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- An all-new, 4th-generation M5: Sports car. Luxury sedan. Either, or both: the driver chooses. [Introduction & Overview, pages 2-5.]
- A proud tradition of 4-door sedans with the capabilities of sports cars. [The M5 Heritage, pages 6-9.]
- "The V-10-engined BMW M5 is, simply, brilliant" – a typical assessment of the new M5. [This and other rave reviews in From the Media, pages 10-11.]
- The new M5 is elegantly expressive of its monumental performance. [Exterior Design & Function, pages 12-15.]
- An all-new 500-hp V-10 engine heads the M5's array of performance features. [Power & Performance, pages 16-23.]
- In the M5 interior, abundant luxury accompanies and supports definitive performance. [Comfort & Luxury, pages 34-39.]
- A range of features from front/rear Head Protection to Active Head Restraints: [Safety & Security, pages 40-41.]

- Includes models from both categories. Pages 55-65.
2006 M5: introduction & overview
Sports car. Luxury sedan. Either, or both: the driver chooses.

M5: just the name awakens anticipation and excitement. There have been only three generations of BMW M’s ultimate sports-luxury sedan up to now, and the newest one arrives to perhaps the greatest anticipation ever. Most certainly, it will generate even more excitement than its exciting predecessors.

And that’s because the new M5 embodies even more of the key M5 attributes than those forebears: more luxury, even more masterful performance, more technical sophistication – all achieved by the application of new design, new technology, new engineering.
Right from the first sighting, it is abundantly clear that this is an automobile that does not fit neatly into any of the established vehicle categories. Instead, it defines its own category. The new M5’s design reveals its spirit: bold esthetics express quintessential mastery of performance and roadworthiness. At the front, a massive central air intake admits the air its V-10 engine requires to produce 500 horsepower. The already daring 5 Series design is made more heroic by exclusive 19-in. wheels, BMW M’s traditional “gills” and the strong accent of unique rocker panels. And at the rear, four stainless-steel exhaust tips and a shapely, functional diffuser communicate awesome performance and aerodynamic capabilities to the majority: those who will be viewing the M5 from behind.

Already proving its command of European roads and Autobahnen, the new M5 enters production for the U.S. market in September ’05. This 4th-generation M5 explodes conventional conceptions of what automobiles can be. It is a sports car. It is a luxury sedan.

And as an integral, essential element of its character, the M5 embodies unique new features and technology that enable the driver to make the choice of which M5 it will be right here, right now: Sports car. Luxury sedan. Or any desired blend of the two. The driver decides.

What’s new
As of 9/05 production:

Exterior design & function
- Front bumper/spoiler/air-intake ensemble
- Traditional BMW M side “gills”
- 19-in. BMW M Double Spoke wheels
- Unique rocker panels (side sills) with sharp accent line
- Standard Satin Chrome Shadowline side-window trim
- M exterior mirrors, shaped to enhance aerodynamics and reduce wind noise
- Distinctively shaped lower section of trunklid
- Rear bumper/spoiler/diffuser ensemble
- Four round stainless-steel exhaust outlets
- Four unique BMW M colors
Power & performance
- 5.0-liter V-10 engine – 500 hp, 383 lb-ft. torque (previous M5: 4.9-liter V-8, 394 hp, 368 lb-ft.)
- All-new 7-speed Sequential Manual Gearbox, first SMG designed “from scratch” as an SMG; incorporates DRIVELOGIC in evolved and refined form. Includes Launch Control.
- M Variable Differential Lock
- Specially modified and calibrated front and rear suspension
- Electronic Damping Control (EDC) – first appearance in a BMW M model; conceived and calibrated for M5 performance/handling goals
- Special M5 steering system: “quicker” than 5 Series, two levels of Servotronic power assist tied to EDC’s Comfort, Normal and Sport settings. Active Steering not available.
- Compound, cross-ventilated disc brakes – BMW's largest-dimensioned, most powerful brakes ever – with black-painted calipers, 2-piston front calipers
- 19 x 8.5 front/19 x 9.5 rear M Radial Spoke wheels with 255/40ZR-19 front / 285/35ZR-19 rear performance tires
- BMW M-calibrated Dynamic Stability Control (DSC) with selectable M Dynamic Mode (similar to M Track Mode of M3)
- MDrive (submenu in iDrive system): allows driver to combine personal preferences into a single setting, selectable via button on steering wheel:
  - Three levels of engine power and throttle response
  - SMG DRIVELOGIC shift-program settings
  - DSC modes and de-activation
  - EDC/steering settings
  - Settings of available Head-Up Display (standard or M)
  - Active Seat Backrest settings (three programs for optional M Multi-function Seats; see page 43)

In addition to these selections within MDrive menu, the power (two of the three levels), SMG, DSC and EDC settings can be selected directly via console controls.

Under the hood of every M Car there's a masterpiece. In the M5, it's an all-new, absolutely unique V-10, delivering 500 hp with a "growling twin-five snarl," to quote one of its many rave reviews.
Comfort & luxury
- Doorsill trims with M5 logo
- Unique speedometer and tachometer dials with -
  - Chrome outer rings
  - Illuminated scale rings
  - Red indicator needles
  - Specific scales (speedometer to 200 mph/330 km/h, tachometer to 9000 rpm)
  - M logo on tachometer face
- Oil-temperature gauge replaces fuel-economy display of 5 Series
- Specific range of information displayed in Head-up Display (in addition to standard set)
- Short, illuminated SMG selector/shift lever
- Power, DSC, EDC and SMG mode switches surrounding shift lever
- MDrive submenu in iDrive
- Heated M sport front seats standard (16-way driver's/14-way passenger's power adjustment including 4-way lumbar)
- Extended Leather upholstery with Merino leather, BMW's finest grade –
  - Additional leather over regular-production 5 Series upholstery includes center section of instrument panel, center console, handbrake boot, door panels and door armrests
  - Unique BMW M color selection
  - Brushed Aluminum Shadow interior trim standard, choice of two optional woods
- Anthracite-color headliner (with Full Leather interior, in Alcantara material)

Options
- M Multi-function front sport seats with –
  - Active Backrests
  - Power shoulder support
  - Active head restraints
- Active Seat Ventilation (requires M Multi-function seats and perforated Full Leather upholstery)
- Comfort Access
- Soft-close doors (available as of spring 2006 production)
- Full Leather upholstery, with leather additionally on expanded area of instrument panel; roof pillars and headliner in Alcantara
- Olive Carrara Natural wood interior trim (Light)
- Walnut Madeira red-brown wood interior trim (Dark)
- M Head-up Display
- Rear-spoiler delete

1 - Due to low-profile tires, please note: Wheels, tires and suspension parts are more susceptible to road hazard and consequential damages. The M5 is not equipped with a spare tire and wheel. Performance tires are not recommended for driving in snow and ice conditions.
Like any BMW vehicle with the big "M" in its model name, the M5 is a creation of BMW M. The full name of this legendary BMW subsidiary is BMW M GmbH: GmbH is the German abbreviation for a limited-liability company (LLC), normally associated with companies smaller than the AG (stock-corporation) type such as BMW AG. It is also separate; irreverent Americans might refer to it as a "skunk works," and as long as you put that in the German context of precision and perfection, that's a fair characterization.

Employing just a few hundred associates, BMW M is headquartered in the small city of Garching, Germany, north of BMW's home city of Munich. BMW M also maintains an engine-development facility in the north of Munich, which is where the engineering of both the M3 6-cylinder power unit and the M5's amazing new V-10 took place.
M5 heritage: three previous generations

The original M Car was the M1, an exotic mid-engine sports car of 1979 that today commands 6-figure prices on the collector-vehicle market. The first M5 appeared in 1986 and there have been two further generations preceding the new one. An M6 based on the then-current 6 Series appeared first as the M635CSi in Europe in 1984, and was then offered in the U.S. as the M6 in 1987-88. The M3, BMW M’s most popular model in terms of production volume, came out in 1986 and was available in the U.S. from 1988 through 1991; a 2nd generation followed in ’92 and came to America in ’95. The present M3 generation has been available in the U.S. since ’02. And though it wasn’t named M6, a high-performance model developed by BMW M, called 850CSi, topped off the 8 Series in 1994-96.

The 1st-generation M5, sharing its 256-hp M 6-cylinder engine with the M6, made its European debut in 1984 but was offered in the U.S. just for a single model year, ’88. It was based on the then-5 Series generation, the E28, and launched the concept that lives on today in the newest M5; a practical, roomy 4-door sedan with sports-car performance. In its January ’87 issue, Road & Track termed the M5 “a world-class supercar, pure and simple.” The magazine continued, “Everything about it is tight and taut, from the snug bodywork, to the excellent driving position, to the beautifully firm steering (though still with vague on-center feel), to its accurate damping and correctly sportive ride control – especially at very high speed.” That parenthetical, by the way, refers to the recirculating-ball steering, which was excellent in the context of its time but didn’t have the tight on-center feel of today’s rack and pinion.

A sleeker model followed as the 2nd-generation M5. In Europe in ’88 and in the U.S. in ’91, its basis was the E34 5 Series; under its hood was the same basic M5’s 6-cylinder BMW M engine as before – then as now, with an individual throttle for each cylinder – but
enlarged from 3.5 to 3.6 liters and now putting out no less than 310 hp. BMW's official 0-60-mph time was 6.1 seconds, sensational for those days; *Car and Driver* reported just 5.6 sec. In its December '90 issue, *Road & Track* named the M5 as one of its Ten Best Cars in the World for 1991 and described it as "a beautifully luxurious 4-door sedan, dare we emphasize even a practical one, but with the soul of a race car."

As the immediate predecessor to the new '06 M5, the 3rd-generation model was launched in Europe in '98, in the U.S. for model year '00. It was based on the E39 5 Series, which introduced such innovations as aluminum suspension, standard All Season Traction and Cornering Brake Control, and an articulated windshield wiper that improved outward vision in bad weather. The M5's own innovations included BMW M's first V-8 engine, a 4.9-liter,
394-hp masterpiece that powered this more-luxurious-than-ever sedan to 60 mph in 4.8 sec. Comparing the M5 with Mercedes' E55 AMG and the supercharged Jaguar XJR in January '99, Automobile Magazine concluded: "But the M5 has the most communicative steering, the strongest brakes, the sweetest chassis, and a simply awesome engine. A faster and more complete 4-door all-rounder has yet to be invented."

That was then; this is now. With the newest M5, BMW has indeed invented an even faster, even more complete "4-door all-rounder" that sets new standards for just how much sports-car performance and driving pleasure can be packed into a luxury sedan. And yet as wonderful as it is, the new M5 is not merely a crowning achievement of BMW M's unique capabilities. It is also the product of a unique heritage, a singular focus on performance automobiles that deliver a specific blend of performance and luxury. As Road & Track put it so succinctly in its December '04 story on the new M5, it's "the sports-car driver's 4-door." That's what all M5s have been; with each succeeding generation, BMW M achieves an ever more perfect harmony of performance and luxury.
"Of course the M5 is one serious super sedan, with a superb drivetrain, svelte suspension and enough room that you can even justify it on practical grounds."

AutoWeek, May 16, '05

"In the M5, one doesn't get the feeling of being in a 2-ton sedan. The metallic hammering sound inspires sporty driving; revs, current gear and speed appear in the Head-up Display right in the driver's line of vision. The M5 obeys steering-wheel orders with razor-sharp precision; the body rolls hardly at all in vigorous cornering. On the other hand, straight-line stability is excellent right up to the highest speeds. The generously dimensioned brakes pull this racer to a stop from 100 km/h (62 mph) in just 115 ft. - again and again, if you please, without perceptible or measurable fade."

Automobil Revue, Switzerland, May 11, '05

"And this is a stunningly impressive engine. Like BMW's F1 V-10s it has a 90-degree vee-angle and compact dimensions for such a large capacity, so it sits usefully low in the nose for a lower center of gravity. Like the racing engines it has sophisticated individual electronic control for each of the ten air-gulping throttle "butterflies," for exceptional power and instantaneous responses."

"It also has Bi-VANOS variable valve timing, to give the best possible spread of power with the best drivability, and it has the most powerful electronic engine management package so far created for a road car, with three 32-bit processors and the ability to perform more than 200 million individual calculations and instructions per second. All of which makes this a very special engine indeed...

"But you don't need an engineering degree to ascertain the engine's excellence, you just have to listen to the new M5 take off in anger and you'll get the point. Because the other thing the M5 V-10 shares with a racing engine is its enthusiasm for high revs - and if that doesn't mean the screaming 19,000 or so of the F1 brigade, it does mean a heady 8250-rpm redline which is way beyond the point where most road car engines would already have disintegrated, and BMW doesn't hide it with excessive silencing - they let it howl through racing-style manifolds and four huge tailpipes."

MSN.com, posted February 3, '05

"The M5 is, and always has been, the distillation of everything that makes BMW cars special. M division engineers, endowed with a streak of lunacy, take an already great BMW 5 Series car and add power, improve its handling, and create a sedan
that takes on dedicated sports cars. You get the feeling these guys share a kinship with those fun-loving, society-be-damned types who put a few special ingredients into a still and create moonshine. In this case, it's the new, 500-hp BMW M5, the moonshine of cars.”
*Car and Driver*, December ’04

"With its fourth-generation M5, BMW not only vaults back to the top of the super-sedan ranks, but also proves that ultra-high technology and driving excitement can indeed coexist in the same vehicle. Few, if any, cars have the wealth of electronics helping them get down the road, while at the same time proving equally entertaining to drive. The M5 does just that, wrapping sports-car performance in a sedan body, then letting the driver decide which of the two it really is."  
*Road & Track*, December ’04

"The new M5's engine is, we're happy to report, the spectacular piece its specs would suggest. The sequential M gearbox aids and abets it by shifting cogs as promptly as any of its type. But the new M5 isn't just a powertrain car. It's a chassis car. The first full-effort curve – the moment when you load up the steering and feel the whole machine carve through the bend like a surgeon's knife, perfectly in tune with your will – that's the defining M5 moment.

"The yowling twin-five snarl as you sear toward max revs is an experience that etches itself deep in your memory.

"However you pride yourself on your manual shifts, this box can do it swifter. The blips on a downshift, especially, are perfection.

"Its steering is quick, pin-accurate, and buck-naked of understeer. Where the old M5 had a dose of push built in, just to keep things stable, the new one is so accurate and hard-wired to your brain that it doesn't need stabilizing.

