – it should have red needles and an oil temperature gauge.

Proper maintenance is essential, but routine E34 servicing at a specialist isn't especially expensive, but checking the valve clearances

E20 2002 TURBO (1973-1975)

ENGINE 2.0-litre four-cylinder turbo M31

POWER 170hp at 5800rpm

TORQUE 178lb ft at 4000rpm

TRANSMISSION Four/five-speed manual

0-62MPH 7.3-seconds

TOP SPEED 130mph

PRICE RANGE £65,000 - £140,000



can be overlooked – they should be inspected and adjusted every 15,000 miles, or annually.

Worn bushes and shot ball joints cause sloppy handling, and you should inspect the radiator and water pumps for any signs of leaks or overheating. A rattle from the front of the engine could indicate a tired timing-chain tensioner, while the dampers used in the EDC system are very expensive to replace – a specialist refurbishment is usually the best option.

As with the M5, the biggest potential issue for 2002 Turbo buyers is rust – lower values in the 1990s meant some older restorations were carried out on a budget, using non-original parts and patching up corrosion instead of repairing it properly. So, beware – even if the 2002 you're looking at appears pristine on the outside, it might still be hiding all sorts of problems underneath.

Reported hot spots include the rear spring boxes on the inner wheel-arch housings, outer arches, inner and outer sills, the four jacking points, front inner wings, the lower outer and inner front panels, inner front wing box sections and the floor of the car. And although most panels are readily available, it could still prove prohibitively expensive to buy a 2002 Turbo



with a rusty shell to do a full restoration.

Other known issues include worn valve stem seals, worn cylinder bores, cooling issues – the aluminium cylinder head can crack if it overheats – blown head gaskets and worn rocker shafts and rockers. Front wheel bearings on the 2002 Turbo need regular greasing, while dampers eventually leak, and suspension springs can crack. Most of the electrics, however,

tend to last remarkably well.

The finest 2002 Turbos have almost all been recommissioned – so check the provenance with a fine-toothed comb. There should be pictures, loads of paperwork and even videos – plus a history file. 2002 Turbo prices range from £65,000 for cars in need of TLC, right up to £140,000, with most good examples between £100k and £140k ■



E34 M5 TOURING (1992-1995)

ENGINE 3.8-litre six-cylinder S38B38

POWER 340hp at 6900rpm

TORQUE 295lb ft at 4750rpm

TRANSMISSION Five/six-speed manual

0-62MPH 5.9-seconds

TOP SPEED 155mph

PRICE RANGE £25,000 - £65,000



HEAD TO HEAD

MODEL	PERFORMANCE	DRIVING EXPERIENCE	STYLE	MAINTENANCE COSTS	FUTURE VALUE
E34 M5 Touring	4/5	4/5	3/5	4/5	3/5
E20 2002 Turbo	3/5	5/5	4/5	4/5	4/5

TURBO S52 E9 CSL TRIBUTE

SHOWSTOP



PER

With a turbocharged S52-swap and custom Group 4 racer bodywork, this incredible CSL Batmobile tribute is simply epic

