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The e34 5 Series

A Time to Be Bold

1982–86—The Hungry Years

BMW wasn't a company to show weakness, but 1982 through 1986 were trying times. This period saw the launch of the major new ranges known as the e28 5 series and e30 3 series. The market welcomed them, sales went up, they were judged an improvement over their predecessors, but there was a problem. BMW never bestowed a new "e" code on a reskinned car, but they were new in a qualified sense. Plus, new European machinery was putting a question mark over BMW's value added. Europe's Ford Sierra and the new GM J car were lighter and more aerodynamic than past models. When it came to acceleration, top speed and gas mileage, a new Opel Ascona 1.6 showed up a BMW 316.

The BMW niche was honey to competitors' bees. The 1983 MB W201 190 range was a direct response to the success of the 3 series, and a serious rival BMW could have done without. The midsize MB W124 mirrored the sporty 190 ... BMW was battling. BMW was no longer the automatic first stop for a sport sedan, and it all happened while BMW was busy being a good citizen. Whittling away weight, introducing electronic advancements and improving fuel economy wasn't sexy. At a time when BMW was earning kudos for Formula 1 success, the image of its road cars was in trouble.

There was no hot e28 until the 1985 MY, and the boldest small Bimmer of the era was the 323i cabrio, and even Baur did that open-top conversion. BMW's R&D department needed a shakeup. Chairman Eberhard von Kuenheim fired the conservative Karlheinz Radermacher from the position of R&D chief. In 1985 Radermacher's successor, Hans Hagen, was in turn replaced by Wolfgang Reitzle. Turmoil in a transitional phase, and the Bavarian funk, carried over to their other mainstay, motorcycles. After 60 years BMW's trusty air-cooled flat twin was being largely phased out over 1983/84. The new family was the K series, affectionately called the "Flying Brick," which offered a water-cooled I4.

Beemer bike fans were a mite miffed over the loss of their old friend, and industrial strike action was making matters harder for BMW. On May 14, 1984, the metal workers of

Opposite, top: A very early UK spec 1989 520i SE 5-speed wearing the upgrade 15 × 7-inch basket weave alloys with 225/60 VR tires (courtesy Andy Ottaway). ***Opposite, bottom:*** The original 520i's 12-valve SOHC six made 129 bhp at 6,000 rpm and 128 lbs./ft. at 4,300 rpm, which pushed the 2-liter sedan up to 123 mph (courtesy Andy Ottaway).



West Germany engaged in strike action to gain a 35-hour working week. BMW had to close four days later. The strike had a bad effect on German industry and specifically affected BMW with its new K series. As Eberhard von Kuenheim said, "In the U.S. we have already lost the '84 motorcycle business to the Japanese."¹ When it rains, it pours in the Black Forest!

On the books BMW was still in the black in any given year, but it was hard going in the economic jungle. BMW could only charge premium prices in export markets, upon which it was greatly reliant. At home BMWs cost less than comparable Mercs. Adding insult to injury, MB models made full list price, and usually had a long waiting list. The electronic gizmos Bimmers packed were partly responsible for the e23 7 series' gaining a reputation for taking unscheduled Autobahn naps! The moral of the story is that no one ever loved a computer.

Fortunately for the Munchen men, tides turn and fortune changes. By the mid-'80s BMW realized that the Motorsport division was the one entity Ford, Opel and VW didn't have, and that they should use it. The revised and expanded 1986 e30 range was a step in the right direction, with the biggest news being the imminent arrival of the 1987 M3. This 200 bhp mini-brick was the exact image-making variant BMW needed. Successful as a road and race car, the M3 was a Ferrari 308 GTB wrapped up in 2002 clothing. Everyone wanted an M3; it made people want a BMW again.

So commenced a glorious high-image era where Bavarian engineers no longer relied on their slide rules to impress the public. BMW had discovered the lure of style and its name was the new 1987 e32 7 series, a larger, crisper-styled e23 replacement courtesy of Claus Luthe's pen. With expansive flat surfaces implying power, the '70s blobby heaviness of the e23 was banished. Suddenly the W126 MB S class looked tired and cumbersome. The e32 was BMW's first all-new design since the 1978 M1, and hot on its heels was the also all-new 1988 e34 5 series.

E34 5 Series—The New Guy

In a major break from the past, BMW jettisoned its reverse slope shark grille, overhangs were curtailed, wheels were closer to each corner and the typically tall Bimmer greenhouse was shortened. The e34 was in line with the upcoming 1991 e36 3 series and both cars were a size up on their forerunners. The e34 cast a shadow similar to yesteryear's e23 Seven, and the e36 was a latter-day e28 Five.

BMW had a recognized style, and breaking away from the formula was tough. The e34's release was delayed because earlier drafts were sent back by management, since they looked too similar to the old e28. However, when the e34 made its debut in May 1988 it did have some old Bimmer standbys. Claus Luthe couldn't leave out that famous C pillar and the four-headlamp grille, but it was a slimmer, flat grille now with a color-coded kidney. BMW's old headlamp wipers were no more; just a high pressure jet remained.

The slimmer grille was facilitated by compact ellipsoidal projector-type headlamps. The ellipsoidal tech applied to dipped beam and fog lamp operation, permitting greater area coverage and less dazzle. The e34 clean sheet allowed greater advances in aero matters. With a higher tail, a smaller front, and an accentuated wedge, it was enough to cut the drag factor to 0.30–0.32 for the initial 520i-M5. As part of the Five's new modernity, the A



Note the e34's onboard computer registering an outside air temp of -35F. The onboard computer's info could be relayed to a dot matrix text display in the main instrument binnacle, via the turn signal column stalk (courtesy James Hartline).

pillar was more laid-back, the front windshield and rear window were flush bonded, and the rain gutters were flush too now.

With a nod to U.S.-style windshield wipers, the e34's partially disappeared at rest. There was very little e34 chrome trim; bumpers and side mirror housings were color-coded. Hunched down on its most aggressive TRX tire option, in Diamond Metallic Black, with thick muscular C pillars and a broad powerful look, for all the changes the e34 was still clearly a BMW. Indeed, the e32/34 L-shaped taillights became a contemporary BMW styling icon.