"After such a virtuoso performance, the E55 struggles. It has the grip, and it certainly packs the punch. But it doesn't have the surgical accuracy, linearity, nor the communication with its driver."  
*Motor Trend*, December ’04, from a comparison test of M5 and Mercedes-Benz E55 AMG

"The new M5...is intuitive and involves the driver every step of the way. It is as stable as its rivals in a straight line, but its steering is lively and soulful. It is as fast through corners, but its handling is sublime and unambiguous. It is as strong on the brake and as energetic on the throttle, but it never forgets to generate feel and feedback. We said the same about the old M5, but this one has more raw speed and power and an even better-balanced chassis. The ride is more composed, with less body roll and understeer. It is more fluent, and there is a greater immediacy between input and reaction.

"Just about the only car that can rival [the M5] in terms of speed from A to B, smiles per mile, and everyday usability is the latest 911 Carrera S. The Porsche costs roughly the same money, and it may rank even higher in street cred, but the BMW offers five seats, a family-size trunk, and a less challenging attitude when pushed. This car is a sensible antidepressant, and it doesn't even require a prescription – just a healthy bank balance.

"The V-10-engined BMW M5 is, simply, brilliant!"
*Automobile Magazine*, November ’04

"The 5.0-liter V-10 would upgrade many 'super sports cars'...The power sport seats meet the highest demands for comfort, provide plenty of lateral support and are upholstered in fine leather...For a nearly 2-ton sedan, it offers outstanding cornering dynamics...

"Yet the fascinating thing about the M5 is its huge bandwidth of comfort, luxury and dynamics, which other manufacturers can cover only with several model series."
*Auto Zeitung*, Germany, issue 23/’04

"The list of positive attributes is so long that it’s almost embarrassing: energetically gripping, well modulated brakes; neutral confidence-inspiring response to the steering wheel and light-footed handling...

"Even when exploiting its full rpm range, the M engine never becomes a whirling dervish, instead remaining discreet and cultivated. Its sonorous, powerful sound has no bothersome peaks."
*auto motor und sport*, Germany, September 15, ’04
Discreet and elegant, yet expressive and muscular design characterizes every BMW M automobile. With each succeeding generation of the M5, BMW M has begun with a regular-production BMW model, and applied a consistent philosophy to its own treatment of the model: accommodate and express the heightened performance capabilities of the M model while maintaining the elegance and good taste of BMW design. The new M5's exterior design adheres strictly to this concept - and in doing so, communicates the spectacular performance of which it is capable.
At the front: the thrust of BMW M performance, expressed visually

Benefits
- Helps enable the M5’s magnificent performance
- Aerodynamically smooth, yet configured to supply necessary airflow to engine, transmission and brakes
- “Flaps” at lower sides help promote stability at speed

Typically BMW M, the M5 front end masterfully combines function and esthetics. The center air intake is large – as it must be to supply the immensely powerful V-10 engine. At each side, a supplementary intake also admits air to the engine as well as for other purposes, such as cooling the transmission and brakes. At the bottom of each side, aerodynamic “flaps” not only help manage airflow for minimizing front-end lift at speed, but lend an additional forward thrust to the entire ensemble. The functional requirement of supplying air to the mechanical elements of this magnificent machine precludes front foglights; they aren’t offered on the M5.

The M5 front end masterfully combines function and esthetics. Large air intakes provide the engine, brakes and other systems with abundant cooling air; the bumper/spoiler ensemble is shaped to promote stability at speed.

BMW’s high-intensity headlight cleaning system is standard on the M5.
In profile

Benefits
- Subtle design elements communicate M5 performance and handling
- Basic 5 Series silhouette, itself graceful and forceful, remains

In the side view, "gills" introduce a now-traditional BMW M element; set into them is an M5 logo. A sharp ridge in the rocker panel enhances the flow of profile lines; the 19-in. Radial Spoke wheels and ultra-low-profile tires add muscle that's every bit as functional as it is visual. Satin Chrome Shadowline side-window trim, as included in 5 Series Sport Packages, is standard on the M5; distinctively shaped M mirrors accommodate airflow smoothly while setting a visual accent with a horizontal line. Because their lower portion is always in black, the mirrors also include a color contrast with all exterior colors except Black Sapphire.

Like all other perspectives on the M5, the profile view subtly but vigorously proclaims the M5's mission: to combine luxury and spacious accommodations with breathtaking performance.

Distinctively shaped M mirrors accommodate airflow smoothly while setting a visual accent with a horizontal line. Because their lower portion is always in black, the mirrors also set a color contrast (seen here) with all exterior colors except Black Sapphire.

In profile, "gills" repeat a traditional design element of sporty BMWs. A sharp ridge in the rocker panel strengthens the flow of profile lines; 19-in. Radial Spoke wheels and ultra-low-profile tires add muscle.
The M5's character in rear view is dominated by a bumper/spoiler ensemble that's exclusive to the M5 in both appearance and function. Rear spoiler, standard on the U.S. model, can be deleted at no extra cost; it is not present on the European model shown here.

**At the rear**

**Benefits**
- Visual elements underscore the feeling of a powerful machine "going away"
- Diffusor and "flaps" enhance aerodynamics

As at the front, the M5's character in rear view is dominated by a bumper/spoiler ensemble that is exclusive to the M5 in both appearance and function. The bumper's main vertical surface is accented by a character line that sweeps downward to define the lower edge of a central diffusor, which helps smooth the exit of airflow under the vehicle. Together with "flaps" at the sides, this helps control aerodynamic lift. The flaps also visually frame the dual stainless-steel exhaust tips at each side.

Also specific to the M5 is a revised lower trunk lid surface that frames the license plate differently than that on 5 Series models.

**Special M exterior colors**

**Benefits**
- Bold colors lend exclusivity and emphasize the M5's bold nature
- Two of the colors are new
- Popular standard colors are also offered exclusive to M Cars:
  - **Interlagos Blue** – a deep blue metallic
  - **Sepang Bronze** – a brand-new metallic that departs daringly from the conventional.
  - **Indianapolis Red** – also new, also metallic, dramatically bold.
  - **Silverstone II** – an evolution of a metallic that was offered on the previous M5.

From the regular-production color palette, BMW M offers non-metallic Alpine White and two metallics: Black Sapphire and Silver C. Thus altogether, seven exterior colors are available.

1 - Due to low-profile tires, please note: Wheels, tires and suspension parts are more susceptible to road hazard and consequential damages. The M6 is equipped with a spare tire and wheel. Performance tires are not recommended for driving in snow and ice conditions.
Power & performance features
Ultimate technology delivers ultimate performance.

Once again BMW M blazes new trails in powertrain technology and performance. The last time a new M5 made its debut, it offered BMW M's first V-8 engine, one based on the existing production V-8 but taken out to BMW M standards of exotic technology and sports-car performance. This time, it's BMW M's first V-10 engine for a roadgoing vehicle — but not BMW M's first V-10, as this is the configuration of its 900-hp Formula 1 racing engine!

There's more than just an unusual number of cylinders here, though. The new M5 V-10, internal code S85, positively bristles with new technology — as the following pages describe in detail. Behind the 500-hp V-10 is the world’s first 7-speed Sequential Manual Gearbox, and it's a whole new concept, not just the familiar 6-speed with an extra gear added.

Farther back in the powertrain, there is an evolved version of the famously effective M Variable Differential Lock that helped the M3 set new standards in road — and track — handling.

New electronics technology does its part too, responsive to driver choices via variable engine response and peak power, transmission shift programs, suspension characteristics, steering assist and stability functions. And it goes without saying that BMW M has worked its magic on an already outstanding mechanical chassis — that is, the aluminum suspension system, its structural underpinnings, and the braking and steering systems that keep a harness on the immense performance this amazing automobile offers.
All-new 5.0-liter DOHC 40-valve (4-cam) V-10 engine

Benefits
- Spectacular performance
- High-rpm concept (8250-rpm maximum) helps achieve 100 hp/liter, adds excitement to the driving experience
- Lightning-fast response to accelerator pedal
- Fascinating, unique sound
- Many new technologies

Let's begin the description of this amazing powerplant with some key data:
- **0-60 mph in 4.5 seconds** (official BMW data for U.S. version), 0-100 km/h in 4.4 sec. (62 mph, data from German Auto Zeitung test quoted on page 11).
- **Top speed 155 mph**, electronically limited. But Road & Track (December '04) believes that without the limiter, the M5 could achieve over 200 mph.
- **500 hp @ 7750 rpm**, 383 lb-ft. of torque at 6100 rpm.
- **Redline 8250 rpm**.

And then we want to know how all this has been achieved. The new M5 V-10 engine is yet another masterpiece of power from BMW M, setting a new milestone for the performance that can be achieved in a roomy 5-passenger sedan, with generous trunk space and all the luxury and safety features that one expects from one of the world's great vehicle makers. So let's take the key attributes of this monumental new engine, and see how they contribute to the dazzling outcomes just listed.

**Why 10 cylinders?** Elmar Schulte, head of engine development at BMW, has a disarming straightforward explanation. “We wanted 5 liters. The ideal cylinder displacement is 0.5 liter. To get 5 liters, we needed 10 cylinders.”

The S85 V-10 is BMW M's newest masterpiece in the art of performance. Displacing 5.0 liters, it generates 500 hp and has a “redline” of 8250 rpm: BMW M has taken the high-rpm route to power because it is the most exciting, weight-efficient approach to a sports engine.
In its general layout, the new M5 engine relates to, and was inspired by, BMW's Formula 1 racing engine - also a V-10. (Both engines' major castings are done at the same BMW plant.) Though unusual, a V-10 is also a satisfactorily balanced configuration. Even though the M5 engine's configuration (with a 90° angle between cylinder banks) entails uneven spacing between cylinder firings (90°-54°), it requires no balance shafts (as do some V-6s and Volkswagen's V-10 diesel) to make it acceptably smooth. Instead, the crankshaft incorporates two large counterweights.

Reporting its driving impressions in the December '04 issue, Road & Track commented: "Run up through the gears out of a slow corner and the engine pulls with a smoothness that easily rivals the [previous] M5's engine, arguably one of the finest V-8s around."

Unique sound is a further attribute of the V-10. Even when idling, it sounds exotic; according to Motor Trend (December '04), "The yowling twin-five snarl as you near toward max revs is an experience that etches itself deep in your memory. No, it's not super-car loud - this car always retains the vestige of sedan refinement, and you could mount a sustained assault on the Autobahn while a rear-seat passenger sleeps."
M5 breathing system: Throttle directly at intake port, hollow camshafts, box-type hydraulic valve lifters (only 31 grams each) and ultra-slender valve stems (just 5 mm) all contribute to engine's lightning-quick reflexes. Altogether, the valvetrain's reciprocating mass has been reduced by 17.5% from that of the predecessor V-8 engine.

High-rpm concept. Like M3’s 6-cylinder M engine, the M5 V-10 was conceived around the use of high engine speeds to achieve its performance. Its redline is 8250 rpm; its maximum power of 500 hp is achieved at 7750 rpm, its maximum torque of 383 lb-ft. at 6100 rpm. This strategy, which avoids extreme torque and instead lets the driver extract super performance by “revving” the engine, allows the use of relatively light, low-mass reciprocating components inside the engine; in turn, this helps moderate overall vehicle weight and optimize front/rear weight distribution.

Note that like the M3 engine, the M5 unit does not employ the Valvetronic system now found in BMW's regular-production V-8 and V-12 engines as well as the new 6-cylinder unit in the 3 and 5 Series. Though Valvetronic eliminates throttles and their throttling effect, it is not (yet) suitable for a very high-rpm engine like this. Instead, the V-10 retains a traditional BMW M valvetrain, with its 4 valves per cylinder actuated via “box-type” hydraulic lifters derived from racing practice. These are small, light and extremely rigid, as they must be for 8250 rpm; they are also specially shaped for efficient valve actuation, with an oblong cross-section (not round like bucket tappets), slightly curved contact surface and a guiding tab to ensure a consistent position in their bores.

Also light in mass are the valves themselves, with stems of only 5 mm/0.2 in. And as on the new N52 engine of 3 and 5 Series, the camshafts are hollow, further reducing valvetrain inertia and enhancing overall engine response. Altogether, the valvetrain's reciprocating mass has been reduced 17.5% from the predecessor engine; this is an important facet of the high-rpm concept. So are light but ultra-strong pistons and connecting rods.
As in all recent M engines, a special High-Pressure Double VANOS system varies the intake and exhaust valves' timing steplessly, widely and ultra-quickly. As on the M3 engine, the VANOS system has its own hydraulic pump; this contrasts with BMW's regular-production engines, whose main oil pump supplies the pressure for VANOS operation. The resulting very high pressure (up to 115 bar or 1690 lb/sq in.) enables the valve timing to be varied more quickly than on the regular engines - yet another factor in the high-rpm concept.

Of course four overhead camshafts (hollow for reduced mass) actuate the valves, and their configuration is literally "geared" to the high revs. Each of the two intake camshafts, positioned inboard, is driven by a simplex chain; from the camshafts' chain sprockets, the exhaust camshafts are driven by gears. The system is extremely rigid - again, as it must be for this engine's level of rotational speed. As usual, each chain is hydraulically tensioned and needs no periodic adjustment or replacement for the life of the vehicle.

A throttle for each cylinder. Maintaining and furthering a great BMW M tradition, the V-10 has an individual, electronically controlled throttle for each cylinder. This too is an important element of the high-rpm concept.

"Breathing" - an engine's ability to ingest and combust air - is naturally a top priority in a super-performance engine. Air is taken in at both sides of the vehicle front, passes through two large intake silencers and two air-mass meters, and then flows into the voluminous plenum (made of a lightweight compound material) atop the engine. From there, air passes through equal-length intake trumpets, and the throttles to the individual cylinders. The entire assembly of plenum and trumpets is attached to the throttle housings via a flange (one per bank) that acoustically and thermally decouples the plenum from the engine itself.

Admission of air into the cylinders is thus through 10 individual throttles. Compared to most engines' single throttle (or even to the throttle-less Valvetronic system of contemporary BMW engines), these are a very costly feature, reserved for the highest-performance engines - including racing powerplants. Positioned much nearer the cylinders than a single throttle can be, they eliminate a "lag time" inherent in airflow and allow the engine to react lightning-fast to throttle moments. Motor Trend characterized this engine's throttle response as "blazingly urgent." The individual throttles get much of the credit for that.

Actuation of the throttles is electrically driven and electronically controlled. In essence this system was introduced on the previous-generation M5 and then adopted for the M3 engine as well. On each cylinder bank, the five throttles are actuated from a single shaft. Via the accelerator pedal and its two potentiometers, the driver gives the commands. In turn, these commands are processed by the engine control module and received by a DC servo motor (also one per cylinder bank). The motor drives the throttle shaft through a tiny gearbox.