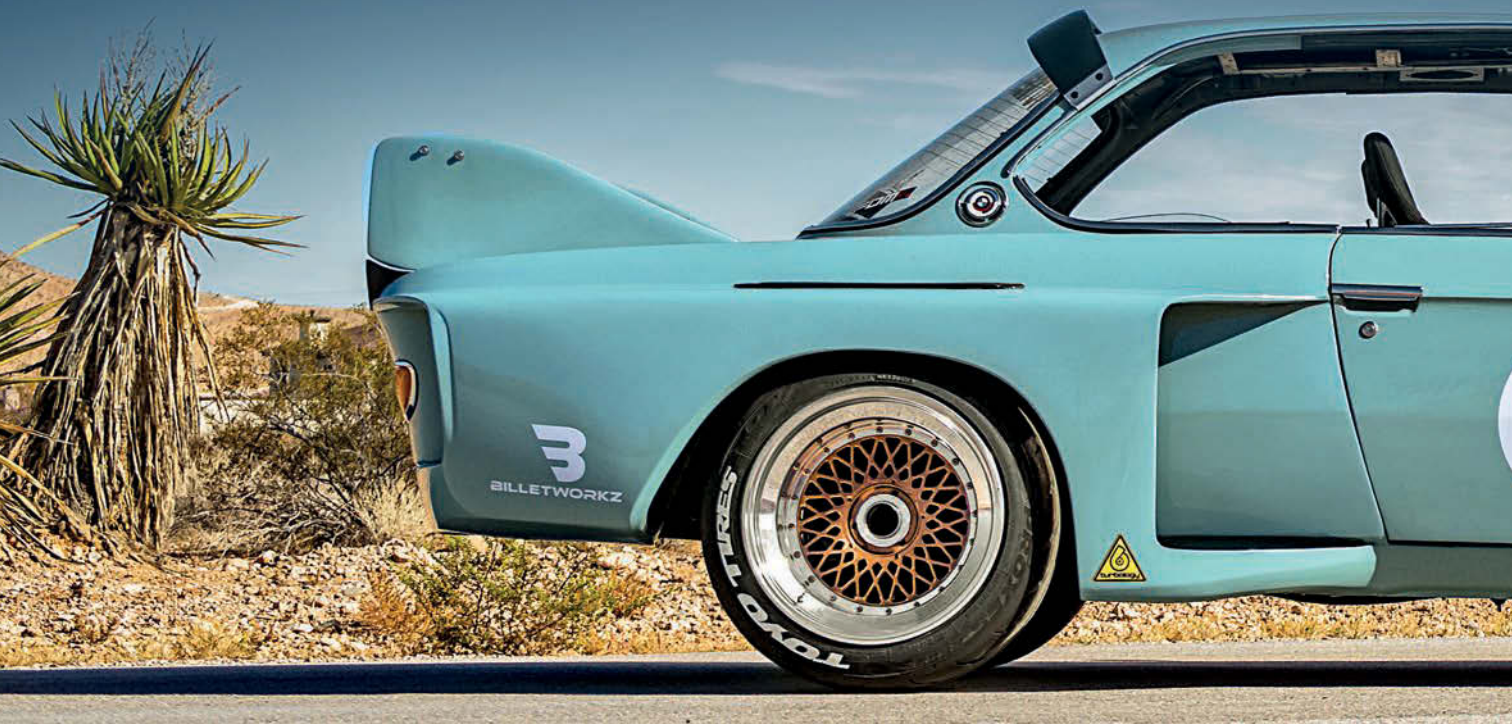
Words ELIZABETH DE LATOUR / Photos VIKTOR BENYI



Occasionally, a car so special comes along that it leaves us truly breathless, and Willy Izaguirre's turbo S52-powered E9 CSL tribute is one such car. Every year, SEMA is full of absolutely incredible builds, but even among such god-like creations, there are a few cars that manage to stand out and elevate themselves to the absolute zenith of modified car culture, and this E9 is one such machine. It was without doubt the modified BMW of that year's show, and one of the cars that everyone was talking about, regardless of where their modifying allegiances might lie. It's just awesome, that's the only way to describe it, an incredible build with near-universal appeal that leaves you in awe, and we're kind of in love with it if you couldn't tell.

It's hard to know where to even begin with a car like this, which has undergone such a complete and absolute transformation, but really it all starts with the owner. So, who is Willy Izaguirre? A legend of the modified scene? Owner of his own modifying empire? Well, no; he's just a car guy, but one with a bit more vision and drive than most of us. He's originally from Guatemala but these days resides in New York. He's an electrician by trade, but quit his job two years ago to start doing CNC work, laser-engraving, and making some of the most unique gear knobs we've ever seen (check them out at @nostalgic_grains); and this is his first Euro build. We'd say he's done a pretty good job with it...

Throughout his motoring life, it's been Japanese machinery that has been Willy's focus, from his first car (a 1988 Toyota MR2) to his fully-restored 1968 Datsun Fairlady running an SR20DET swap, which he currently owns alongside this E9. But the seeds for what would blossom into his full-blown →



“RACING BBS WHEELS ARE SO ICONIC, SO DESIRABLE, AND SO SEXY, THEY WORK SO WELL ON THE CSL AND IN MAGNESIUM CENTRELOCK FORM, THEY ACHIEVE ABSOLUTE WHEEL PERFECTION”

love for BMW were sown when he was just a boy. “I’ve been interested in BMWs since I was a kid back in my home country circa 1990. Next to my house was a BMW repair shop, and I always spent lots of time after school there,” he says. He got the taste for BMW ownership with a 2002 and an E30 before he went big with his E9 build.