It looked bigger, because it was bigger. The e34 had the numbers over the e28 in almost every regard, 3.9 inches longer, a couple of inches wider and 0.1 inch shorter for that sportier look. The new Five also had a 5.3-inch-longer wheelbase. There was a clear physical link between the latest 5 and 7 series cars. The e34 took part of its floorpan and suspension hardware from the e32 7 series. Original planning consisted of even closer family ties, but that was dropped since it would have made the Five too heavy. There was also a need to differentiate the characters of the e32 and e34. As things stood, one needed to go to the long wheelbase e32 "L" (an extra 4.5 inches) to put daylight between the new Fives and Sevens.

The e34 also introduced a new kind of hush all over the 5 series thanks to additional



Top: With independent figures of 0–60 mph in 7.4 seconds and top speed of 145 mph, the 535i was faster than all its sedan opposition. However, it was pricier than both the Jag XJ6 3.6 and MB 300E (courtesy Tony Hart). *Bottom:* The 1988–92 530i used a 188 bhp 3-liter 2-valve version of BMW’s small six. A 1989 UK example is shown (courtesy Paul Sharp).

sound padding. The polar opposite of the lithe 2002, the e34 big bus had 112 lbs. of sound-deadening material, not just under the hood and in the doors, but in the A and C pillars too. E34 extravagance even extended to rubber mats residing under the rear bench seat. Noise-absorbent plush carpeting/headliner, hydraulic engine mounts and special driveline bushings created a dwelling quiet enough for a pharaoh to rest in. The icing on the cake involved preassembled door seals, the best way to get a good fit on the assembly line.

Given the e34's higher cruising and top speeds it was key that the new Five be as silent as an echo chamber. Even the 520i had a top speed of 123 mph, the same factory figure as the 1975 528. However, extra refinement brought a weight penalty. Comparing 520i with 520i, the new e34 was 396 lbs. heavier, which taxed existing engine reserves. That said, one reached any destination more safely since the e34 was designed to meet higher parameters. The impact speed of the BMW crash program was raised to 35 mph.

The e34 was a safer place to be, and the boys in the white lab coats had the figures to prove it. Claimed flexural and torsional rigidity were 43 percent and 70 percent better in the static state, with both aspects 30 percent improved in the dynamic state. The new Five made a very good showing in a 1990 34 mph offset crash test performed by the German TÜV and the University of Heidelberg's Institute for Legal Medicine and Injury Research, for motoring journal *Auto Motor und Sport*. In the test of 8 large family sedans the BMW 520i came first!² Second and third places were occupied by the W124 MB 200 and Volvo 740, respectively. The remaining 5 cars often showed great signs of passenger safety cell deformation, calling in to question the priority placed on safety by other European and Japanese manufacturers. As for the e34's bumpers, they were not just 5 mph units; BMW had created 9-mph bumpers! Concealed behind the color-coded e34 bumpers were hydraulic dampers and impact boxes. These items would fend off low-speed thumps sans cosmetic flaw. If a 9-mph crunch occurred, the impact boxes were replaceable, limiting repair costs.

Another cosmetic benefit of the new bumper system was that the European and U.S. 5 series cars now looked the same, except for the U.S. side marker lights, which were well integrated by this stage. It was ironic that even though the e34 was a bigger car than the old Five, the U.S. e34 was shorter than the U.S. e28, due to the much neater 9-mph bumpers. Despite the big bumper changes, there was but relatively little change to BMW's suspension, which was no bad thing.

There was a continuation of the double pivot MacPherson strut front suspension, and 13-degree semi-trailing arm rear suspension with Trac-Link. Slight refinements were made to the optional Nivomat self-leveling device, and there was an extra steel brace bar added to the rear semi-trailing arms to stiffen the structure. However, it was the different nature of the new Five itself that brought real handling change. Bolting the parts to a new larger, wider Five with longer wheelbase and 50/50 weight distribution completely altered 5 series chassis behavior. The e34 introduced a new word to BMW's vocabulary: understeer! The handling spectrum ranged from boring understeer to neutral when pushed. Work at it hard enough and oversteer would come, but there was so much warning and it was a hard task to master in the lower-powered 520i/525i.

Banished for good was the sudden fishtailing of old nose-heavy Fives, but BMW wasn't willing to depart from system TRX just yet. The e34 range started with larger wheels, nothing under 15 inches; 15 × 7-inch basket weave cast alloys with 225/60 VR tires were a popular option. However, lurking on European and UK option sheets were larger metric



Top: The U.S. e34 525i was a direct replacement for the e28 528e starter Five; there was no eta in e34. The license plate present shows the “Power Cat” mascot of Kansas State University’s football team (courtesy Dick Schneiders). *Bottom:* This 1990 Canadian spec 525i differed little compared to U.S. e34s, save the use of metric speedo and presence of French on some info decals (courtesy Alan Smith).



This 1989 U.S. 535i has 17-inch Borbet rims, Eibach pro kit lowering springs and Bilstein dampers. BMW North America's sales target for the '89 MY was 85,000 units (courtesy Barry Kaplan).

TRX rims and Michelin tires. This pack hung around until the e34's 1995 demise in the 415 × 195 mm size, shod with Michelin TRX 240/45 tires. As shown on the e28 5 series, and other cars, system TRX gave a good ride but other tires offered greater grip.

One of the few chassis differences in the e34 range was the separate spring and shock mounting on the 525i and higher models. Dual elastic rear suspension mounts were also utilized on the 525i and all variants north. However, when it came to braking, all e34s were on safer ground, using larger rotors than the e28. Front brakes were 11.9 inch vented disks, with 11.8 inch solid rotors rearwards. As per the e28, BMW continued to use weight-saving fist calipers. Even with the powerful new 535i, one was assured that the driver would never run out of brakes, tires or road!

E34 Electronic Aids—Trust the Computer

Old-school Bimmer ergonomics had a better reputation than the company's handling, so this area was just lightly redrafted for the e34. The angled dash returned, sporting more curves than on the e28. The designers placed the dash outer vents on the wraparound window trim connecting dash and door trim, so that a side window demist function was possible. The revised onboard computer was now placed on the center console below the central dash vents. Since the computer's readout panel wasn't in the driver's direct sight, its info was relayed to the instrument binnacle.