Via the MDrive system, the engine's maximum power and the throttles' response to the accelerator pedal can be set to different levels; see MDrive, pages 32-33.
Exotic technology for knock control: ionic current inside combustion chambers is measured by special circuitry in the sparkplugs themselves. If knock (detonation) is incipient, ionic current so indicates; ignition timing is retarded as necessary at the individual cylinders, lightning-fast and with hyper-precision.

Ultra-high compression ratio. At 12.0:1, the V-10 again notches up BMW's highest current compression ratio; previously the M3, at 11.5:1, had the highest. The higher the compression ratio, the more power can be extracted from a given engine size, so this too is a significant factor in the V-10’s high performance.

Ionic-current technology. In a “world first” for such a high-revving engine, and a first for BMW, the BMW M engineers have applied an exotic technology to the knock control that is so crucial with such a high compression ratio. Instead of piezoelectric knock sensors positioned in the cylinder block to detect detonation via vibration, the sparkplugs themselves do the knock-sensing – and do it incredibly quickly and directly.

They operate on a fascinating principle. The air-fuel mixture in an engine's cylinders has a certain electrical conductivity, which varies - especially as 'knock,' or detonation, occurs in a cylinder. Built into the engine's electronics is circuitry that applies a small voltage across the sparkplug's electrodes just after it fires; the ionic current resulting from this voltage is a function of the combustion process taking place. If knock (detonation) is about to occur, the ionic current will so indicate; the resulting signal goes to the engine's electronic control system and ignition timing is retarded appropriately.

The advantages of this technology over conventional block-mounted knock sensors are:
- Each cylinder's combustion process is measured individually, and its ignition timing is also adjusted individually. If only one cylinder is tending to knock, only that cylinder will have its timing retarded.
- Such adjustment occurs more quickly. The whole process – onset of knock, measurement of ionic current, adjustment of timing - takes place in just 0.8 milliseconds at 8000 rpm, rapid enough to adjust the timing before that sparkplug's next firing!
- Because of its extreme sensitivity and speed, this technology allows the engine to “edge closer” to its full potential in the upper reaches of power and rpm.
- Contributes to moderate fuel consumption and tightly controlled exhaust emissions. The engine meets U.S. LEV2 (Low Emission Vehicle) standards.

This technology is another contributor to this engine's high-rpm capability. It does not, by the way, require a different type of sparkplug, nor is the sparkplug's durability affected by its extra “duty.” The current-measuring voltage is approximately 100 volts, vs. more than 25,000 V applied to fire the sparkplug.
G-sensitive lubrication system. Given the 90° vee-angle of the cylinder banks and the M5’s cornering ability – expect skidpad figures around 1g – special attention has been directed to ensuring natural return of oil to the main sump. There are two sumps, the main and larger one behind the front frame crossmember and a smaller one forward of the member; a baffle separates the two sumps from each other. This arrangement is called a “semi-dry-sump” system.

First, the mechanically driven main oil pump is a new variable-volume type, an innovation also found on the N52 6-cylinder engine. By varying the output of its pump element according to engine oil pressure, the engineers have achieved a pump that always delivers sufficient pressure to lubricate this demanding engine, yet never pumps more oil than is necessary. Thus it –

- Contributes to the engine’s high power output, by requiring less power from the engine.
- Doesn’t require a bypass to divert excess flow; this helps avoid excess oil temperatures and oil foaming.

Positioned within the same housing as the main (pressure) pump is a recirculating pump that picks up oil from the small front oil sump and transfers it back to the main sump. Then there are two additional, electrically driven scavenging pumps, one for each cylinder bank. In straight-ahead driving, these pumps pick up oil from the rear of the engine and return it to the sump. In hard cornering (0.6g or greater), the Dynamic Stability Control system’s lateral-g sensor switches magnetic valves to different pickup points, at the curve-outner side of either head and the oil pan. This system remains active even if the driver switches off DSC.

The oil level and temperature are monitored by a thermal sensor; a warning is displayed if the level falls low, and an oil-temperature gauge is included in the tachometer face. Oil is cooled by a coolant-oil heat exchanger.
Low-back-pressure, tuned exhaust system.
Exiting the engine through stainless-steel exhaust headers (one for each cylinder bank) that Germany's *auto motor und sport* magazine (November 10, '04) called "an artwork in stainless steel," exhaust gas from each cylinder travels an ideal length of 560 mm/22 in. before reaching the engine-close first catalytic converter on each side. A high-pressure forming technique is used to shape the headers, enabling them to achieve the necessary strength and desirable light weight with only 0.8-mm/0.03-in. wall thickness — another example of BMW M's amazing attention to the detail design of this engine. Two additional catalytic converters, one per side, are located farther back in the system.

Germany's *auto motor und sport* magazine called the M5's exhaust headers "an artwork in stainless steel." Forward catalytic converters, seen at top, are positioned immediately at the headers' outlets for quick effectiveness when the engine is first started from cold.

The entire exhaust system from headers at far left to main mufflers and quad outlets at right.
Further advanced engine electronics. Once again BMW M has developed a new, ultra-powerful electronic control system; called MS S65, this scheme incorporates much of the experience gained from the V-10 racing engine. All the engine's electronic functions – throttles, ignition, fuel injection, lubrication, communication with the Sequential Manual Gearbox, and more – are overseen by a central electronic module employing three 32-bit microprocessors capable of 200 million operations per second.

This system also incorporates the MDrive functions, including the three power levels and throttle calibrations described under MDrive on pages 32-33.

Variable tachometer warning zone. Pioneered on the previous M5 engine and now found on the 5, 6 and 7 Series' tachometers as well, this feature reminds drivers that a cold engine should be treated with care. Displaying a yellow "caution" segment and a red "limit" segment, this zone moves from a minimum point with a cold engine to the full 8250-rpm redline as the engine oil warms up.

BMW M developed the new, ultra-powerful MS S65 electronic control system, which employs three 32-bit microprocessors capable of 200 million operations per second.

7-speed Sequential Manual Gearbox

Benefits
- A major step forward in the evolution of BMW's SMG concept
- 7 forward gears interact with high-rpm engine to extract maximum performance
- Faster-than-ever shifting
- Retains 5 automated, 6 manual (sequential) shift programs
- Includes Launch Control

The M5 is offered initially only with this unique transmission, incorporating the best of Formula 1 racing technology to help drivers extract the M5's full performance capabilities.

For M5 customers who prefer a manual transmission, a 6-speed will be offered later. But this amazing new transmission does everything a manual transmission can do, plus several things a manual can't:
- Offers 7 forward gears, which would be awkward for a manual shift lever to manage
- In high-performance driving, can shift much faster than even an expert driver could
- Can provide automated shifting when desired
- Offers a wide variety of shift programs in both Automated and Sequential modes
- SMG engages and disengages the twin-disc clutch, precisely coordinating its action with shifts. There is no clutch pedal

First, let's see what kind of transmission the engineers have developed to accomplish all these goals. For starters, this is the first SMG designed and developed right from the start as an SMG; previous generations – there have been three, counting two BMW M generations and the simpler system offered in regular-production BMWs – have all been created by adding the SMG control system to a conventional manual transmission.

This has sweeping implications for how the transmission operates and what it can do:
- The gears have been positioned in such a way that the gearsets with the greatest loads (1st, 2nd and 3rd gears) closest to the load-carrying bearings. This promotes durability in a transmission that must transmit immense power and is shifted fast and hard – just generally subjected to brutal use.
To be shifted by a conventional manual shifter, this gearset placement would result in a shift pattern that would be extremely awkward. But this was not a problem, because all shifting would be executed by the SMG anyway.

Even if the shift pattern were manageable, 7 speeds would be difficult for a driver to manage; a 6-speed is the practical limit for a purely manual transmission.

And yet with a high-revving, high-performance engine, 7 speeds are ideal and desirable, tangibly helping the driver extract such an engine’s full potential.

The entire internal mechanism – gears, shafts, bearings, shift rods – is laid out optimally for SMG’s electrohydraulically powered shifting and is in no way compromised for conventional manual shifting.

The shifting mechanism allows simultaneous actuation of two shift rods at once, which helps the unit achieve lightning-quick shifts. This would not be possible with a conventional manual gearbox. Additionally, the gear synchronizers (which facilitate shifting without gear-grinding in any manual transmission or SMG) utilize carbon-fiber cones, which also contribute to the ability to shift so fast.

Now to the particulars of the system’s capabilities and advantages.

**DRIVELOGIC shift programs, 11 of them.** In this respect, the new transmission follows the precedent already set by BMW M’s 6-speed SMG, which has been offered on M3s since 2002. As before, there are two basic shift modes: Sequential (S), in which with certain exceptions all shifting is initiated by the driver; and Automated (D, for Drive), which provides operation similar to – but by no means identical to – that of a conventional automatic transmission.

Within these two modes, there are as before a total of 11 shift programs:

- **Sequential** – 6 programs, S1-S6 from “softest and slowest” to “hardest and quickest” shifts; i.e. from most leisurely to sportiest. The driver initiates shifts with either the console shift lever (tip forward for downshifts, rearward for upshifts) or “paddles” on the steering wheel (left paddle for downshifts, right for upshifts).

- **Automated** – 5 programs, D1-D5 with a similar progression from mildest to sportiest, with the additional distinction here that as the program gets sportier, the vehicle and engine speeds at which shifts occur also
move upward. Even in this D mode, if the driver manually initiates a shift, the unit switches to S and remains there until A is again selected by the driver.

In the sportiest program of all, S6, the minimum shift time has been reduced 20% from that of the existing SMG, which was already very fast. In the course of everyday driving, shifts are smoother, making the interruption of power flow that occurs during a shift barely noticeable.

As in the existing SMG, gears are shifted electrohydraulically; all shifting is controlled by a 16-bit microprocessor that can make more than 12 million calculations per second.

**Special functions and safeguards.** The 7-speed SMG incorporates a number of special functions and safeguards, some familiar from the 6-speed SMG and some new:

**Launch Control.** In the S6 program, the driver can utilize a further SMG capability. Dynamic Stability Control must be de-activated via its console button. Then the driver holds the shift lever forward (as if for a downshift) and presses the accelerator pedal fully down. This raises the engine to 4000 rpm, ideal for launch. Ready to go, the driver simply releases the shift lever; the M5 launches with precisely balanced clutch slip and wheelspin for an optimum start. From there, SMG will upshift automatically just before the engine redline. Thus launch control gives essentially the same standing-start acceleration results as would an expert driver. To preclude overheating the clutch, the control system requires an interval of several minutes between Launch Control starts; and if the clutch monitoring logic does ever detect clutch overheating, the clutch engages fully rather than slipping.

**Automatic downshift** to 1st gear for starting off from rest. Whether in D or S mode, SMG automatically engages 1st gear as the vehicle comes to a stop. If the mode selector is in D, upshifts will then occur automatically; or the driver can initiate the upshifts.

**Overspeed protection.** If the driver calls for a downshift (S mode) that would overspeed the engine, the downshift command is ignored.

**Slip Control.** If a downshift occurs on a slippery road, SMG disengages the clutch for

**Start-off Assistant,** active in both S and D modes. When stopped facing uphill, the driver simply holds the brake pedal until ready to start off. Upon release of the brakes, the M5 is ready (for 1 second) to start off without rolling back. In contrast to the earlier SMG, this function is achieved without any action on the driver's part, and via the brakes rather than by slipping the clutch.

**Hill Detection.** Depending on road gradient, down- or uphill, the D shift points are modified to ensure optimum gear selection. In S mode, shift times are shortened so that the engine is always "on point" for best acceleration uphill, or engine braking downhill.

**Double-clutching.** In D or S mode, DRIVELOGIC coordinates clutch disengagement, shifting, engine speed and clutch engagement to accomplish smooth downshifts — just as a skilled driver would.

**2nd-gear start** in D1 program: Starting up from rest, the transmission is in 2nd rather than 1st gear; the clutch engages particularly delicately. Although the traction-control function is also there to prevent it, this reduces even the chance of transitory wheelspin.

**6-speed manual transmission** (available as of fall 2006 production)

**Benefits**
- Conventional shifting for customers who prefer it
- Robust and fun to use

"Back by popular demand," a 6-speed manual transmission will be available in model year 2007. As in the previous M5, it is controlled by a handsome shift knob with illuminated 6-speed pattern and M logo. As always, the transmission is designed for smooth and precise shifting, as well as long life.

A dual-mass, hydraulically damped flywheel between engine and clutch is specially tuned to the 10-cylinder engine's power pulses. The primary clutch plate is made of forged steel for high strength. The clutch is self-adjusting, maintaining consistent pedal forces over the life of the clutch; this helped the engineers achieve the necessary high torque capacity with reasonable pedal effort.
The M5 suspension system: targeted modifications

Benefits
- Even sportier handling than 550i
- Reinforcements and geometry modifications help accommodate M5’s increased power

Handling and roadability modifications from 5 Series fall into multiple categories: the basic suspension system and its connections to the body structure; a special M version of Electronic Damping Control; the M Variable Differential Lock; Servotronic steering with two levels of power assist; hugely dimensioned, cross-drilled brakes; and wheels and tires that give the M5 an awesome footprint.

- More rigid bushings, 0.9-in. wider track. At the rear, the changes are more extensive:
  - The subframe is modified.
  - The links are essentially the same as in the Z8.
  - Bushings are stiffer.
  - Axle halfshafts are hollow for reduced weight with greater strength.
  - Geometry has been tailored to the much greater torque that will be poured through the whole system.

Here the track is actually narrower (by 0.6 in.) than that of a 5 Series with standard wheels, because the 9.5-in.-wide rear wheels’ center plane must be farther inboard for their massive 285/35 tires to clear the bodywork. (A similar situation applies to a 550i with its Sport Package wheels and tires.)

And at all four wheels, specially calibrated springs and shock absorbers - the latter made variable by Electronic Damping Control, below - complete a sporting suspension setup that only BMW M could create.

1 - Due to low-profile tires, please note: Wheels, tires and suspension parts are more susceptible to road hazard and consequential damages. The M5 is not equipped with a spare tire and wheel. Performance tires are not recommended for driving in snow and ice conditions.
Electronic Damping Control
Benefits
- First appearance of this advanced suspension system in an M Car
- Specifically engineered by BMW M to enhance the road qualities of this ultimate performance sedan
- Provides three modes: Normal, Comfort and Sport

EDC steplessly controls the shock absorbers to any level of firmness between their softest and firmest settings within that mode, precisely adapting to road conditions and the driver’s demands at any moment. The cutaway views, looking inside the squared area of this view of a front strut/shock-absorber unit, show an EDC shock absorber’s inner workings.