Clearly, Willy has an interest in the classics, and that’s what drew him to the idea of this project. “I decided to get to the roots of BMW’s racing history by building a resto-mod of the iconic 3.0 CSL. A good friend sold me the car, a 1973 3.0 CS, and it was a rust bucket... The floors were rotted straight through, you could see the road underneath!” he exclaims. Having seen some pictures of how the car looked when he bought it, we’re even more amazed by the end result. “I drove it for two months and fell in love with it... however, it was quite slow and needed major surgery to get it repaired, that’s why I decided to do the resto-mod,” he explains. “At SEMA 2016, Jon Sibal made a render of a CSL, and I reached out to him to ask if I could use his render to build a SEMA 2017 project. He gave me the green light, and the madness began,” he says.

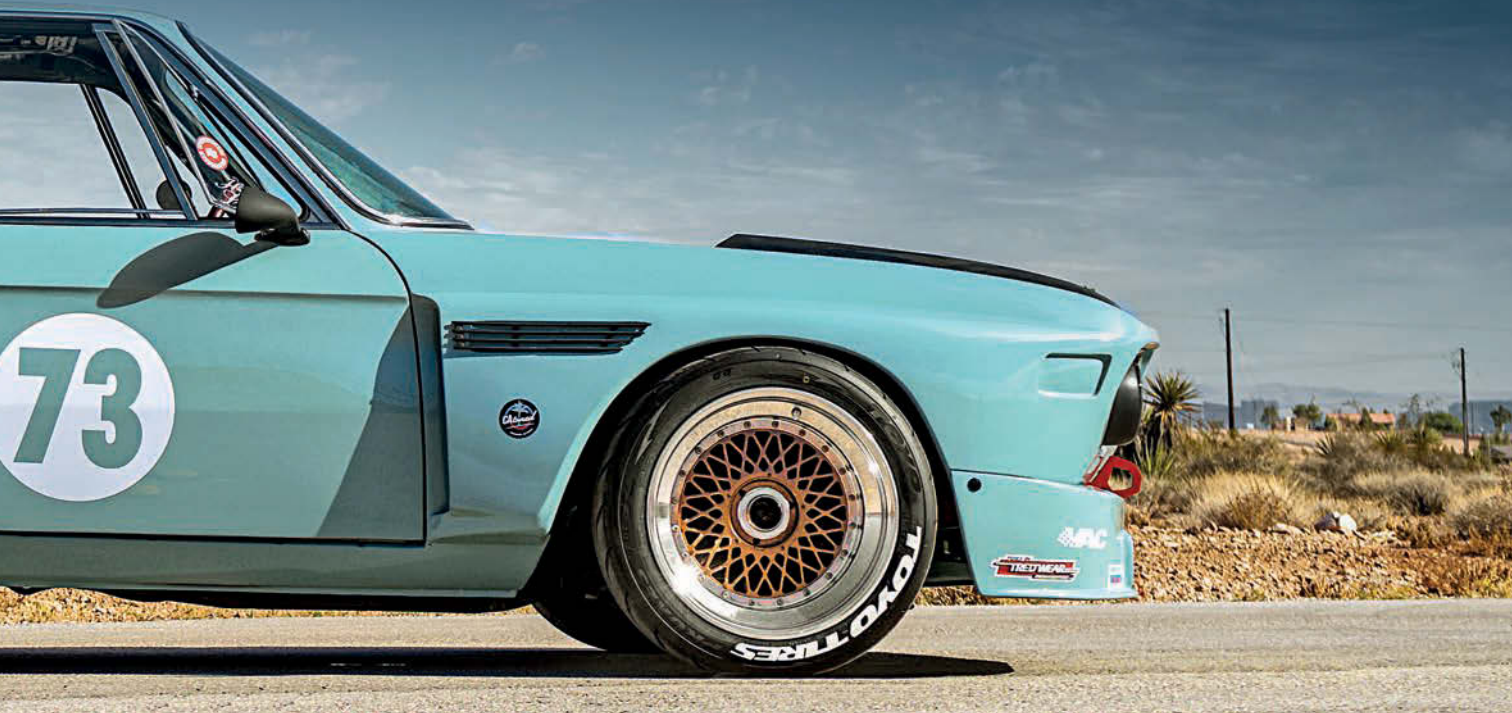
Willy didn’t waste any time and got stuck straight into the build, but, unfortunately, it didn’t get off to the most auspicious of starts... “The project started about 18 months ago when I brought the car to a shop not too far from me to do the engine swap,” Willy tells us. “After a

long eight-month period, they called me to tell me that it was ready. When I got there I saw the car and was very disappointed. The engine was crooked in the engine bay, they had ‘hockey pucks’ as motor mounts, and the transmission and intake manifold did not fit. I took the car out of that shop and brought it to Redline Restorations to fix everything,” he says, and fix everything they did. “We made custom engine and transmission mounts, the whole engine bay was stitch welded, and the bottom of the car was reinforced with a 2x4 steel beam,” Willy explains. That did the job of bringing the car up to standard and sorting out all the maladies.