This UK spec 525i SE 24-valve was probably the best-value variant of the Euro e34s, explaining its popularity. The 1991 525i SE 24v cost 24,200 pounds sterling on debut (courtesy Craig Reeves).

Yes, BMW had carried over the Check Control function to the e34, but it was easier to use and fully automatic now. No need to look up at an overhead panel; it was all now displayed under the tach and speedo using a LCD dot matrix text display. Tap the turn signal steering-column stalk and the onboard computer's info would also be relayed using the same LCD panel. Directly below the panel was BMW's usual S.I. indicator system of colored lights. The intelligent BMW econometer was there, too, at the base of the rev counter.

Was this the cockpit of a BMW 5 series, or the flight deck of the Starship *Enterprise*? It was tough to tell now that BMW had introduced an electronic odometer/tripmeter display, an item becoming common on this class of vehicle. The idea was to make it harder to fraudulently doctor a car's mileage and thus enhance its Blue Book value. If one was boldly going where no human had gone before, then one might as well get comfy. BMW made this easier to achieve by copying the Daimler-Benz 3D power seat controller, now placed at the leading edge of the seat squab.

Manipulate the seat-shaped control blocks and electric servo motors did your bidding, moving the corresponding seat sections to the desired configuration. BMW also worked in auto height adjustable front seat belts, and reverse mount rear belts. The reasoning behind the outboard buckle connectors was so that in an accident the rear occupants wouldn't collide into each other sideways, causing head injuries. Rear seating space was slightly up



The revised M50 2-liter I6 made a decent 150 bhp. When the Vanos version arrived, max bhp/torque stayed constant, but the 140 lbs./ft. was now produced at 4,200 rpm, not 4,700 rpm (courtesy Mario Papakyriacou).

on the e28, but the e34 was a car with a lot of padding. The space-wasting rear drive format was the driver's friend, but the enemy of lovers of rear leg room.

One may have been cramped in the back of a Five, but at least the temperature was amenable. BMW included a dual zone temperature control heater as standard equipment in the e34. Standard in many export markets like America and Australia was a/c, with set-and-forget climate control as an option. Due to the e34's larger interior this was the first Five to get a rear HVAC outlet vent. It sounded like the new Munichmobile was getting softer than marshmallows, since there were a number of high-tech electronic driver aids for easier balance and control.

A hot topic of the '80s was traction control and BMW offered it on the e34 as ASC (Automatic Stability Control). Working with sensors used by the ABS system, ASC looked out for grip loss and instantaneously manipulated the throttle. If the surface was slippery it wouldn't let the driver gun the throttle, but would only permit as much engine power as could safely be used without traction loss. The system was initially withheld from the North American market: BMW management was anxious to avoid an "Audi 5000 phantom throttle" incident until ASC could prove itself in Europe.



BMW could look upon cars like this 1995 525i and judge the e34, the second all-new Five since '72, to have been a commercial Garden of Eden (courtesy Mehrdad Zarifkar).

Around the time the Vanos baby sixes were introduced BMW upgraded ASC to ASC+T. This expanded device, not available on the outgoing M30 e34 535i, selectively applied each of the rear wheel brakes to stop a skid. The extra "T" stood for traction, and ASC+T was available on Vanos 525i models during 1992, and subsequently on the V-8 e34s. So later e34s had electronic throttle and brake control on the menu, with one important quality: the system could be completely turned off. BMWs are drivers' cars and the engineers recognized that there were times when the driver didn't wish to be countermanded.

ASC was first seen on the e32 7 series, and so was EDC (Electronic Damper Control). The little brother e34 was also available with EDC, a driver-switchable electronic ride firmness device with two settings, comfort and sport. Recognizing that not all BMW owners enjoy a glass-smooth West German Autobahn, the BMW engineers working with company Fichtel und Sachs gave those traversing Belgian cobbles or English B roads a fighting chance to retain their teeth fillings! Some found it hard to discern the character difference between the two modes, and press-on types preferred the firm setting, so the option's value was questionable.

Similarly questioned sentiments existed over the optional Servotronic system for the e34's recirculating ball steering. Rather than base power assistance on engine speed, Servotronic measured out help using road speed. The system met its goal of giving extra assistance at low speed for parking maneuvers, but the assistance seemed to hang around at higher speeds too, leaving the steering feeling too light during freeway cruising. Once again, informed parties chose to avoid the expense of Servotronic, since the e34's regular power steering was already very good.



The 525i SE had many of the features that came as standard equipment on the 535i, like sunroof, alloys, sports steering wheel, onboard computer and Blaupunkt Bremen stereo cassette deck. The SE's value was clear to see ... even in a fog (courtesy Ollie Juggins).

As per later e28s, the e34 used the ZF 4-speed auto, with the option of a switchable EH version with 3-mode shift program. The latter EH box was standard on the e34 535i, and the mode selector had changed. No longer the e28's dial, the e34 used three buttons next to the shift gate on the driver's side. As before there was Sport (S), Economy (E), and the manual hold 1-2-3 mode, now denoted "M." For the 1993 MY, a ZF 5 speed 5HP22 autobox was introduced on the baby-six-powered Vanos cars.

The 5-speed auto brought a new level of flexibility in this engine size class. With the 5-speed the M button was replaced with a snowflake symbol, signifying a winter shift program for slippery conditions. The 5-speed auto never made it onto the M30 engined e34 535i. Standard e34 gearbox was an overdrive 5-speed manual, with a close-ratio 5-speed optional in Europe.

A couple of extra items brought by the e34 were pressure control for the windshield wipers, and a vent fan timer. The first feature was on the top-end 530i/535i versions; with higher road speeds the wipers were pressed more firmly onto the windshield. With the second it was possible to turn the fresh air ventilation on via the onboard computer's timer setting, so that air was circulated and the car's interior temp lowered while parked.

Fresh air was also coming from the e34's tailpipe thanks to stricter European emissions regulations. Those EEC regulations were agreed on June 28, 1985, taking effect from October 1989 to October 1993. It all implied a detoxed catalytic converter future for the e34, cat converters for the home market and the ability to run unleaded gas without adjustment.