On the M5, there are three EDC modes rather than the two provided in the more luxury-oriented 7 Series. They are –
- Normal, as the setting likely to be chosen most of the time; a judicious blend of handling precision and riding comfort.
- Comfort, shifting the balance of attributes toward the comfort side of the scale. Most appropriate for gentle, speed-controlled driving on relatively smooth and straight roads.
- Sport, putting full emphasis on the M5’s tremendous road capabilities at some sacrifice of riding comfort.

Within each of these modes, EDC continuously adjusts shock-absorber firmness to actual conditions as described above. The driver can choose from these settings via the EDC console button, and can program a preferred setting into the MDrive configuration (see pages 32-33). Writing in Automobile Magazine’s November ’04 issue, authoritative correspondent Georg Kacher concluded that “The new M5...is intuitive and involves the driver every step of the way. It is as stable as its rivals in straight line, but its steering is lively and soulful. It is as fast through corners, but its handling is sublime and unambiguous. It is strong on the brake and as energetic on the throttle, but it never forgets to generate feel and feedback.”
M Variable Differential Lock: putting power to the road, the BMW M way

Benefits
- Enhances sporty handling, especially on slippery roads
- Complements Dynamic Stability Control
- Promotes “surefootedness” under all driving conditions

Mechanical limited-slip differentials are part of the BMW M tradition of ultimate road handling. Together with the German division of GKN Viscodrive, BMW M engineers developed a more capable mechanical limited-slip differential; called the M Variable Differential Lock, this concept appeared first on the current M3, and now comes to the new M5.

Under dry to not-quite-dry road conditions, the traditional 25% limited-slip has some ability to improve traction; but under split-traction conditions (when one wheel is on slippery, the other on firmer ground) it cannot transmit more torque than the slippery side permits. On all current BMW models, electronic traction control (a function of Dynamic Stability Control) addresses this issue, though not in a manner conducive to sporty driving in the M Car sense. (Thus there’s a switch to reduce or altogether eliminate DSC action when the driver so desires.)

The M Variable Differential Lock specifically addresses low- and split-traction situations in a way that reinforces sporty handling, imparting a slippery-road ability that other high-performance, rear-wheel-drive sports cars generally do not have. The main distinction between a traditional limited-slip “diff” and the M Variable Differential Lock is that where the former senses torque, the latter senses wheel speed (rpm).

Anytime a speed difference develops between the two rear (driven) wheels, a shear pump, driven by this difference, develops pressure in the unit’s silicon viscous fluid. This pressure is directed to a multi-disc clutch that transfers driving torque to the wheel with the better road grip (“select high”). The greater the speed difference between the two wheels, the more aggressively the clutch engages. As this difference in wheel speeds diminishes, the clutch begins to ease off.

This mechanism thus accomplishes finely calibrated action by entirely natural means. There is no external pump, no external source of lubrication or operating fluid. The very motion to be controlled – differences in speed between one wheel and the other – generates its locking action.

Viscous fluid is so-called because it develops internal force (via an increase in its viscosity) whenever it is sheared; this is why the relatively small difference between one wheel speed and the other can generate the necessary locking action.
Servotronic steering with two effort levels

Benefits
- Precise road feel
- Servotronic power assist reduces effort needed in parking and at low speeds
- Driver can choose between two levels of effort

Like the ’06 7, 6 and 5 Series, the M5’s rack-and-pinion steering system has Servotronic vehicle-speed-sensitive power assist. Servotronic provides the strongest assist at low vehicle speeds for ease in parking and low-speed maneuvers, and then progressively decreases assist to preserve steering feel as road speed increases.

Also as in those Series, the M5’s steering ratio – the number of degrees the steering wheel must be turned to steer the front wheels by 1 degree – is variable; the ratio gradually becomes “quicker” (greater steering angle relative to steering-wheel turns) as the steering wheel is turned away from its center position. This is not Active Steering, which varies the steering ratio more widely and does so in response to vehicle speed; instead, the BMW M engineers chose to tailor the 5 Series’ “standard” steering system to the attributes of this ultimate sports sedan.

But variable ratio and Servotronic assist aren’t all that’s special about the M5’s steering. For the first time in a production BMW automobile, it offers the driver a choice of two levels of assist: Normal, with the typical BMW level of assist, and Sport, with a higher overall level of effort (less assist) for sportier feel. Within these two settings, Servotronic still varies the assist according to vehicle speed.

Immensely powerful, fade-resistant compound, cross-drilled brakes

Benefits
- Largest brake dimensions on any BMW model
- Cross-drilling further enhances their fade resistance
- Compound construction eliminates any vibration in extreme use

Powerful brakes are always a BMW strength; even more so with the M Cars, which take all aspects of BMW performance to an even higher level.

So it is that the M5 gets immensely dimensioned ventilated disc brakes. At the front, they are 374 mm/14.7 in. in diameter and 36 mm/1.42 in. thick; these measurements compare with the 550i’s 348 x 30 mm, already generous.

At the rear, they’re 370 mm/14.6 in. in diameter and 24 mm/0.94 in. thick (550i: 345 x 24).

These are even larger dimensions than those on the heavier 7 Series.

But like its steering, the M5’s brakes go further. Whereas the 550i (along with the 6 Series) has aluminum/cast-iron brake rotors (with benefits described in Fast Facts 2005, page 26), the M5 takes the full leap to compound brakes.

This most elaborate of BMW brake concepts, also appearing on the M3 with Competition Package, shares with the 550i/6 Series 2-piece rotors, with an aluminum “hat” inner portion (to reduce unsprung weight) and a cast-iron outer portion that is the actual
friction surface. But whereas on the 550i and 6 Series the hat and outer portion are riveted together, here the hat and outer portion are connected by steel pins on which the aluminum and cast-iron portions, because of their differing expansion rates, can move relative to each other.

The 5 and 6 Series’ aluminum/cast-iron construction cuts unsprung weight, and reduces rotor deformation under hard-braking, high-heat conditions by about 20%. This construction, which fully allows the two rotor components to expand differently, is more elaborate and costlier. It saves an equal amount of weight, and **totally eliminates deformation**. In practical terms, this means virtually no tendency of the brakes to vibrate when hot, and also virtually no likelihood of the rotors cracking even under the extreme temperatures that typically might be encountered in driving on a racetrack.

Additionally, the M5 brake rotors – again, like those on the M3 Coupe with Competition Package – are **cross-drilled**. Visible through the wheels, cross-drilling enhances heat dissipation beyond that provided by the rotors’ internal ventilation, further increasing the brakes’ resistance to fade. The cross-drilling also reduces weight – unsprung weight – by a full 1.5 kg/3.3 lb. per rotor. The front calipers have dual pistons, another M5 upgrade; front and rear calipers – highly visible through the wheels – are painted in an eye-catching glossy black.

In its wheel-tire equipment, the M5 takes the 5 Series platform to its ultimate level of performance and style.

**Wheels and tires: ultimate grip and style**

**Benefits**
- Ultimate road handling
- Appropriately aggressive appearance

In its wheel-tire equipment, the M5 takes the 5 Series platform to its ultimate level of performance and style. The wheels, in a traditionally open, discreetly aggressive M Double Spoke design (#166M), are sized 19 x 8.5 front/19 x 9.5 rear and carry 255/40ZR-19 front / 285/35ZR-19 high-performance tires, specially developed for the M5.

These are not run-flat tires; there are no run-flats yet that meet BMW M’s parameters in terms of speed rating and weight. The M5 exhaust system, with its four main mufflers clustered at the rear of the vehicle, does not provide space for a spare tire, so the M5 is
Specially calibrated, variable Dynamic Stability Control

- In its basic calibration, already tailored to the specific needs of an M Car’s handling
- Provides a 2nd mode (M Dynamic Mode) for ultra-high-performance (track) driving

DSC is standard on all BMW models; on M3 models and the M5, this electronic traction and stability system is complementary to the M Variable Differential Lock.

DSC’s traction control occurs by electronic means; the system senses wheel-speed differences and reduces engine torque and/or applies individual rear-wheel brakes to optimize traction. The crucial difference to the M5 driver between the M Variable Differential Lock and the DSC traction function is that the former in no way impedes power delivery, and is hence suitable for performance driving.

In cooperation with the experts at the supplier Continental Teves, BMW M engineers have developed specific DSC logic that, together with the fast-responding engine, performance-oriented gearing and M Variable Differential Lock, achieves the desired traction enhancement in an M-compatible way.... in other words, without undue interference with MS performance and the differential lock’s ability to get M power to the road. With DSC and the differential lock at work, the M5 can master virtually any traction situation.

The M5’s DSC also incorporates some of the new functions first seen in the new 3 Series:
- **Brake Standby:** When the driver lifts off the accelerator pedal abruptly, DSC recognizes that sharp braking may be about to occur and applies just enough pressure in the brake system to stop up the pads against the rotors. Thus when the driver’s foot reaches the brake pedal, the short “time lag” normally resulting from bringing the pad to the rotor is eliminated. Actual braking sets in more quickly; the reduced stopping or deceleration distance could reduce the likelihood of an accident.
- **Brake Drying:** Acting on input from the rain sensor (an element of the rain-sensing windshield wipers), the pads are periodically brought up to the rotors — just enough to eliminate any film of water between pads and rotors, but not enough to cause any brake application.

The **Start-off Assistant** function, actually part of DSC, is described earlier under 7-speed Sequential Manual Gearbox. Functions not in the M5, though found in some other BMW models, include Comfort Stop and Fading Compensation (first seen in the new 3 Series) and Dynamic Traction Control (found in most recent rear-drive models).

As usual with DSC, it can be de-activated by the driver. (The Dynamic Traction Control mode of regular-production BMW automobiles, however, is not present in the M Cars.) As with the M3 Competition Package, the M5 DSC takes on a unique dimension by offering an M Dynamic Mode. Activated by the same console button that de-activates DSC, this mode allows more oversteer and wheelspin, which can be useful to an expert driver on a race track. It is not recommended for use on public roads.

**MDrive: M technology at the driver’s disposal**

- 279 possible combinations of settings
- Allows driver to choose preferred settings for engine, transmission, suspension, steering, DSC, available Head-up Display and available Active Seat Backrests into one easily recalled setting via an MDrive button on the steering wheel.

Via the MDrive system, the driver has fully 279 combinations of control settings to choose from — and an MDrive button on the steering wheel that allows the 1-touch selection of the driver’s preferred combination of same. Here’s how it all works.

The table on the facing page illustrates the 20 available programs: 3 for engine power, 11 for the transmission, 3 for the Electronic Damping Control (with 2 linked settings for steering assist), 3 for Dynamic Stability Control, including “off.”

**What they mean:**

- **Power and throttle response, 3 settings:** P400, the “comfort” setting, allows a maximum of 400 hp and gives “normal” throttle response. This is the default mode, applying anytime the engine is revved up. P500, the “normal performance” setting, allows the engine’s full maximum output of 500 hp. With the throttle response than in P400. Both those settings may be selected conveniently via the Power button on the console, next to the shift lever.
The 3rd setting, P500 Sport, also allows the engine to deliver full power, but provides even quicker power response to the throttles. It is selectable only within the MDrive menu on iDrive; the increment of throttle response from P500 to P500 Sport is not as dramatic as that from P400 to P500.

**Transmission.** SMG provides 5 automated programs in Drive, D1-D5; 6 programs in Sequential, S1-S6. These are explained in more detail on pages 25-26.

**Electronic Damping Control.** 3 settings: Normal, Comfort and Sport. Steering power assist is linked to these settings: Its Comfort mode (more power assist) goes only with the EDC Comfort setting. The steering’s Sport mode (less assist) goes with EDC’s Normal and Sport modes.

**Dynamic Stability Control.** 3 settings: Normal, M Dynamic Mode and de-activated (though ABS always remains active).

Now let’s see how MDrive arrives at those 279 combinations:
- 3 power settings x 10 SMG programs (excluding for the moment S6) x 3 EDC modes x 3 DSC choices = 270.
- Then, transmission program S6: Because it can be selected only with DSC deactivated, 3 power settings x 3 EDC modes = 9. Add these to 270 and you get the full 279 modes. One might even see the total as 280 by counting Launch Control - itself accessible within S6 - as a further program.

Selecting modes in MDrive. Within the MDrive menu in iDrive, the driver can select every one of these settings and link them to the MDrive button on the steering wheel. Once this is done, regardless of which individual settings have been selected previously, all settings are instantly set to the selections the driver has programmed in MDrive. Conversely, the previously chosen settings will be restored when the MDrive button is pressed again.

As mentioned earlier, power settings P400 and P500 can be summoned anytime by pressing the appropriate button on the console. So can the EDC and DSC modes; likewise the SMG program, which identically to the M3 system can be set via the shift lever and the mode selector behind it.

**Additional MDrive settings.** Two other features, the M version of BMW’s Head-up Display and the Active Seat Backrests that are part of the M Multi-function sport seats, can also have their settings programmed onto the MDrive button via the MDrive menu. Both are optional; see Options for details.

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### MDrive: M5 power & performance, 279 ways

<table>
<thead>
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<th>Power &amp; throttle response</th>
<th>SMG shift programs</th>
<th>EDC modes</th>
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<td>Sequential</td>
<td>Normal</td>
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<td>D1</td>
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</tr>
<tr>
<td>P500</td>
<td>D2</td>
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<tr>
<td>P500 Sport</td>
<td>D3</td>
<td>S3</td>
<td></td>
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<tr>
<td></td>
<td>D4</td>
<td>S4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D5</td>
<td>S5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>S6*</td>
<td></td>
</tr>
</tbody>
</table>

* Available only with DSC de-activated.