You can’t have missed the engine swap that Willy mentions because there’s no bonnet on the car, and it’s one of the first things you notice and that smoothed, stitch-welded bay really shows it off at its very best. The engine itself is an S52B32 from a 1998 E36 M3, and Willy says that it’s had some minor mods carried out, though we get the feeling his idea of minor might be slightly different to most people’s...

Everything is built around that turbo (because why wouldn’t you turbocharge your S52?), which is a Precision 62/66 with a T51R mod by OCD Works. It’s bolstered by an uprated head gasket, ARP head studs, uprated injectors and an uprated fuel system, an aftermarket intake plenum and VAC Motorsports oil cooler. The exhaust manifold, exhaust, screamer pipe





Turbo S52 is simply epic

TURBO S52 E9 CSL TRIBUTE

ENGINE AND TRANSMISSION 3.2-litre straight-six S52B32, uprated head gasket, ARP head studs, uprated fuel system and injectors, ceramic-coated Precision 62/66 turbocharger with T51R mod, titanium exhaust manifold, aftermarket intake plenum, intercooler with titanium pipework, VAC Motorsports oil cooler and cap, rear-mount radiator with titanium pipework, RK Tunes map. ZF five-speed manual gearbox

CHASSIS 9.5x17" (front) and 15.5x17" (rear) BBS magnesium centrelock wheels with gold centres and 255/40 (front) and 315/35 (rear) Toyo R888R tyres, CA tuned coilovers

EXTERIOR Custom blend paint, custom Group 4 wide-body kit, wind splitters, carbon rear roof spoiler and boot spoiler aerofoil, carbon rear arch vents, carbon headlight covers

INTERIOR Carbon single-piece bucket seats with M tricolour stitching, vintage Nardi wooden steering wheel, custom Nostalgic Grains gear knob, custom carbon dash, custom Speedhut gauges for oil temperature, water temperature, and boost pressure, AEM AFR gauge

and intercooler piping were all fabricated by hand from titanium, and the exhaust and turbo have been ceramic coated. You might also have noticed that there's no rad in the engine bay. Cast your eyes to the rear of the car, and that's where you'll spy the cut-out in the boot lid that feeds air to the boot-mounted radiator, with all the pipework for this having also been fabricated by hand from titanium.

An incredible amount of incredible work has gone into this engine and engine bay, and it's all just, well, incredible really. That engine bay might well be one of the cleanest we've →



One of Willy's own custom gear knob creations



Gorgeous carbon fibre dash (and no airbags)



Massive front-mount intercooler



Those custom arches are simply enormous

ever seen, and the engine is spectacular, it's dream build stuff, really. This car would have been utterly spectacular regardless of what was nestling in the engine bay, but the fact that Willy has gone for a full-on performance engine build makes it even more awesome. In case you were wondering, it does have plenty of performance; once tuned Willy is expecting to see 500-600hp, which should be enough to make things interesting...

Dragging ourselves away from the engine bay, we have to remember that this car started out life as a narrow-body E9 and that's when you learn that almost all the body panels you see before you have been custom-made. "I always like to build something unique; my friend Lance Medina at Clason Point Collision did all the bodywork and paint," says Willy. He's done a hell of a job creating the custom Group 4 wide-body kit, which looks absolutely perfect and just utterly spectacular. The CSL Batmobile is one of the wildest BMWs ever built, and Willy's tribute



captures and recreates every aspect and element of the original racer perfectly, and then takes it even further. You've got your period-correct details, such as the wind splitters up front and the classic BMW badges, but then you've got all the carbon aero elements that Willy has added, which not only look fantastic but work so well with that custom minty paint.

The roof spoiler is made from carbon, as is the aerofoil of the rear wing, then there are the carbon headlight covers, and even the vents mounted on top of those massive rear arches are fabricated from carbon and are fully functional – look closely and you'll see the rear tyres and tarmac through the slats. Every scoop and vent is fully-functional and not just for show, apart from the side grilles, which are simply attached to the front wings, exactly as they are on the actual CSL racer. The whole thing is so good that it doesn't look like a resto-mod tribute, it looks like the real deal that someone has lovingly restored, and that speaks volumes about the

quality of the work involved, and the attention to detail that's been lavished on this build.