Top: A 1995 UK 520i SE in Arctic Grey metallic, with Shadowline and 15-inch BBS cross-spoke rims (courtesy Martin and <http://www.bmwland.co.uk>). **Bottom:** This loaded 520i SE has silver leather interior, walnut trim pack, front armrests and a full-size toolkit (courtesy Martin).



Yes, the 525tds was an outright performance match for the 520i, and offered superior in-gear acceleration times, but its diesel couldn't match the turbine smoothness of the Vanos 2-liter shown (courtesy of the owner).

The latest e34 520i still had the familiar 1,990 cc I6 with 129 bhp, but its CR was slashed down to just 8.8 to one! The same applied to the 525i, which also had 8.8 CR, but many changes had occurred since the e28. The e34 525i used a 2,494 cc version of the BMW baby six, not the M30 big six as in olden times. Power rating was also well up, with the new 525i making 170 bhp. Similar news applied to a new European variant called 530i. The e34 530i sported a 188 bhp 2,986 cc edition of BMW's baby six, with a higher CR of 9 to one. This left just one more step in early e34 days: the 535i.

The e34 535i used the rugged 3,430 cc version of BMW's big six, but differences were abundant. As with other e34 variants Bosch DME was a standard fit, plus a CR drop. The BMW 3.5 liter was no longer rated at 218 bhp with 10-to-one CR. The detoxed 3.5, as seen in the e32 7 series, had 211 horses and a CR of 9 to one. However, performance figures were generally improved over the e28 era. A better drag coefficient meant that claimed top speeds were mighty high. The new 525i and 535i boasting claimed terminal velocities of 137 mph and 146 mph, respectively.

Factory acceleration times were also adequate in spite of the e34's greater girth, and those weren't the only gains. For the U.S. 1989 MY it was all gain, with the e34 receiving 2 model variants with the same power enjoyed by Europeans. The U.S. 525i was rated at 168 bhp and the 535i was on 208 bhp. These were SAE figures, equal to the DIN outputs quoted by BMW. North America would benefit now that Europe had made friends with the cat converter, and the U.S. 535i's 208 bhp was a big improvement over the 182 bhp of



Top: For active safety BMW introduced ASC+T around the time Vanos became available. A precursor to modern stability control systems, the e34's ASC+T curbed understeer and oversteer in crisis situations by selectively braking individual rear wheels (courtesy of the owner). *Bottom:* In spite of the German-style front license plate, this 1995 525i resides in Sunnyvale, California. Clear turn signal lens covers are a popular aftermarket accessory (courtesy Robert Kane).



Top: The 518i lived on into e34 days, right until this final e34 1995 MY 518i SE with revised M43 I4. These late-design BMW alloys were supposed to stop the tire from jumping off the rim during a blowout (courtesy Darren Kelly). **Bottom:** This 1996 UK e34 518i SE Touring shows that BMW's new I4 was feisty enough to deal with a wagon body. The e34 Touring continued in Europe until the e39 Touring made a '97 MY debut (courtesy Ray Coldwell).

the previous U.S. spec 3.5. There it was: 2 billion deutsche marks well spent. The 5 series sat smugly in its new e34 business suit, looking rather pleased with itself.

The DOHC 24 Valve M50 Baby Six (520i/525i)

However, there was room for improvement with the small 6-cylinder e34s, BMW's Euro volume sellers. The BMW 2/2.5 liter I6s may have been emissions ready, but they were adjusted at the expense of throttle response. BMW needed something more in tune with the emissions challenge at hand. The solution was the heavily revised 24 valve M50 baby six, making a mid-1990 debut in the German home market, a 1991 MY entrant for world markets.

The new DOHC M50 I6s had class-leading power outputs of 150 bhp and 192 bhp, for the 2-liter and 2.5-liter versions respectively. The M50 was tilted 33 rather than 30 degrees from the vertical to permit the bulkier cylinder head to clear the hood. More cams and more valvetrain meant more noise. To put a sock in the I6's mouth, hushing stereo cams and quad valves, BMW employed a sound-dampening engine lid. It was a fake dress cam cover that sat over, but wasn't very well aligned with, the real cam cover. However, with the doubling of engine parts and the move to chain drive, there were extra decibels to dampen.



A German spec 520i Touring in Oxford green metallic with the M50B20 multivalve I6. At BMW, cargo took a back seat to handling with the e34 Touring (courtesy of the owner).



The 525i (1995 example shown) and 530i were the e34 wagons BMW sold in North America, the latter having made a 1994 MY debut. Four-liter and Motorsport e34 Tourings were available in Europe (courtesy Greg Flint).

The M50 was the state-of-the-art small six that was expected from BMW. It even had a plastic breathing straw! The intake manifold was plastic, and its construction method promised better breathing. The whole idea was maximum return from low-octane unleaded, and that required high tech. As put into practice by Saab, the new M50 had one ignition coil per cylinder; it also had Bosch sequential fuel injection (DME 3.1). Having a knock sensor was crucial when having CRs at 10.5 for the 520i and 10 to one for the 525i.

A much sprightlier performance was provided by the latest 520i/525i, and it was almost a pure power gain because BMW had kept the weight gain to a minimum. The use of plastic plus a hollow cam and crank kept the weight rise to just 26 lbs. over the 2-valve motors. The new 24-valve sixes bettered every number in the book, nearly an unqualified improvement. Nearly, because tardy as the 2-valvers were, they had an edge in refinement. They were a hard act to follow, given the 2-valve 2-liter was said to have refinement equal to a V-12.

As compensation, the new 520i and 525i were as fast as V-12s ... almost! Comparing BMW factory-claimed top speeds the 520i was up from 203 to 211 kph, with the 525i racing up from 221 to 230 kph. Not bad, given no rise in displacement, but there was still a problem: an absence of low-speed torque. Especially in a heavyweight shell like the e34 there was no replacement for displacement, until BMW brought out Vanos. For the 1993 MY BMW introduced variable valve intake timing to the baby six.



As with Honda's Vtec, one gets a cam for every occasion: one for mid-range torque, another for top-end power. In the Bimmer iteration there was hydramechanical adjustment of the intake camshaft by as much as 2.5 degrees, with such adjustment presided over by the engine's DME ECU. There were no claimed power increases for the 520i/525i, but their compression ratios were increased to 11 to one for the 520i and 10.5 to one for the 525i. The Vanos 525i combined with the new 5-speed auto set yet another new benchmark for complete, economical, sporty executive motoring in the 2 to 3 liter class.