A total of 279 combinations of settings affecting driving dynamics can be captured via MDrive (presentation inspired by *auto motor und sport*, Germany). On M5s so equipped, settings for the Head-up Display and Active Seat Backrests settings can also be captured by MDrive.
Imagine the sportiest and most luxurious 5 Series interior you have seen so far. Then imagine it made even sportier, even more luxurious, and equipped with special features that enhance your enjoyment of the ultimate BMW performance. That would be the M5 interior – upholstered in Merino, BMW’s finest leather grade; trimmed in brushed aluminum or a choice of two elegant woods; offering a unique selection of upholstery colors; providing its driver special instrumentation and displays; and offering such options as the M Head-up Display and M Multi-function sport seats with Active Backrest Width.
Special M instrumentation

Benefits
- Speedometer and tachometer reflect M5’s performance potential
- Oil-temperature gauge integrated into tachometer face

Both main instruments have unique fulltime-illuminated white scales and red pointers. The speedometer scale reads up to 200 mph, the tachometer to 9000 rpm. A variable tachometer warning segment in yellow, with red normally beginning at the limit of 8250 rpm, is included. Via a rotating disc behind the instrument face, this segment extends downward to as low as 4500 rpm with a completely cold engine on a cold day, then gradually moves up to the full 8250 rpm as the engine warms up. On the speedometer, a similar disc carries a pointer indicating the set speed for the cruise control.

With such a high-performance engine, oil temperature is a critical factor (and the factor to which the variable rpm limit is related). Accordingly, an oil-temperature gauge is set into the lower portion of the tachometer. As a further differentiation point of M5 instrumentation, via the On-board Computer the driver can select oil temperature (instead of average speed) to be shown in the display between speedometer and tachometer.

Unique M sport steering wheel

Benefits
- Smaller diameter, thicker rim than in 5 Series
- Sporty design includes round center section, BMW M logo, different spoke shape, special stitching
- MDrive button and SMG paddles are distinctive controls

The M5 steering wheel is sized, proportioned and designed to be “as sporty as it gets.” Its distinctions include –
- Smaller diameter: 381 mm/15.0 in. vs. 5 Series 385 mm/15.2 in.
- Thicker rim, padded leather with M-color stitching
- Thumb contours at 10 and 2 o’clock
- SMG paddles above lateral spoke: right for upshift, left for downshift
- Round center and unique spoke shape
- MDrive button (see pages 32-33) replaces one programmable button.

As in the 5 Series, the steering wheel includes power tilt/telescopic adjustment and is included in the memory system.
Start/Stop button

Benefits
- The sporty way of starting and shutting off engine
- Facilitates offering of optional Comfort Access

Along with other 5 Series models as of 9/05 production, the M5 comes standard with BMW's Start/Stop button, which replaces the previous key-start arrangement. Comfort Access is optional; see Options, page 44.

Illuminated SMG shift lever, special console controls

Benefits
- Extra-short
- Handsome shift pattern, illuminated and including BMW M logo

The M5 center console is highly distinctive, dominated by the SMG shift lever and flanked by MDrive controls. In detail, features here include –
- The ultra-short SMG shift lever, with its illuminated SMG shift pattern (R-N-D/S and +/- for sequential shifting)
- Power button, for 3 settings of engine power and throttle response
- DSC button, for 3 Dynamic Stability Control settings
- EDC button, for 3 Electronic Damping Control settings
- SMG control, for selecting from Sequential Manual Gearbox's 11 shift programs.

Set into a neatly designed panel at console center, these controls are surrounded by the standard brushed-aluminum or optional wood trim; the iDrive controller, menu selector and Voice Command button are behind them.

Ultra-short SMG shift lever has illuminated shift pattern and is flanked by mode/program selectors for engine power/throttle response, Dynamic Stability Control, Electronic Damping Control and the transmission itself.

Merino leather, extended or full

Benefits
- BMW's finest leather grade, standard in all M5 interiors
- Extended treatment standard, Full treatment available at extra cost
- Special M color selection

Unique upholstery is standard in the M5 – indeed, BMW's finest leather grade, available in three versions and with unique M colors making up most of the palette.

Standard equipment is an Extended treatment of Merino leather, with this beautiful leather appearing not only on the seats and door panels, but also the door armrests, center-
Shown here with its standard M Sport seats, the M5 interior is available with fine Merino leather in three versions: the Extended non-perforated and optional Full Perforated, both in a choice of three colors; and Full non-perforated, in five colors.

dash area (surrounding the climate and audio controls), center console (including its armrest) and handbrake boot. In the optional Full treatment, leather is also applied to the entire dash width. Perforated Merino is available in the Full version; it is mandatory with the optional Active Seat Ventilation.

The color selection is as follows (see color chart on page 54):
- Extended Merino and Full Perforated leather – Black, Silverstone II and Sepang Bronze Light
- Full leather, non-perforated – Black, Portland Natural Brown, Sepang Bronze Light, Silverstone II and Indianapolis Red.

In all M5 interiors, the headliner and roof pillars are Anthracite color; with the optional Full Leather, they are in Anthracite Alcantara.

Three highly distinctive interior trim materials are offered from top to bottom, brushed aluminum; Olive Carrara Natural, medium-tone with burl grain; and Walnut Madeira, reddish-brown with a more linear grain.

**Special interior trim**

**Benefits**
- Brushed aluminum standard, choice of rich woods optional
- All materials exclusive to M5

With all interiors, the standard interior trim – appearing across the dash, on the door pulls and on the center console’s main horizontal surface – is a boldly brushed aluminum. Optional at no extra cost are two elegant woods:
- Olive Carrara Natural, a medium-tone wood with burl grain
- Walnut Madeira, reddish brown with more linear grain.

In the ordering system, the Olive Carrara is referred to as Light, the Walnut Madeira as Dark.
Comfort & luxury

M sport seats
Benefits
- In addition to familiar adjustments, add passively adjustable backrest width
- 4-way power lumbar support, standard
- 3-stage heating with balance control, also standard

BMW sport seats are widely praised for their excellent anatomical support and extensive adjustability; BMW M sport seats embody even more comprehensive design and features for supporting the driver in sporting driving.

In addition to the adjustments provided by the 5 Series’ available front sport seats, the M5’s standard M front sport seats include adjustable backrest width, which enhances their adaptability to various human statures. Along with the steering wheel and exterior mirrors, each driver’s preferred adjustments are stored in Vehicle & Key Memory and are reset to those adjustments when that driver unlocks the vehicle with his or her remote.

New, amazing M Multi-function sport seats are optional; see Options for details on them.

Navigation System and “high” iDrive: standard in M5
Benefits
- GPS Navigation
- Larger, higher-resolution iDrive Control Display and Force Feedback controller
- Voice Command

This system, optional in 5 Series models, is standard in the M5. Its standard features include -
- GPS Navigation System with DVD database, incorporating all the latest refinements and enhancements
- High-resolution (640 x 240 pixels), 8.8-in. Control Display
- Controller with Force Feedback (incorporates tactile feedback into controller movements)
- Voice Command system, with new option of obtaining GPS guidance to a city or town by spelling out its name with one’s voice.

For further details, see ’06 5 Series Product Information Book, page 49.

Premium Sound Package: also standard
Benefits
- Audiophile-quality sound of Logic7 audio system
- 6-disc CD changer

This desirable Package is optional in all 5 Series models, standard in the M5. It includes -
- Increased audio power
- Very high-caliber speakers (aluminum-membrane type for all but subwoofers); 13 speakers, including 2 subwoofers
- Digital Sound Processing (DSP), adjusted along with other Logic7 parameters on iDrive Control Display
- Surround Sound simulation.
Navigation System is standard in M5, as are the Premium Sound Package, auto-dimming mirrors, Ambient Light Package with additional M5-specific door lighting, and the Universal Transceiver. European model, with 'Celsius climate controls, is shown.
In terms of safety and security, the M5 — along with the 5 Series from which it is derived — is a state-of-the-art vehicle from a state-of-the-art vehicle maker. In brief form, this section of the Product Information Book presents the range of safety and security concepts and features that help make the M5 such a sound automotive investment.
Robust side-impact resistance is built into the doors of all BMW models. Seen here (on a regular-production 5 Series Sedan) are the M5’s upper door reinforcements and the diagonal reinforcing bars of its interlocking door anchoring system.

**Key safety and security features**

- **Dual front-impact Supplementary Restraint System (SRS)** with dual-threshold deployment, 2-stage Smart Airbags - optimized for shape and deployment characteristics.
- **Front safety belts with automatic tensioners and force limiters** - standard.
- **Automatic-locking restraints (ALR) on all passenger safety belts** for installation of child restraint seats.
- **Interlocking door anchoring system** for side impacts.
- **Front-seat side-impact airbags** - standard.
- **Rear safety belts with automatic tensioners** - included with the optional rear-seat side-impact airbags.
- **Head Protection System** - front-to-rear head protection via BMW’s proven Inflatable Tubular concept; tubular airbag that deploys from ceiling and is suspended on a “sail.”
- **Active front head restraints** - included with the optional M Multi-function front sport seats. Responding to impact sensors at the rear of the vehicle, the head restraints instantly pivot forward into close proximity with the occupants’ heads. Thus occupants are able, if they prefer, to adjust the restraints away from direct contact with their heads, yet gain optimum protection against whiplash or more serious head/neck injuries.
- **Energy-absorbing padding of body-pillar and roof areas** - specific padding at the A-, B- and C-pillars as well as along the roof above the doors.
- **Fuel-tank design and location**. Not only is the fuel tank designed to remain sealed even in severe impacts, its location has been chosen to provide optimum protection from impacts.

- **Intelligent Safety and Information System (ISIS)** - employing 14 sensors to achieve a precise “tailoring” of the safety devices’ deployment to actual accident circumstances.
- **Battery Safety Terminal** - in case of a severe accident impact, breaks the high-current connection between the battery and starter cable. This helps prevent a possible short circuit in the electrical system.
- **Automatic fuel-pump shutoff upon severe accident impact**. In addition, the doors are automatically unlocked; the interior lighting and 4-way hazard flashers are switched on. Thus even after an accident, BMW’s safety strategy is still at work.
- **Coded Driveaway Protection** - The multifunction remote is equipped with a tiny transponder which stores an electronic code transmitted by a ring antenna around the ignition slot. Each time the remote is removed, this code is changed; the next time, the engine can be started only if the remote matches the new code.
- **Central locking system with double-lock feature**. When the vehicle is locked from the outside, the double-lock feature prevents individual door-lock buttons from being pulled up; thus even if a thief has broken into the car, it isn’t possible to open the doors. Owners, however, have access to information on how to get out in case one is locked inside the vehicle from the outside.
- **Alarm system with interior motion detector** - standard.
- **BMW Assist** - BMW’s comprehensive system of customer services and in-car telematics is standard. For detailed information, see CenterNet or BMW Fast Facts 2005, pages 333-334. Includes a 1-year subscription to BMW Assist services, after which the customer pays an annual subscription fee.
Options
Almost everything is standard. Almost.

Because the M5’s standard equipment is so extensive, its options list is relatively short. Yet certain features have been made optional, and most of them are unique to the M5. This section covers all factory options and a brief selection of Center-installed accessories.
M Multi-function sport seats
(codes 4MA + 4MF)

Benefits:
- Even more widely adjustable than standard M sport seats
- Include Active Backrest Width, shoulder-support adjustment and active head restraints

Surely the ultimate in ultimate seats! In addition to the already extensive adjustments and features of the M5's standard M sport seats, these add:
- **Active Backrest Width.** Responding to cornering forces, the lower backrest side bolsters move to "tighten" the curve-outer side and thus provide extra lateral support to the occupants. That is, in a hard right corner, the driver's and passenger's left lower backrest bolsters move inward; in a hard left corner, the right bolsters tighten. Moreover, there are 3 programs for this function: Comfort, Normal and Sport, in order of aggressiveness, programmable within the MDrive menu.

- **Adjustable upper-backrest width.** Separately from the lower bolsters that incorporate Active Backrest Width, the upper side bolsters are power-adjustable to vary backrest width and support according to the occupants' preferences. This adjustment is not affected by the Active function.
- **Active head restraints** – as on the Comfort seats of 5 and 7 Series models. Via two additional impact sensors at the rear of the vehicle, a rear-end collision causes the front head restraints to pivot forward into close proximity with the occupants' heads. Thus occupants are able, if they prefer, to adjust the restraints away from direct contact with their heads, yet gain optimum protection against whiplash or more serious head/neck injuries.

**Active Seat Ventilation**
(code 453, requires M Multi-function sport seats & X2 perforated Full Leather)

Benefits:
- **Pleasant ventilation**
- Helps keep occupants' clothes free of perspiration

Multiple fans inside each front seat gently blow air upward through an internal web and special perforated leather to provide pleasant ventilation and help keep occupants' clothes free of perspiration. Requires perforated Full Leather.
Options

Comfort Access (code 322)
Benefit
- Additional convenience in entering, starting and exiting the vehicle
Eliminates the need to activate a remote to unlock or lock the vehicle, or to insert it into the dash slot before starting the engine.
- **Keyless access** - User enters vehicle merely by pulling a door handle, or opens the trunk by pressing the trunk release. Presence of the remote (say, as in the user’s pocket or purse) has already confirmed that the user is authorized.
- **Keyless starting** - User authorization is confirmed by the presence of the remote inside the vehicle; the driver starts the engine by merely pressing the Start/Stop button.
- **Keyless engine switch-off and vehicle locking** - Driver turns off the engine via the Start/Stop switch, and presses a door handle to lock the vehicle after exiting.
If the user has left the remote in the interior, the vehicle will not lock. If the remote has been left in the trunk and the trunk lid is closed, it will open again as a reminder to retrieve the remote.

Soft-close doors (code 323, available as of spring 2006 production)
Benefit
- Easier, quieter door closing
- Greater certainty that doors are securely closed
- Helps ensure perfect weathersealing
Familiar from the 7 Series' Convenience Package. The user closes the door gently; an electric mechanism draws it fully in.

Full Leather upholstery (perforated or not perforated, codes X2 or X3)
**Benefits**
- Even greater luxury
- Non-perforated version available in two additional colors
This leather treatment (even more extensive than the M5’s standard Extensive treatment) is in the fine Merino grade. Whereas the standard leather (also Merino) appears on seats, door panels, door armrests, center-pop area, center console and handbrake boot, the full version includes leather across the entire dash width.
Like the standard leather, the perforated Full Leather is available in Black, Silverstone II and Sepang Bronze Light. The non-perforated Full treatment offers two additional colors: Portland Natural Brown and Indianapolis Red. Both Full Leather treatments require the M Multi-function seats.

Alternate interior trim (Olive Carrara code 4MJ, Walnut Madeira code 4ME)
**Benefit**
- Additional choices at no extra cost
In place of the standard brushed aluminum, optional at no extra cost are two elegant woods:
- Olive Carrara Natural, a medium-tone wood with buri grain
- Walnut Madeira, reddish brown with more linear grain.
In the ordering system, the Olive Carrara is referred to as Light, the Walnut Madeira as Dark.
With its M display selected, the optional Head-up Display represents the engine’s rpm band as a 3-color graphic band (green-yellow-red) that flashes when it’s time to upshift; the gear currently engaged (2nd here) and the actual speed (14 mph).