Now, we have to talk about the wheels; obviously, we were going to anyway, but just look at them. They are the most perfect wheels imaginable for this car, and those rears are just insane, so wide, so much dish, just incredible. "Since I was building my own version of the Batmobile, I wanted to use period-correct wheels," says Willy, "so the decision for a set of BBS magnesium centrelocks was made," and this was unquestionably the right decision. Racing BBS wheels are so iconic, so desirable, and so sexy. They work so well on the CSL and in magnesium centrelock form, they achieve absolute wheel perfection. Willy's got 17s on the car, and they measure 9.5" wide up front and – brace yourselves – 15.5" wide at the rear; they're almost as wide as they are large! Seeing them on this car, with those gold centres, and massive widths filling out those arches so perfectly, you become acutely aware of the →

"WILLY'S GOT 17S ON THE CAR, AND THEY MEASURE 9.5" WIDE UP FRONT AND – BRACE YOURSELVES – 15.5" WIDE AT THE REAR"



fact that choosing anything else would have been sacrilege. Perfect wheels need perfect suspension to complement them, and here Willy turned to CATuned for a set of the company's coilovers, which offer 30-way damping adjustment alongside their height adjustment, and they deliver the perfect drop.

The outside is outrageous, but when it came to the interior Willy also had some serious plans in mind. "I wanted no interior at all," he says, "just two carbon fibre seats and a carbon fibre dash made by my buddy Tony Spitaleri at Carbon Fiber Element," and that really is it. There is basically nothing else in the cabin of this CSL, which is wholly appropriate really and ties in perfectly with the whole racing car tribute concept. While there might not be much there, what there is, is to die for. You've got those two sexy single-piece carbon buckets, complete with M tricolour stitching, which dominate the otherwise barren, fully-stripped and grey-painted metal interior. There's that lush Nardi wood-rimmed steering wheel, and one of Willy's own custom gear knobs finished in a blend of wood and mesmerising resin. Then you've got the simply sensational carbon dash. It's this big slab of glorious black weave that is draped across the entire width of the interior and features a double gauge cluster pod that houses the custom Speedhut gauges for oil temperature, water temperature and boost pressure, as well as the speedo and rev counter, set in a brushed metal plate, and between which sits an AEM AFR gauge. All of it is simply stunning.

While this car may be 'finished' it is, of course, not finished. Willy has plenty more plans for it, but with the SEMA deadline to meet, and having lost eight months of build time at the start of the project to the company that first had a crack at the car and failed to deliver, it wasn't 100% complete when it was unveiled at the event. There's lots still to come, including a set of custom aluminium panels that Willy will be fitting inside, along with the custom roll-cage that will also be installed. Those are the short-term plans that were on the to-do list all along, but the long-term plans are rather more grand. "We have plans to add a sequential transmission, APR race jacks and a BBK," says Willy, and those additions will take this build to the next level if there even is a next level above a build like this...

With this extraordinary CSL tribute, Willy has built his dream car, achieved everything he wanted to do, the way he wanted to do it and the results speak for themselves. You can't build a car like this without passion, and that is the very essence of this entire project ■

THANKS First off to God, my wife and my two kids: Emily and Anthony, my mother, Eva Media, for stitching together the centre sections on the seats by hand after the sewing machine decided to quit on



her, PJ Pitcher (@Turbology) for keeping me on track even when I was ready to quit on the build process and also for being the co-pilot for the 44-hour drive from NY to Vegas towing the BMW, Jason Schmuck (@schmuckbuilt) for all your fabrication skill and always working with me on crazy projects, Tony Spitaleri (@carbonfiberelement) for hooking me up with some amazing carbon fibre pieces, Billy Hoang (@needpowdercoating) for all the ceramic and powder coating, Tony Salloum (@Vacmotorsports) for all your support and expertise, Lance Medina (@Clasonpointcollision) for all body work and paint, Stan Chen (@toyotires) for tires and the opportunity of SEMA experience, Jon Sibal (@jonsibal) for the

badass render, House of Logos in the UK (@house_of_logos) for refinishing the BMW roundels, RedLine Restorations (@redlinerestorations) for bringing the rust bucket back to life, George Kiriakopoulos (@modifiedperformance) for opening his shop doors in Vegas to us to work on the car on a Sunday (we never met before) – you, my friend, are a badass drifter and I wish you the best, Alex Kersten (@autoAlex) and his Car Throttle team for being so cool and nominating the BMW for the Gran Turismo Award, my good friend Austin Barnett (@billetworkz) for the CNC expertise and being without a doubt my best friend, @speedhut Custom Gauges, @Tredwear Tire Graphics, @Ocdworks

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