When studying the e34 engine bay, there is a quick way to check whether the baby six at hand has Vanos. Vanos I6s have a protrusion at the front of the cylinder head, which accommodates the Vanos hardware. Bear that in mind the next time a plaid-wearing used car salesman tries to hoodwink you! With Vanos the writing was on the wall for the 530i, a logical if somewhat slow-selling e34 variant. The unloved 188 bhp 530i was dropped when the first 192 bhp 525i was introduced. The 3-liter seemed redundant, but the 535i continued apace.

M40—A New Generation of I4s

At the lower end of the range it seemed the Bavarians couldn't run away from the 518i nameplate. Combining an 1,800 cc engine with the large e34 body may have seemed like a joke, but BMW was serious. What started as a reaction to the OPEC oil embargo would resurface in the e34 with a new four-pot motor. BMW had pensioned off the ancient M10, replacing it with the lighter and thermodynamically more efficient M40. BMW's Karlheinz Lange came up with 1.6- and 1.8-liter M40s, which were introduced in the 1988 e30 3 series. Now for the 1991 MY the 1.8-liter version would appear in the e34 5 series.

Things started off with a 115 bhp M40 with a cast-iron block, alloy head and cambelt drive. The 2-valve-per-cylinder configuration contributed to the torquey nature of the I4; it didn't feel at any disadvantage to the departed 129 bhp 520i. This was the e34 to test the character of the owner. Could he live with a Bimmer without the credibility of an inline 6? Would she exercise the badge delete option when getting the 518i?

Those able to look past the image deficit got themselves a bargain. No shortcuts of any note were taken with the 518i's interior; this was a viable budget entry to the world of 5 series motoring. The 518i was the only e34 to use rear drum brakes, but ABS was still available, and braking performance was fine. As a package the 518i worked, so it was the fleet buyer's friend. Given a choice between a 518i and a loaded Ford Scorpio/Granada or Opel Omega/Vauxhall Carlton, the answer was child's play: the blue-and-white roundel ran out a winner every time!

Benefit from badge cachet, and the 518i's ability to run on a lower-octane gas than other Fives, all got even better during 1994 when BMW introduced the revised M43 I4 to the 518i. It was still on 1.8 liters, but now featuring lifelong chain cam drive. Torque was slightly up, from 122 to 124 lbs./ft. The revisions were first seen on the e36 family and

Opposite, top: BMW's all-wheel-drive "iX" system combined with the e34 Touring body was a practical combo that predated the SUV. BMW's e30 and e34 iX models only used the 2.5 liter I6 (courtesy Mark Hoy). **Opposite, bottom:** BMW marketed the new 530i V-8 as a direct replacement for the outgoing 535i I6, with a 7 bhp advantage. Here we see the 530i in a South African setting (courtesy Duncan Meyer).



Enjoy the 540i's 295 lbs./ft. at the track. A front spoiler with brake cooling ducts and rear vented disks were further trackside advantages the 540i enjoyed over the 530i V-8 (courtesy Dave Brennan and Jack Puryear).

included individual control intake manifold (ICIM) to eke out more go from the small four. Power output for the 1.8-liter I4 stayed at 115 bhp.

BMW factory figures for the 518i 5-speed manual (automatic was unavailable) involved 0–62 mph in 12.4 seconds and a top speed of 121 mph. This was no M5, but at least one could pretend to be in that exalted chariot while cruising at a genuine 100 mph in the humble 518i! For 1995 BMW extended the practical nature of the 518i even further through a wagon Touring variant. Indeed it was in that Touring body that BMW dabbled with an alternative fuel source in 1995. BMW released the BMW 316g Compact and 518g, model variants that ran on Compressed Natural Gas (CNG).

With CNG the driver uses more of it than he would gasoline, but in some parts of the world it's cheaper, so the motorist cuts overall cost. CNG is very clean-burning, but its convenience depends upon how established its distribution is in any given country, and it also works better with larger engine sizes. A more common alternative in Europe is diesel, and BMW was really picking up the pace in that area after a slow start. In the '90s they not only offered more diesel models, but were more proactive in selling their diesel engines to other manufacturers.



Top: With 286 bhp and 4 liters of displacement, the 540i V-8 auto got close to the M5 3.6 on paper, and even closer in real-world driving. *Bottom:* The new Nikasil 3- and 4-liter V-8 of the '90s was BMW's second postwar V-8 design, and like its '50s counterpart it was all alloy too (courtesy Lee Ridgway).

E34 Touring in a Diesel?

Open the hood on an Opel Omega or Range Rover and be greeted by the sight of a BMW diesel engine! A diesel e34 was around from the start of e34 life in the form of the 115 bhp 524td, a carryover from the e28 days. For the 1992 MY the 524td was replaced by two new versions called 525td and 525tds. As the names suggested, these cars had enlarged 2.5 liter I6s, courtesy of a longer stroke. The new M51 turbodiesels had improved torque: the 525td produced 115 bhp, but the intercooled 525tds came with 143 bhp.

Diesel motoring had come a long way in performance and refinement. BMW diesels had an encapsulated engine compartment, so that the e34 diesel interior was just as hushed as its gasoline counterpart. The mechanical refinement of the latest turbodiesels, their mile-stretching economy and high torque output were quickly making them the “thinking man’s” 5 series. Given high European gasoline prices and the pokey power delivery of the 520i/525i, it was becoming difficult to overlook BMW’s turbodiesels.

A greatly expanded model range is what the e34 was about. The 5 series was a niche player no more. There were diesels and there could even be wagons. BMW started on the sports wagon trail in 1971 when launching the 1600–2000tii Touring range, a Michelotti-styled hatchback version of the 2002. The hatchback was discontinued in 1974, not having been the commercial success BMW had hoped for. However, things turned around completely with the 1988 e30 3 series based Touring.

The e30 Touring hit a home run for BMW. The range was quickly expanded to embrace BMW’s full line of 3 series engines. The new Touring was a good fit for BMW’s demographic profile. Those who had dutifully bought BMW 2-door sedans needed something that could cope with a small family. The Touring was the answer, and it allowed Bimmer fans to stay loyal to the marque. On a larger scale, the subsequent 5 series Touring stopped defections to the Daimler-Benz T series wagon camp. For those who said they would never own a station wagon, BMW’s e34 Touring was an acceptable compromise.