M Head-up Display
(code 610)
Benefits
- M Version of Head-up Display offers M-specific information set
- Preferred setting for Display is programmable in MDrive menu

BMW’s Head-up Display displays important driving information in color on a 6 x 3-in. field in the windshield. A virtual image is projected from the top of the instrument panel onto the windshield, appearing approximately in line with the end of the hood in the driver’s field of sight. Thus the driver can observe the information with essentially no diversion from the road ahead. Via the iDrive control display’s I-menu, the driver decides which information is to be displayed here and the brightness of the display.

The M5’s Head-up Display is a special M version, in which either the standard selection of information or a special M set can be displayed. A switch in the lighting control center to the left of the steering column, serves to switch on the HUD: selection between the standard and M display sets occurs in the MDrive menu, and that selection is stored on the MDrive button.

- For the standard set, the user selects the iDrive’s I-menu and chooses any or all of Navigation instructions, cruise-control set speed and current vehicle speed.
- The M set includes:
  - Dynamic engine-speed band in green, yellow and red
  - Upshift indicator (engine-speed band flashes as the rpm limit is reached)
  - The gear currently engaged
  - As with the standard display, the vehicle speed.

Sirius Satellite Radio
(code 659)
Benefits
- Integrated into vehicle audio system
- Offers 100 channels of programming
- Includes scan and presets

Together with Sirius, BMW is offering its customers the latest in radio technology.

The Sirius system beams programming to satellites orbiting the earth; Sirius-equipped vehicles receive the programming. Except for locations where reception is physically blocked, users can enjoy the same programs anywhere in the U.S. Sirius provides 60 original channels of commercial-free music of virtually every genre, and 40 sports, news and entertainment channels. Sirius currently caters National Basketball Association and National Hockey League games as part of its sports coverage.

Hardware for the vehicle consists of:
- an activated Sirius Satellite Receiver
- a Satellite Antenna
- a Sirius-compatible audio system
- and includes a 1-year subscription, to which Sirius currently adds a complimentary 2-month extension (is limited offer).

Once the equipment is installed and activated, the customer simply selects the satellite radio mode (example: AM/FM/CD/Satellite). As with FM and AM, users are able to scan and set their favorite presets. The audio display can show the channel name, channel number and (in the case of music channels) artists and music title.

For the latest information on Sirius availability, see CenterNet.
Options

Split folding rear seats are offered optionally...

...in combination with a ski bag (regular-production 5 Series model shown).

Split folding rear seats and ski bag (code 465)

Benefits
- Enhance passenger- and cargo-carrying versatility
- For security, folding seats can be unlocked only from inside trunk
- Ski bag allows skis to be carried "indoors"

The seats are split 60% left/40% right. The pass-through for the ski bag is in the center, as part of the 60% side; as with the standard rear seat, there are three head restraints. Releases for folding the seats are in the trunk.

Heated rear seats (code 498)

Benefits
- Cold-weather comfort for rear passengers too

Like the heated front seats that are standard in the M5, this option offers 3-stage/2-zone heating of the outer seating positions. The controls are at the rear of the center console.

Option 416 includes a power rear-window sunshade and 2-segment manual rear door-window shades.

Power rear sunshade and manual rear door-window sunshades (code 416)

Benefits
- Reduce glare and external heat load for rear-seat passengers
- Add privacy
- Driver can operate power rear-window shade

The rear-window shade is powered, and controlled from a console switch. The door-window shades are easily positioned by rear-seat passengers; each of these consists of two portions, for the main window and the fixed quarter pane.

Rear-seat side-impact airbags and rear safety-belt tensioners (code 261)

Benefits
- Side-impact protection for rear-seat passengers
- Offered as option so that customers can decide whether or not to order

As in the 5 Series, rear-seat side-impact airbags are offered as optional equipment so that customers can decide on the basis of their own priorities whether or not to have them. This option also includes automatic tensioners on the rear outboard safety belts.

Rear-spoiler delete (code Z05)

At no extra cost, the M rear spoiler that is standard on the U.S. M5 can be deleted.

BMW Center-installed accessories

Among the accessories available for the M5 are:
- Nose mask
- Car covers, outdoor and indoor types
- Windshield sunshade
- Sun/wind deflector for moonroof.
2006 M5 features & technical specifications
Standard & optional features
2006 BMW M5

Exterior design & function
- Alloys wheels with a diameter of 18". Standard brake system with 4-piston calipers.
- M exterior package included: rear spoiler (M5), side Skirt extensions, M5 boot lid, M5 front bumper, M5 rear bumper.
- M5 exterior package: 19" M5 wheels, M5 exterior package.

Power & performance
- M5 performance package: 418 hp, 0-100 km/h in 5.8 seconds.
- Suspension: M5 coilovers, M5 rear suspension.
- M5 drive system: with M5 drive system.
- M5 engine: M5 engine, 418 hp, 0-100 km/h in 5.8 seconds.
- M5 transmission: 6-speed manual, 6-speed automatic.
- M5 steering: M5 steering, 15" M5 wheels.
- M5 exterior package: M5 exterior package, 19" M5 wheels.
**Comfort & luxury (cont.)**

**2006 BMW M5**

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<tr>
<td>- Extended Leather</td>
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<tr>
<td>- Full Leather</td>
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<tr>
<td>- Perforated Full Leather</td>
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<td>volume-controlled rear outlets, activated charcoal microfilter</td>
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<td>Open storage compartments in front &amp; rear doors</td>
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<tr>
<td>Pop-up rear center armrest</td>
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<tr>
<td>Interior trunk release, electrically operated</td>
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<tr>
<td>Fully finished trunk with reversible floor mat to keep smaller cargo</td>
<td>S</td>
</tr>
<tr>
<td>from sliding</td>
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## Safety & Security

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<td>Dual front-airbag Supplemental Restraint System (SRS)</td>
<td>with dual-threshold deployment, 2-stage Smart Airbags</td>
</tr>
<tr>
<td>Front safety belts with automatic tensioners &amp; force limiters</td>
<td>S</td>
</tr>
<tr>
<td>Automatic-tensioning rearseat (ATR) on all passenger safety belts</td>
<td>(or installation of cloth rear seat feasible)</td>
</tr>
<tr>
<td>Interlocking door latching system for side impacts</td>
<td>S</td>
</tr>
<tr>
<td>Front &amp; rearguard Head Restraint System (HRS)</td>
<td>S</td>
</tr>
<tr>
<td>Front passenger airbag</td>
<td>S</td>
</tr>
<tr>
<td>Rear-side-impact airbags &amp; automatic tensioners on rear outboard belts</td>
<td>OPT</td>
</tr>
<tr>
<td>Additional front head restraints</td>
<td>OPT</td>
</tr>
<tr>
<td>Intelligent Safety &amp; Information System (iSIS) for deployment of safety systems</td>
<td>S</td>
</tr>
<tr>
<td>Battery Stability Terminal</td>
<td>S</td>
</tr>
<tr>
<td>REAR Airbag, including automatic deployment function, SOS button, enhanced Roadside Assistance, TeleService*</td>
<td>S</td>
</tr>
<tr>
<td>Converse &amp; Collision Response service</td>
<td>S</td>
</tr>
<tr>
<td>Center folding system with double-lock anti-theft feature, selection unlocking</td>
<td>S</td>
</tr>
<tr>
<td>Cockpit Dwellinity Protection</td>
<td>S</td>
</tr>
<tr>
<td>Arrth system with operation front remote, interior motion detector</td>
<td>S</td>
</tr>
</tbody>
</table>

* - Positive Controls, spoke when optimum bottle is used in combination with Bluetooth interface.
* - Requires both rear seats to be installed for rear seat.
* - Standard and only available with full Leather upholstery.
* - Equipped with full Leather sport seats.
* - Standard by default.
* - No extra cost.
* - Dual-Stage Airbags.
## Technical specifications
### 2006 BMW M5

### General
- **Curb weight, lb.**: 4012
- **Weight distribution, front/rear, %**: 52.2/47.8
- **Wheelbase, in.**: 113.7
- **Track, front/rear, in.**: 62.2/61.7
- **Length, in.**: 191.5
- **Width, in.**: 72.7
- **Height, in.**: 57.8

### Body
- **Type**: 4-door sedan
- **Aerodynamic drag coefficient**: 0.31
- **EPA size classification**: Compact

### Accommodations
- **Seating capacity, persons**: 5
- **Shoulder room, front, in.**: 57.2/63.7
- **Head room, front/rear, in.**: 31.7/37.8
- **Leg room, front/rear, in.**: 41.5/26.0
- **EPA passenger compartment volume, cu ft**: 90.1
- **EPA cargo volume, cu ft**: 14.0

### Engine & Electrical
- **Engine type**: DOHC (4-cyl), 40-valve V-10, high-pressure Dohlmei VACOS 1 TEMAS, variable valve timing, 30 individual electronically controlled thyristors with PID, PDCO, PDES & PDES S settings
- **Bore x stroke, mm/mm**: 2.0 x 76.9/135.2 x 2.98
- **Displacement, cC/cm³**: 4999/90.5
- **Compression ratio**: 12.0:1
- **Power @ rpm, hp**: 500 @ 7500
- **Torque @ rpm, lb-ft**: 383 @ 6400
- **Engine-management system**: M5 865 with ionically current knock control, variable valve timing, electronic throttle control, variable maximum power level, electronic lubrication system, oil-level/temperature sensor, variable catalytic converter control, catalytic converter monitoring & other functions included in control strategy
- **Fuel requirement**: Premium unleaded
- **Fuel capacity, U.S. gal.**: 18.5
- **Battery capacity, anti-flx**: 90
- **Alternator output rating, amp, kV**: 170/2380

### Drivetrain
- **Drive system**: Front engine/rear-wheel drive
- **Sequential Manual Gearbox (SMG)**: Electrified hydraulically actuated, electronically controlled 7-speed Sequential Manual Gearbox with 8 Sequential & 8-Sequential shift programs, twin-disc clutch
- **Ratios**:
  - **1st**: 3.50:1
  - **2nd**: 2.60:1
  - **3rd**: 1.81:1
  - **4th**: 1.38:1
  - **5th**: 1.16:1
  - **6th**: 1.00:1
  - **7th**: 0.89:1
  - **Reverse**: 3.91:1
- **Final drive ratio**: 3.62:1
**Chassis**

- Body/frame construction: Unitized, aluminum front end, otherwise steel
- Front suspension: BMW M sport suspension in aluminum struts, double-pivot lower arms, coil springs, electronically controlled twin-tube gas pressure shock absorbers with Normal, Comfort & Sport modes, and rollover multilink, thrust plate
- Rear suspension: BMW M sport suspension in aluminum, 4-link integral system, coil springs, electronically controlled twin-tube gas pressure shock absorbers with Normal, Comfort & Sport modes, and rollover multilink, thrust plate
- Steering type: Rack & pinion, Sequential vehicle-speed sensitive power assist with Normal & Sport speed levels
- Overall ratio: Variable, mean (6.1:1, 12.4:1)
- Turning circle, ft: 40.7

**Wheels**
- 4-wheel compound, ventilated & cross-ventilated disc brakes
- Front: Diameter x thickness, mm/in: 314 x 35/14.7 x 1.42
- Front calipers: Aluminum
- Rear: Diameter x thickness, mm/in: 370 x 24/14.8 x 0.94
- Rear calipers: Cast iron
- Tires: 255/40R18 front / 255/35R18 rear special performance

**Stability enhancement systems**
- Dynamic Stability Control (DSC), including all-speed traction control, electronic brake force distribution, antilock braking (ABS), controlling/braking stability enhancement, Dynamic Brake Control, Brake Standby, Brake Drying, Start-off Assistant & M Dynamic mode

**Performance data**

<table>
<thead>
<tr>
<th>Acceleration, 0-60 mph/sec</th>
<th>4.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top speed, mph</td>
<td>161</td>
</tr>
<tr>
<td>Fuel economy, EPA est., mpg:CITY/HIGHWAY</td>
<td>20/18 (preliminary data)</td>
</tr>
</tbody>
</table>

1. Gasoline: 91 octane minimum recommended.
2. 8-speed automatic transmission, rear-wheel drive.
3. 260 HP @ 5,000 rpm
4. 340 ft-lbs @ 4,000 rpm
5. BMW RENNtech performance package.
6. BMW AG not responsible for misinterpretation of technical data or disregard thereof by customers.
7. BMW AG reserve the right to make technical changes without wetting for any reason.
## Exterior/interior color combinations

### 2006 M5

<table>
<thead>
<tr>
<th>Exterior colors</th>
<th>Standard color</th>
<th>Metallic colors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Alpine White 300</td>
<td>Silver Gray A06</td>
</tr>
<tr>
<td><strong>Extended Merino leather</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black LK5W</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Silverstone II UKA9</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Sepang Bronze Light LK65</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>Full Merino leather</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black X25W</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Portland Silver Natural X281</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Silverstone II X34B</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Sepang Bronze Light X24B</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Indianapolis Red X347</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td><strong>Full Merino leather perforated/ M Multi function seats</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black X25W</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Silverstone II X24B</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Sepang Bronze Light X24B</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

- ● = Standard selection (included)
- ○ = Color available (option)
- ■ = Not available
The M5's competition
Because the M5 is both a luxury sedan and a sports car, its competitors come from both vehicle categories.

Thanks to its dual character as a luxury sedan and all-out sports car, the M5 can compete equally powerfully against such rivals as the Mercedes-Benz E55 AMG and the Porsche 911 Carrera S – taking on both of them on their own terms, out-luxing the 911 while out-sporting the E55. That's how marvelously versatile the M5 is. In the spirit of the M5's "dual personality," we examine seven of its would-be competitors here: from the sedan category, the Mercedes-Benz E55 AMG and CLS55 AMG and the new Cadillac STS-V; from the pure sports-car camp, the Porsche 911 Carrera S and Aston Martin V8 Vantage Coupe; and to show how the M5 competes even with exotic mid-engine sports cars, the Ferrari F430 and Lamborghini Gallardo.
The competition

Mercedes-Benz E55 & CLS55 AMG

The E55 AMG is the M5's most "direct" competitor, in that it is based on Mercedes' midsize sedan series, has the most powerful engine Mercedes installs in that series, and is priced similarly to the M5. However, in its array of attributes, it represents the usual contrast between AMG and BMW M. For example, it comes only with an automatic transmission, vs. the M5's more sporting 7-speed SMG. Its supercharged V-8 engine stresses torque while the M5's V-10 dazles in power and revs; and in its overall character, the E55 features blunt muscle while the M5 is a precision driving instrument. The CLS55 AMG is essentially a body variant of the E55, with a rakish shell on the same platform and a few mechanical differences such as 19-in. wheels and tires in place of the E55's 18-in. equipment. Mercedes calls it a 4-door coupe; it base-prices $5,800 above the E55.

Key advantages of M5 over E55 AMG

Exterior design & function
- Standard Xenon Adaptive headlights and headlight cleaning system, vs. optional
- Both M5 exterior mirrors auto-dim; on the Mercedes, only the left one does.
- Park Distance Control standard; Mercedes' Parktronic optional.

Power & performance
- First things first: M5's 500 hp vs. E55's 469. But in fairness, the E55's acceleration is approximately equal to the M5's. It's the way it's delivered that makes all the difference: "Against the stopwatch," writes the authoritative German journalist Georg Kacher in Automobile Magazine (November '04), "the 500-hp M5 is in the same league as the Audi RS6 and the Mercedes-Benz E55 AMG, because the makers of all three quote a 0-62-mph time of 4.7 seconds, and all three bump up against the limiter at 155 mph. But the BMW is different, because it involves you and feels as if it was built by people with passion. Putting the M5 through its paces is a spine-tingling and pupil-widening experience."
- Another aspect of the M5's superior experience is the V-10 engine's unique sound. Motor Trend (December '04) describes it: "The yawling twin-five snarl as you see toward max revs in an experience that etches itself deep in your memory. No, it's not superior loud... But the noise is like the throttle response — sharp, strong, blazingly urgent."
- 7-speed SMG or 6-speed manual vs. Mercedes' 5-speed automatic: another BMW advantage in true sportiness. Mercedes uses an AMG version with Normal, Sport and Manual modes, but it's still a torque-converter automatic and still just a 5-speed. Oddly, lesser E-Class models come with a 7-speed automatic.
- Also part of the M5's versatility is its amazing adaptability. Combining the available programs for engine, transmission, EDC and DSC, the M5 driver can choose from 279 combinations of driving and riding characteristics. Mercedes' air suspension provides 3 levels of firmness and the automatic transmission has 3 modes, but the E55 comes nowhere near the M5 in its ability to adapt to the driver's tastes and moods.
- Comparing the M5 with the Mercedes CLS55, Germany's auto motor und sport magazine (October 27, '04) drew several conclusions regarding handling and ride: "Even in the hardest of suspension settings, the CLS has less road shock than the M5 in its Comfort mode. And unusual for a Mercedes, its agile handling and surprisingly precise steering. But the M5's handling is snappier and more precise. Its steering wheel wants to be handled in a sporty, hearty way. Even in the suspension's Normal and Comfort modes, the M5 pulverizes curving roads."
- Playing a role in the M5's superior handling are its larger wheels and tires: 19-in. with 255/40ZR front / 285/35ZR rear tires. E55 standard wear is 18-in., with 245/40ZR front / 265/30ZR rear.
• Germany's Auto Zeitung magazine compared the CLS55* and M5 handling in its 26/04 issue: "The AMG attains unreasonably high cornering speed, but can't keep up with the M5. Its steering is less direct; its body rolls more. In the admittedly good-natured Benz, one misses the light-footedness of the hot-blooded BMW."
• Flat Tire Monitor standard on M5: The Pressure Monitor optional on E55.
• M6 brakes top E55 brakes in two ways:
  1. Compound construction eliminates distortion under hard use.
• Comparing the CLS55's brakes 1 with those of the M5, Auto Zeitung commented that the Mercedes "decelerates with its electrohydraulic brakes almost as well, but the pedal modulation is less precise." This is an ongoing criticism of Mercedes' Sensotronic "brake-by-wire" system.

Comfort & Luxury
• M5's optional M Head-up Display: Mercedes offers nothing comparable.
• Roomier interior:
  1. More shoulder room (+0.9 in. front/+1.1 in. rear)
  2. More head room (+0.3 in. front/+0.2 in. rear)
• More EPA passenger volume (999.1 cu ft.
• M5's upholstery and trim options cost a maximum of $3,500. Mecedes charges up to $5,000 for its options.
• Features that are standard in M5, optional in E55:
  1. GPS Navigation
  2. 6-disc CD changer

Cost & experience of ownership
• Full maintenance for 4 years/50,000 miles, vs. Mercedes' complementary 1,000- and 3,000-mile service and one tire rotation only.
• 12 years/Unlimited-mileage corrosion warranty, vs. 4/50,000.

For CLS55 AMG vs. M5, add or substitute:
Power & performance
• Unlike E55, CLS55 has 19-in. wheels and tires comparable to M5's; yet Auto Zeitung's handling evaluation (above) indicates that the CLS still doesn't match M5 handling.

Comfort & luxury
• "Tightened interior, for 4 passengers only: M5 provides -
  1. More shoulder room (+1.1 in. front/+1.2 in. rear)
  2. More head room (+0.8 in. front/+1.8 in. rear)
• CLS's official EPA passenger volume is actually greater (104.3 cu ft.), but Germany's Auto Zeitung (issue 26/04) noted that the M5 "offers much easier entry, while the Benz requires some agility to duck under the low roofline... the CLS is just short on head room."
• The magazine adds, "Also the outward vision suffers from the unusual styling: the driver can only guess where the hood is, and sees absolutely nothing of the rear end."
• Switzerland's Automobil Revue (January 5, '05) adds its word to the vision thing: "Just as high heels look more sensational than Birkenstocks, so the CLS's special styling reduces its practicality: from inside, the Paner-style side windows are too small, and the high backlight further reduces outward vision.

E55 and CLS55 AMG strengths. 8-piston fixed calipers front, 4-piston fixed rear. Easy-exit feature moves driver's seat rearward, steering wheel upward. E55 only: E55 also available as wagon. Panoramic moonroof available (fixed glass panel from windshield to rear window, Sedan only).

---
1. Comparison based on competitors' data sources.
2. Designated available.
3. E55 and CLS55 are variants of the same platform and technically virtually identical.
4. Due to low-profile tires, clearance must be maintained with manufacturer's wheels. We assume a 19-in. CLS may assist with a spare tire and wheel. Performance data are not recommenced for driving in snow and poor conditions.

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Cadillac STS-V

Cadillac continues to show it intends to compete seriously with BMW and other true premium marques; the STS-V is its newest entry. Starting with the relatively new STS, a rear-wheel-drive sedan priced in the BMW 525i/530i segment, Cadillac has applied extensive performance modifications: supercharged 4.4-liter V-8 engine producing 440 hp; 6-speed automatic transmission (no manual offered); structural reinforcements; sport-tuned suspension; a new type of power steering fromZF; 4-piston Brembo brakes; 18-in. front/19-in. rear wheels/tires; 4-mode stability/traction system; sporty/luxurious exterior and interior modifications. Though not announced at this writing, the base price will probably be in the $65,000 range.

Key advantages of M5 over STS-V

- **Opinions about design are subjective; we’d say Cadillac has done a good job of applying a high-performance look to the STS. But the M5 is the original.**
- **Both M5’s exterior mirrors auto-dim; on the Cadillacs, only the left one does.**

Power & Performance

- GM’s taken a traditional approach to getting more power out of an existing engine: add a supercharger. The basic Northstar V-8 remains, extensively modified but lacking the from-the-part-up high technology of the M5’s all-new V-10:
  - First, BMW M gave its engine more displacement: 5.0 liters vs. Cadillac’s 4.4.
  - With its 10 cylinders and high-revving concept, the M5 engine has a more exotic sound: the “rowing twin-five snarl” to which Motor Trend referred.
  - The M5 engine has an individual throttle for each cylinder; STS-V has just a single throttle. And the M5’s throttle system offers three levels of throttle response.
  - M5’s redline is 8250 rpm. Cadillac hasn’t revealed the STS-V’s redline, but with its power peak at 6400 rpm, it’s probably below 7000.
  - 12.0:1 compression ratio, vs. just 9.0:1.
  - Ion-current knock sensing enables the M5 engine to adjust ignition timing more quickly to actual conditions than Cadillac’s conventional knock control.

- M5’s semi-dry-sump, g-sensitive lubrication system is closer to racing technology than STS-V’s conventional wet-sump lubrication.
- M5’s 500 hp vs. STS-V’s 440. Cadillac can boast of higher torque – 430 lb-ft. vs. M5’s 380; this is part of the STS-V’s low rpm concept, similar to that of the supercharged Mercedes E55s.
- BMW M’s advanced and totally performance-oriented 7-speed Sequential Manual Gearbox is a stark contrast to Cadillac’s 6-speed automatic. Here Cadillac has merely matched BMW’s regular-production automatics.
- BMW M5 will also offer a 6-speed manual – another alternative STS-V doesn’t provide.
- Electronic Damping Control offers 3 modes of suspension operation, it’s not known if STS-V will have Cadillac’s Magnetic Ride Control, if so, it’s likely to offer 2 modes. Otherwise, compared to the STS, STS-V suspension gets a firming-up and auto-leveling.
  - In addition to 2 modes for its Dynamic Stability Control system (plus de-activation), the M5 has the Variable Differential Lock to enhance handling in dry or not-quite-dry road conditions. STS-V has four modes of stability and traction control, but no variable differential lock.
  - In addition to BMW M’s traditional steering precision, M5’s Servotronic power steering gives the driver two choices of effort level. Cadillac’s power steering (made by ZF) varies assist according to steering-wheel turning (more effort near the straight-ahead position, less as it turned more), but offers no driver choices.
  - 4-piston Brembo brakes sound impressive, but here too M5 tops STS-V with cross-drilled rotors and larger dimensions: 14.7 in. front/14.6 in. rear vs. Cadillacs’ 14/14.3.
  - Also part of the M5’s versatility is its amazing adaptability. Combining the available programs for engine, transmission, EDC and DSC, the M5 driver can choose from 279 combinations of driving and riding characteristics. Even with its variable stability/traction settings, STS-V comes nowhere near this adaptability to the driver’s tastes and moods. And MDrive enables the M5 driver to program a favorite combination of settings, then recall it at the touch of a button.
Comfort & luxury
- Details of the STS-V's interior are not known at this writing.

Cost & experience of ownership
- Full maintenance for 4 years/60,000 miles; Cadillac does not include maintenance.
- 12-year/unlimited-mileage corrosion warranty, vs. 6-year/unlimited-mileage.


Porsche 911 Carrera S Coupe
A pure sports car as a competitor to our M5? Why not? the M5 brings together the capabilities of a pure sports car and the amenities of a luxury sedan, while the Porsche 911 is limited to merely the capabilities of a pure sports car. And though M5 pricing has not been finalized, it's expected that its base price will be close to that of the 911 Carrera S.

As the more powerful version of Porsche's 911 Carrera (rear-wheel-drive) line, the Carrera S is available as a Coupe or Cabriolet; we analyze the Coupe here. At 355 hp, its 3.8-liter engine is 30 hp stronger than the 3.6-liter unit of the base Carrera. Typically for Porsche, it is offered with a host of options, which can be used to "customize" the vehicle to a great extent but which can also drive the price into a dollar stratosphere. Here, instead of accounting for every optional model insignia and leather seat-adjuster knob, we will focus on two main things: [1] the way the M5 matches the Carrera S's sports-car attributes while carrying up to 5 persons in sumptuous luxury; and [2] the significant standard equipment and options that are relevant to the Carrera S vs. M5 comparison.

Key advantages of M5 over Carrera S
- Exterior design & function
  - All-paint choices, including special M colors, are available at no extra cost on the M5; Porsche charges $825 extra for metallics.

Power & performance
- The German magazine Auto motor und sport tested the Carrera S and M5 (in its August 27, '94 issue) and reported identical 0-100-km/h (0-62 mph) times for both: 4.7 sec. The Carrera S had its standard 6-speed manual transmission.
- In official Porsche data, the Carrera S does 0-60 mph in 4.6 sec. with the manual transmission. With its available Tiptronic automatic — merely a 5-speed, but $3,420 extra — the Carrera S needs 5.0 sec. for 0-60 mph. But there's no such loss for the M5: its 7-speed SMG is both manual and automated. So on balance, the M5 is quicker in the 0-60 test.
- auto-motor und sport doesn't do skidpad tests; instead, it performs various slalom, cone and avoidance tests. The Porsche was quicker through all of these, but not by much; for example, with cones spaced 59 ft. apart, the M5 went through the slalom at 40.6 mph, the 911 at 41.6 mph. Also, the M5 was tested with a full passenger and luggage load — cargo the 911 with its vestigial rear seats can't carry — and was still able to do the slalom at 40.0 mph!
- Although the Porsche's braking performance was somewhat better — about 10 ft. shorter stopping distance from 62 mph and 26 ft. shorter from 118 mph — the M5, like the 911, showed no deterioration in braking performance between cold and hot brakes. The Porsche's shorter braking distances aren't the result of superior brakes, but rather its lighter weight (by about 780 lb.) and rear-heavy weight distribution.
- Porsche provides variable settings for suspension (PASM — Porsche Active Suspension Management), though with only 2 modes vs. BMW's 3.
- Porsche's Tiptronic automatic transmission provides sport and manual settings, but by far not the variety of shift programs M5's 7-speed SMG offers.

1. Comparison based on competitor's '94 model.
2. Due to favorable tax, import rates, warranty, data and assessment, only a few examples of each have been tested out and compared thus far. The M5 is a notch sport with a space the size and urban. Maintenance costs and tolls are known toll for driving in snow and or conditions.
The competition

- Variable settings for engine throttle (though not maximum power) and stability control (PSM = Porsche Stability Management, similar to our DSC) are offered in Porsche's Chrono Package Plus ($920), and can be recalled by a Sport button. But Porsche does not provide the variability, or the ability to program the Sport button, of M5's unique MDrive system.

Comfort & luxury
- 5-passenger capacity vs. 2-2 - in truth, Porsche offers only 2-passenger capacity, plus children or extra cargo carried inside.
- Standard GPS Navigation, vs. optional ($2,070).
- The M5 offers a wide range of leather treatments and interior trim, up to Full leather and elegant woods, at moderate extra cost or none. Porsche's interior, though improved over previous 911s, remains relatively Spartan in standard form; various leather and wood options are priced into the thousands.
- M5's standard power sport seats include power lumbar, thigh support and backrest width plus memory. Porsche charges $1,550 extra just for power seats; other features add more cost.
- Auto-dimming interior/exterior mirrors are standard on M5. Auto-dimming interior and driver's-side exterior mirror are optional on Carrera S.
- Heated front are standard in M6, $480 extra in the Carrera S. Heated rear seats are available in M5, not the Porsche.
- M Head-up Display - optional in M5, not available in any Porsche 911.
- Bluetooth phones interface standard in M5. Porsche offers dealer-installed Bluetooth prep.
- BMW's stellar Logic 7 13-speaker audio system, complete with 6-disc CD changer, is standard in the M5. Porsche offers a 13-speaker Bose system for $3,990 extra and a CD changer for $650 more.