Thus, in the 1992 MY, BMW released the initial 520i and 525i Tourings. These wagons weren’t heavy load-luggers in the fashion of a faux wood-paneled Ford Country Squire 351 or a Volvo 740 wagon. The emphasis was on style, a sedan driving experience, good looks with practicality. The e34 Touring didn’t adhere to the “boxy is best” template, and the independent rear suspension didn’t bless the style wagon with a perfectly flat load floor.

It was no workhorse, but BMW did wagonize the e34. The floor was raised an inch so that it was level with the loading lip. Carpeting in said load area was of coarser grade than that found in the passenger compartment. The 60/40 split folding rear seats allowed long items to be stowed while part of the rear bench was still inhabited. Optional split nets from the rear seats could attach to the Touring’s ceiling to secure random small objects. The seat back bolster came with a privacy security load cover.

The Touring featured a reinforced e34 roof, and when fitted with optional luggage racks, further extended the wagon’s cargo capacity. How much could an e34 Touring carry? With the rear bench folded, the e34 Touring was good for 51.2 cu. ft. This was much less than prestige rivals, especially the MB T’s 76.8 cu ft, but it was a BMW after all. The Touring offered the best ride comfort/handling class compromise; indeed, since Touring development was later than the e34 sedan, sentiment existed that the engineers had done a better job on the Touring.

Chassis changes were modest, but once again the Bavarians got things just right. Front springs were stiffer and so too were the rear shocks; larger diameter sway bars were used as well. There was also cosmetic harmony, as physical changes to the e34 concerned the B pillar rearwards. The designers created a gently rising swage line, and included larger versions of the e34's "L"-shape rear lamps to balance out the greater rear bulk and glass area. The result was a seamless wagon that thought it was a sedan.

Little touches to keep the family happy on a vacation trip covered a 10-speaker stereo with speakers hidden in the rear ceiling and a concealed radio antenna. Radio antenna wires, doing double duty as car alarm sensors, were placed within the rear side window glass. To maintain clear rear vision BMW used one rear window wiper, with a nozzle spray aimed into the wind so that the mist spray evenly covered the glass. In a move harking back to U.S. wagons of old, the e34 Touring possessed a split tailgate.

Open the entire rear tailgate, or just the rear glass window to access that toothbrush at night while camping: with the e34 Touring, the choice was yours, and there were electric servo motors to make light work of either task. Another possible aperture was an optional 4-way panoramic dual steel sunroof, a gadget fetishist's dream come true complete with a one-touch batten-down-the-hatches shut-up-shop facility. Officially called the Double-Lever Sliding Sunroof, the large dual panel device had a complexity that would have instilled fear into any Bimmer product liability czar.

The two tilt-and-slide sunroofs were enough to scare small kids and moderate-sized pets, as the power-assisted panels whirled to make the wagon a virtual convertible. Engine playlist options were regular 5 series fare. When the Touring went to the U.S. it started out in 525i form, with the 530i V-8 variant added for the 1994 MY.

With the V-8 version one could race to the golf course! The 530i Touring was the hottest 5 series wagon BMW North America offered. Europe received more potent versions although it was the turbodiesels that made the most sense in that part of the globe. A vehicle with all-wheel drive could also be useful in Northern Europe, during winter when the hills were covered with snow: all-wheel drive gave a car the surefootedness of a mountain goat. Audi proved this successfully in the '80s with its Quattro concept.

On All Fours — 525iX

The 1980 Audi Quattro turbo coupe elevated the marque. A championship-winning vehicle that rewrote the rally rulebook, four wheels driven — good; two wheels driven — bad! Audi quickly capitalized on the Quattro coupe's attraction by bringing out Quattro all-wheel drive variants of all its model ranges. The public really dug the Quattro idea, leading other European brands like Alfa Romeo and Daimler-Benz to introduce all-wheel drive on some of their cars. Mindful of the Quattro's performance image, BMW weighed in on proceedings with the 1986 325iX, an Audi 90 Quattro rival, but the story started years earlier.

BMW started developing an all-wheel drive 3 series in 1980. Much re-engineering work had to be done to convert the baby-six-powered rear-drive 3 series into an all-wheel drive high-performance car. The result was a drivable pre-production version denoted 325i/4 in 1984, eventually being released as the 325iX. The engineering lessons learned from this

exercise were transferred to the 5 series when the 525iX was launched for 1991. Powered by BMW's 24-valve 2.5-liter I6 (no other engine was offered), the 525iX featured permanent all-wheel drive with a rearward-biased 36/64 torque split.

It should be emphasized that unlike the 325iX, the 525iX was not offered as one of BMW's racer variants. This was just a sober middle-level e34 with traction benefits. The center differential had a viscous coupling designed by FF Developments and ZF which used an electromagnetic multi-plate clutch. At the back of the 525iX resided a rear differential with electrohydraulic lock. There was a propshaft to the front axle differential utilizing chain drive; the e30 3 series had used a rubber-toothed belt. As with the e30 3 series, the engine sump was modified to integrate with the front differential and driveshafts.

There was computer control of the power spread carried out by the center and rear differentials, shifting what the I6 could produce from front to back and side to side on the rear axle. The 525iX models had uniquely shaped and styled 16 × 7.5-inch alloy rims that wouldn't fit on a regular 525i because the more deeply dish ed iX rims would clash with front suspension struts. Naturally, all this 4 × 4 hardware made the 525iX heavier than a normal 525i, by precisely 90 kilos. Performance figures suffered: for sedans, top speed dropped from 143 to 137 mph, and the 0–62 mph time rose up from 8.6 to 9.5 seconds.

The 525iX was also more expensive and thirstier than its two-wheel-drive counterpart. A 525i used 9 liters of gas per 100 km; the 525iX used 9.6 liters. However, in spite of the above, there was one cogent reason to purchase a 525iX: control! Independent testing confirmed that both in the dry and the wet, especially the wet, the 525iX showed clear advantages in putting its 192 horses onto the road and ease with which the driver could press on at the limit. The grip limit was a safer place to be in the iX, with BMW setting the car up to preserve BMW's typical final oversteer.

The designers had created a safe and entertaining automobile with the 525iX, very useful in ice and light snow where 2-wheel-drive vehicles would normally steer themselves into the nearest ditch. It was no longer necessary to give up an executive sedan and turn to a trusty MB G-wagon or Range Rover when the going got mushy. The practical benefits of iX were even available in the 525i Touring, and BMW's all-wheel drive system permitted regular functioning of the e34's ABS system. However, sometimes good products fall upon deaf ears.

The 325iX and 525iX never made it onto the BMW bestseller list. The public didn't seem to think that the iX price premium was worth it; for them, the regular 325i/525i sufficed. BMW and Daimler-Benz discovered that the Quattro cachet only shone at Audi. Stuttgart pulled the plug on their MB 4-matic model. In the sophisticated luxo segment, marques become associated with a set of qualities, and the market seldom rewards when a manufacturer plays against type. For BMW it would seem that even in the nineties, drivers still dreamt of getting sideways in a 2002!

M60 e34 530i/540i — Back to the V-8s

BMW is well known for its excellent engines, with power, economy, and smoothness ahead of the rest. In the 1950s the company's highest-profile engine was an all-aluminum V-8 designed by Alfred Böning. This unit was made in 2.6- to 3.2-liter sizes with an in-block

oil cooler, and was the world's first volume-produced all-alloy V-8. However, there were areas of weakness: the in-block oil cooler was n't that great, and it was a heavy engine. As an OHV design it didn't incorporate the hemispherical nature of the 1,971 cc OHV Fritz Fiedler I6 found in the classic BMW 328.

With dual carbs and 160 horses the BMW 507 3.2-liter was no match for the 3-liter I6-powered MB 300SL Gullwing with direct fuel injection and 240 bhp. As a grand tourer the 507's V-8 was friendly enough, but the Bavarians could do better. That better came in 1968 when BMW returned to the luxo segment and introduced 2.5/2.8 liter versions of its big six for the e3 sedan and e9 coupe. This engine was the head of the class, being durable, economical and, most importantly, powerful!

BMW made a better six than Daimler-Benz, or anyone else at the time. BMW's big six also served well through the '70s when the fuel crisis made the MB V-8s and Jag V-12 seem too extravagant. U.S. luxury V-8s also looked uneasy as they lost cubic inches and power with each passing year in the name of emissions control and better gas mileage. In 1981 BMW was pleased to declare that they would be sticking with a six for the foreseeable future, but that wasn't the whole story.

The BMW 2.5–3.3-liter I6, especially when teamed with a manual gearbox, delivered performance commensurate with a V-8 or V-12 automatic, but behind the scenes BMW too was trying to go large. BMW saw the MB 3.5/4.5 V-8 and wanted one too. So they joined a couple of M10 1.8-liter I4s at the crankshaft and voila! However, a 3.6-liter V-8 was on the small side, given the big six was up to 3.3 liters by 1974, so the engineers put together two 2-liter M10s. Unfortunately there were technical problems joining two M10s of this size, so the idea was canned.

BMW's thoughts then turned to creating a V-12 from its new 2–2.3-liter baby sixes. Destination for the supermotor was the upcoming e23 7 series, with its target being the MB 450SEL 6.9; BMW had always liked to dream big. So BMW made a 4.5-liter V-12 and put it in a manual-transmission e23, where it did 0–62 mph in 7.4 seconds, with a top speed over 140 mph. This was slightly swifter than the 6.9 liter Mercedes.

The public were invited to see this 275 bhp V-12 at the 1979 Frankfurt auto show, but BMW wasn't going to build it. Blame it on the high price of a barrel of oil, or the fact the M30 was up to 3.5 liters and 218 bhp by 1978; it seemed like now (1980) was not the time for a V-12 power plant. Instead, BMW put a KKK turbo on their 3.3-liter I6 (3,210 cc) to create the automatic 1980 745i turbo. It's still called 745i since, in racing regs, multiplying by 1.4 (3.2×1.4) gives an effective, normally aspirated displacement of 4.5 liters. Turbocharging also gave the 745i 252 bhp at 5,200 rpm and 280 lbs./ft. at 2,600 rpm.

Outright performance was unaffected by the change from 4.5-liter V-12 to 3.2-liter turbo I6, but there was some irony in the fact that the 745i was starting just as the MB 450SEL 6.9 was finishing. For the '83 MY BMW upped the ante even more by replacing the 745i's 3.2 with the then-current 3.5 liter. The turbo 3.5 made the same power, but max torque now arrived at 2,200 rpm, and even peak power was now produced at an even more accessible 4,900 rpm.

Accessible was the word: large or small, there were sixes for all. Those on a budget could enjoy the greatness of the mini 320i I6, while captains of industry had their chauffeur-driven 745is. Then there was the M635CSi whose 286 bhp 24-valve engine just happened to make the same power as the MB 6.9-liter V-8. The world was content with BMW

sixes. Sadly, no truth stands forever, and a new state of play was revealed when *Consumer Reports* assembled 4 luxury players in 1990 in a showcase of the past, present and future.³

The past was obviously the Lincoln Continental, with all the soft luxury and silence offered for those who didn't want to know there was a road under them. It was ambling along in an unfussed manner. Present champ had to be the e34 BMW 535i, with revised emissions-friendly 208 bhp I6, but the future came in the form of two V-8 Japanese rivals. The newcomers were fast-rising stars known as the Infiniti Q45 and Lexus LS 400. The closest the Japanese had come to unseating the Germans was the V-6 Honda/Acura Legend, but these competitors from Nissan and Toyota were much more serious.

Nissan and Toyota had beaten BMW at its own game, being a supreme niche market player, if one could call 181,129 cars sold into May 1993 a niche. The Japanese saw a middle ground between the Continental and 535i. They knew 30-to-45-year-old U.S. buyers didn't want to drive the Lincolns and Cadillacs their parents and grandparents had owned, but they also knew that for many the high-sport Autobahn-bred Bimmer and Merc driving performance characteristics held little sway. This was still 55-mph America and a company that offered a well-built V-8 luxury sedan filled with power assists/trimmings, and a nameplate that rhymed with success, would be suitably rewarded.

While the Infiniti benchmarked itself closer to BMW and Benz standards of driver involvement, Lexus took the comfortable scenic route and enjoyed longer-lasting sales success because of it. The LS 400 was well finished, comfortable and silent; most importantly, it was reliable. That was the clincher. Toyota had reinvented the series 62 Caddy Deville for a new generation. Worryingly for the Germans the LS 400 was like the 1975 Caddy Seville in its ability to appear from nowhere and take conquest sales.

The BMW 535i could still hang with the V-8 newbies. In comparing automatic cars the Bimmer matched the LS 400's 7.9-second 0-60 mph time, and wasn't far behind the Q45's 7.1 seconds.⁴ Considering the Lexus and Infiniti had much more powerful and bigger DOHC V-8s, 4 and 4.5 liters respectively, the SOHC I6 BMW hadn't done too badly, but fashion was against it. The 535i was the Hudson Hornet of the early '90s, an I6 car in a market that just wanted to hear V-8s!

Daimler-Benz wasn't doing much better; its I6 300E was looking decidedly meek. The Japanese were happy for the 300E to inherit the Earth, as long as their cars were first to reach the drive-in burger joint. U.S. luxury brands were also caught napping with yesteryear's V-8s. Soon everyone joined the V-8 party, since the days of high gas prices, when everyone thought the V-8 would become extinct, were over. As David Benson of the *Daily Express* wrote in 1987, "Big is Beautiful — again."⁵ So the message went out: Send us some decent V-8s. Ford readied its new modular V-8, Cadillac finally gave the Allante an engine to be proud of in the Northstar 4.6 V-8. Daimler-Benz launched a midsize 400E fit for J.R. Ewing and BMW prepared its own V-8.

BMW acceded to demands for larger power plants, but started at the top. In the final hours of the greed-is-good '80s the Bavarians released their V-12 based on joined baby sixes. All hailed the mighty 300 bhp 5 liter V-12 in the 750i/iL and 850i coupe, until the 1990 recession removed the wind from the proverbial sails. Below decks, BMW was working on some sharp V-8s to fill the chasm between the 192 bhp 24-valve 2.5 I6 and the 300 bhp 5.0 V-12. Thus, for the 1993 MY, BMW let the world meet the re-engined e32 730i/740i, powered by 218/286 bhp 3- and 4-liter V-8s respectively.

The new V-8s, designated M60, replaced the M30 3.5 I6. The 2/2.3-liter baby sixes used to be called M60, but by now all past 12-valve baby sixes were simply denoted M20. The V-8s weren't exactly all-new; they were created by joining two M40 I4s at the crankshaft. Audi did much the same when melding two 1.8-liter VW Golf GTi I4 motors to make one 3.6 liter V-8. What made the BMW V-8 special was that it used the DOHC 4-valve-per-cylinder head as seen on 318iS variants, and it was an all-aluminum motor. The construction medium gave a link to the all-alloy V-8 BMW made in the 1950s.

Aluminum was where similarity to the '50s V-8 ended. This Bavarian V-8 was technically equivalent to the modern Infiniti and Lexus V-8s. As with the M50 I6, the M60 V-8s used a plastic intake manifold, plus a noise-absorbent cosmetic engine cover. The early '90s was the start of the period where car makers wanted to make their engines look like neat household appliances. Wires and piping were all tucked away as shrouds descended, lest the poor consumer should accidentally see a mechanical component under the hood.

Bosch HFM Motronic 3.3 with knock sensors was running the V-8 show, permitting the 3-liter to have a 10.5 CR. The 4-liter had 10-to-one CR. Power and torque peaks were produced at 5,800 rpm and 4,500 rpm respectively. Max torque for the 3-liter was 214 lbs./ft., and the 4-liter had 295 lbs./ft. The 4-liter even had an edge on the Infiniti's power and torque, even though it was 500 cc down on displacement. Technical qualities extended to Nikasil bores and sintered connecting rods that weighed 538 grams, a 17 percent weight saving over conventional rods.

The M60 V-8's cams had built-in balancing of masses. During the V-8's development, use of a noncylindrical cam cured a bad sound effect displayed in the 2,500–3,000 rpm range. A chain drive rather than a cambelt was used on both V-8s. R&D boss during the V-8 project was Dr. Wolfgang Reitzle, with engine constructors Adolf Fischer and Reinhard Hoffmann. Differences between the 530i/540i V-8s were minor, badging and displacement aside. The 540i came out in 5-speed auto-only form. The 530i could have either a 5-speed auto or manual gearbox. The latter was a unique combination in this market sector, and BMW North America did offer the stick-shift 530i V-8. That was something the Japanese didn't have.

In the interests of matching horsepower with stoppability, the 540i had a front spoiler with brake cooling ducts. The 540i also had rear-vented disk brakes. For the 1995 MY, BMW made a 6-speed manual available on the 540i; in the U.S. this variant was part of a package that included front bucket seats and sports suspension. This was a worthwhile improvement because the stock 540i setup basically amounted to a 525i with M-Technic suspension. Also for the 1995 MY, BMW created a 540i Touring to complement the existing 530i Touring; the 530i also gained rear-vented brakes that model year.

One thing the V-8s had from the start was a special winged kidney grille. Broader than the regular e34 kidney, it visually distinguished the V-8 on its mid-'93 MY Euro debut. The V-8s also brought better performance stats. With a factory top speed of 146 mph the manual 530i was identical in achievement to the outgoing 535i, and matched the I6 car's 7.7-second 0–62 mph time. The 540i was electronically limited to 149 mph and 0–62 mph was 6.8 seconds as an automatic. When the 540i 6-speed arrived the latter figure dropped to 5.7 seconds.

The 540i with 6-speed incurred a price-raising gas-guzzler tax in the U.S., with an EPA city number of 14 mpg that was fair of the feds. However, BMW had long since stopped

worrying about CAFE. The V-8s had breathed new life into the e32 and e34 ranges. V-8 power had returned the marque to the luxo/sport winners circle. The V-8s would also give the German tuners something new to tinker with, and the e34 certainly showed that the tuners liked to tinker. For a number of firms the e34 was the first Five series chassis they formally got involved with.