Safety & security
- Front and rear Head Protection System – standard in M5, not available in 911 series.

Cost & experience of ownership
- Full maintenance for 4 years/50,000 miles, standard with every new BMW; with Porsche, the customer pays.

- 12-year/unlimited-mileage corrosion warranty, vs. Porsche's 10 years.
- 340 BMW Centers in the U.S., vs. 193 Porsche dealers.

Carrera S strengths. Excellent performance and traditional sports-car character. Shorter braking distances: from 100 km/h/119 ft. vs. M6's 158 ft. Front & rear foglights, red brake calipers.

Aston Martin V8 Vantage
Ford-owned Aston Martin's V8 Vantage is a "downscaling" of the DB9, with a shortened chassis and a V-8 engine in place of the DB9's V-12; the point is to offer a lower-priced model to compete with the high end of Porsche's 911 series. It is presently offered only as a coupe, but a convertible is expected to be added. At this writing the price has not been finalized; the base is expected to be around $120,000, about 50% more than the M6. Aston Martin hopes to sell about 3000 units per year worldwide; U.S. introduction is planned for about the same time as the M5's.

Configured like the M5 with a front engine and rear-wheel drive, the V8 Vantage has a mostly aluminum/composite structure and skin. Its engine is an evolution of the Jaguar V-8, with 4.3-liter displacement and an output of 380 hp @ 7500 rpm. Aston Martin claims 0-60 mph in 4.9 sec. and a top speed (less electronically limited) of 175 mph. The engine is in front; the 6-speed manual transmission (no other transmission is offered) is combined with the differential into a rear-mounted transaxle. Like the M5, this Aston has a lubrication system designed to ensure full oiling during vigorous cornering, acceleration and braking.
Key advantages of M5 over V8
Vantage

Exterior design & function
- Xenon Adaptive low- and high-beam headlight are standard on M5. Low-beam-only, non-Adaptive Xenons are optional on the Vantage.
- Front and rear Park Distance Control is standard on M5. "Reversing sensors" (rear-only) are expected to be optional on the Vantage.

Power & performance
- M5's V-10 engine vs. Aston's V-6.
- Generally much higher technology through-out: individual throttle for each cylinder, variable throttle response and power level, variable intake- and exhaust-valve timing, and inc/oc-current knock control. Aston's V-6 has a single throttle, variable intake-valve timing only, and conventional knock control.
- 500 hp vs. 380; even with the M5's far greater passenger and cargo capacity, a better weight-to-power ratio: 9.2 lb./hp for M5, 9.5 lb./hp for V8 Vantage.
- M5 engine is higher-revving: 8250 rpm maximum vs. V8's 7500.
- M5's 7-speed SMG not only has more gears than Aston's 6-speed manual, but can be shifted faster and offers vastly more driving choices. It plays a role in the M5's superior acceleration: 0-60 mph in 4.5 sec. vs. Aston's projected 4.9 sec.
- BMW M Electronic Damping Control with three settings, vs. Aston's traditional non-variable suspension.
- M5's Servotronic vehicle-speed-sensitive power assist with two levels of assist, vs. Vantage's simple "power-assisted steering."
- M Variable Differential Lock, vs. Aston's conventional limited-slip.
- Bigger brakes: 14.7 in. front/14.6 in. rear vs. Aston's 14.0 front/13.0 rear. And Aston Martin has not attempted an innovation like the M5's compound brake construction, which eliminates any chance of wheel spin under extreme brake use. Aston claims that its grooved rotors are superior to M5's cross-drilled, but we have no confirmation of this claim.
- Aston plans to offer 18- or 19-in. wheels and tires. 19-in. equipment is standard on the M5.
- Flat Tire Monitor standard on M5; Tire Pressure Monitor optional on Vantage.
- M5's MDrive system: Aston Martin offers nothing like it.

Comfort & luxury
- 5-passenger capacity vs. pure 2-seater.
- 14.0-cu ft cargo volume, vs. 10.6 in the Vantage's trunk. There's some extra cargo space behind the Vantage seats; M5 matches and exceeds this with available folding rear seats.
- Power tilt and telecoping steering wheel, included in memory system, vs. Aston's manual adjustments.
- M5's optional M Head-up Display; Aston offers nothing comparable.
- Cruise control is standard on M5, optional on Vantage.
- Climate-controlled center console compartment in M5, not in Vantage.
- M5's choices of Merino leather in Extended (at no extra cost) or Full (at extra cost) treatment; three choices of interior trim; and, with Full Leather, Alcantara headliner. Standard in Vantage is a "technical-grain leather and fabric interior," leather is optional, as are various trim materials.
- Standard 16-way driver's/14-way passenger's power/heated M front sport seats, vs. Aston's mere 10-way power seats.
- Aston Martin offers nothing to compare.
- Standard M5's Multifunction sport seats with their Active Backrest Width, 4-way power lumbar support and adjustable upper-backrest width.
- For ultimate convenience in entering, exiting and starting/stopping the engine, M5 offers optional Comfort Access. Aston offers no comparable feature.

Safety & security
- Front and rear Head Protection System – standard in M5, not available in V8 Vantage.
- Active Head Restraints are included in M5's optional M Multi-function sport seats; Aston doesn't offer this feature.
- Aston Martin claims that its LED brake lights provide rapid illumination, but BMW matches this while adding the advantage of 2-stage Adaptive Brake Lights.
- M5's standard alarm system includes an interior motion detector and a tilt sensor; these features are optional on Vantage.
Cost & experience of ownership
- 4-year/50,000-mile vehicle/powertrain warranty vs. Aston's 2/1/unlimited.
- 12-year/unlimited-mileage corrosion warranty vs. Aston's 6/1/unlimited.
- Full maintenance for 4 years/50,000 miles, standard with every new BMW; Aston Martin doesn't include maintenance.
- BMW is an independent carmaker with a well-established reputation for quality and consistency. Aston Martin is owned by Ford Motor Co.
- BMW has 340 Centers in the U.S.; Aston Martin has just 30.

V8 Vantage strengths. Very attractive design, available power-fold mirrors. Doors have stepless door checks (like 7 Series) and swing upward as they open, to help clear curbs. 175-mph top speed (M5 could beat this if not electronically limited). Mostly aluminum chassis/body structure, moderate weight of 3600 lb. Carbon-fiber propeller shaft has high-tech appeal. Aston may claim an advantage for 4-piston brakes all around (M5: 2-piston front, single-piston rear). Optional red or silver brake calipers (black standard).

Ferrari F430
The F430 replaces the former 360 Modena, built since 1999 and achieving Ferrari's greatest sales volume ever. Like its predecessor, it is to be available in Coupe (summer '05) and Spider (roadster, early calendar '06) forms, the latter with a fully automatic power softtop. Both are powered by a midship-mounted V-8 engine with a choice of a 6-speed manual transmission or an also-optional "F1" sequential gearbox. The engine, newly developed, but retaining the "flat-crayshaff" configuration of the predecessor, delivers 483 hp and has just 3197 lb. (Coupe) or 3361 lb. (Spider) to pull, so 0-60-mph times 3.9-4.1 sec. are a strength of the F430s. Though prices haven't been finalized as of this writing, they will be around $180,000 for the Coupe and $195,000 for the Spider.

Key advantages of M5 over F430
Exterior design and function
- Xenon Adaptive low- and high-beam headlights are standard on M5. Xenon standard on F430, but not Adaptive.
- Front and rear Park Distance Control is standard on M5; Ferrari doesn't offer this feature – even though it's more critical in a vehicle with poor outward vision (see auto article, sport quip, next page).

Power & performance
- M5's V-10 engine vs. Ferrari's V-8; firing order of cylinders with Ferrari's "flat-crayshaff" V-8 does not give optimum sound. "Rumbling, almost sleepy" is the way Germany's auto motor und sport (April 13, '05) described the F430's sound in gentle driving, adding that "Subtle vibrations, like the restless pulse rate of a racing horse, 'reach the driver' in fairness: it gets more interesting in harder driving, at least in the Spider. Yet of the Coupe, Switzerland's Automobil Revue (October 13, '05) reported that "Some Ferrari fans may be disappointed, because from the outside the F430 sounds duller than the 360... in the cockpit, anything shrill or 'infernal' is lost. The elevated rpm levels this engine can reach aren't so authentically conveyed...."
- 7-speed SMG vs. Ferrari's 6-speed "F1 sequential transmission. The same report noted that the F430's transmission shifts "quickly and precisely in 150 milliseconds, but not with the 'explicitiveness' of the BMW M5's transmission." No wonder: the M5 can shift in just 65 ms!
- In the M5, there are two ways to shift the SMG: with steering-wheel paddles or a console-mounted shift lever. Ferrari provides only paddles.
- And Ferrari's paddles are in fixed positions; Automobil Revue noted that in "long drawn-out courses, where an upshift is called for, this fixed position is a problem." By mounting them on the M5's steering wheel, BMW M has made the paddles handier more of the time; but when they're not so handy, as in tight curves, there's the shift lever for the M5 driver.
• With its separately programmable engine response, transmission, suspension and DCC, the M5 offers its driver fully 279 possible combinations of driving and performance characteristics. Ferrari offers only 5 overall programs, selectable via a rotary dial on the steering wheel; each of these combines certain presets for the electronic differential and shock-absorber firmness, one of them switching off the DCC (called CST by Ferrari). The transmission offers only 2 modes (manual and automatic), selected separately. Thus at best, the F430 offers 10 combinations.

• The M5 has Launch Control; the U.S. F430 model doesn't.

• M5's Servotronic vehicle-speed-sensitive power assist with 2 levels of assist, vs. Ferrari's simple "power-assisted steering."

Comfort & luxury
• 5-passenger capacity vs. pure 2-seater.
• Limited seat adjustments in F430, and auto motor und sport wrote that the driver's seat is "too high for tall drivers." The M5's standard seats are 16-way adjustable for the driver, 14-way for the front passenger.
• Ferrari offers nothing like M5's available M Multi-function sport seats with their Active Backrest Width, 4-way power lumbar support and adjustable upper-backrest width. (Racing style carbon-fiber seats are available, but they're not really practical for daily use.)
• Much better outward vision for the M5 driver; auto motor und sport noted "poor outward vision" in the F430 coupe.
• M5's optional M Heat-up Display; Ferrari offers nothing comparable.
• Standard GPS Navigation with 8.8-in. screen and full iDrive controls; nothing comparable offered in the F430, though Ferrari does offer a rudimentary navigation system as an option.

• Climate-controlled center console compartment in M5, not in F430.
• For ultimate convenience in entering, exiting and starting/stopping the engine, M5 offers optional Comfort Access. Ferrari offers no comparable feature.

Safety & security
• Front and rear Head Protection System – standard in M5, not available in V8 Vantage.
• Active Head Restraints are included in M5's optional M Multi-function sport seats; Aston doesn't offer this feature.
• auto motor und sport gave the F430 a minus for its "heaver airbag equipment"; it doesn't include side-impact airbags.

Cost & experience of ownership
• 4-year/50,000-mile limited vehicle/powertrain warranty vs. 2/year/unlimited.
• 12-year/unlimited mileage corrosion warranty vs. none.
• Full maintenance for 4 years/50,000 miles, standard with every new BMW; Ferrari doesn't include any maintenance.
• BMW is an independent carmaker with a well-established reputation for quality and consistency. Ferrari is owned by Fiat.
• BMW has 340 Centers in the U.S.; Ferrari has just 30 dealers.
• auto motor und sport noted "detailed workmanship problems" on the F430 it tested.

F430 strengths, 0-60 mph in about 4 sec., 196-mph top speed (not electronically limited), 8500-rpm redline. Attractive engine visible through clear cover on Spider. 4-piston brake calipers standard; ceramic brakes with 6-piston calipers optional (at about $14,000). Undeniably exotic sports-car design, outside and in.

1. Auto Motor und Sport, June 2005
2. Market Data Book 2005
3. - - -
Lamborghini Gallardo

The Gallardo is Lamborghini's "move-downmarket," joining the $300,000 Murcielago as a more moderately priced offering ($165,900 before delivery and taxes). Like the M5, it's powered by a 5.0-liter V-10 engine -- but not as advanced or sophisticated as the M5's. Unusually for an exotic car, it has an all-wheel drive; it is available with a choice of 6-speed manual or sequential transmission. Initially it's offered as a Coupe; a Spyder (roadster) version is to be offered in calendar '06. The chassis/body structure is aluminum, resulting in moderate weight of about 3660 lb. The Gallardo is also relatively compact, just 169.3 in. long vs. the Ferrari F430's 1776.

Exterior design & function

- Xenon Adaptive low- and high-beam headlights are standard on M5. The Gallardo has Xenon's, but without the Adaptive feature.
- Front and rear Park Distance Control is standard on M5; Lamborghini doesn't offer this feature -- even though it's more critical in a vehicle with poor outward vision (see Road & Track quote, next page).

Power & performance

- The Gallardo's V-10 engine is derived from Audi's 4.2-liter V-8; the M5's is completely new, not derived from an existing engine. The Lamborghini unit does not have the M5's individual throttles, just a 2-stage conventional induction system. In fairness: Gallardo's V-10 develops almost as much power as BMW M5, namely 492 hp/376 lb-ft. vs. M5's 500/380.
- Whereas the M5 has a purpose-developed, all-new 7-speed SMG, Lamborghini's 6-speed sequential transmission (called E-gear) is not so impressive. Autoweek (June 21, '04) called it "clunky and awkward." Germany's auto motor und sport magazine (February 18, '04) reported similar behavior in low-speed driving, as did Switzerland's Automobil Revue (July 7, '03). Yet Gallardo's sequential box adds $10,000 over the standard 6-speed manual.
- In the M5, there are two ways to shift the SMG -- with steering-wheel paddles or a console-mounted shift lever. Lamborghini provides only paddles.
- And Gallardo's paddles are in fixed positions. By mounting them on the M5's steering wheel, BMW's M4 has made the paddles handle more of the time; but then when they're not so handy, as in tight curves, there's the shift lever for the M5 driver.
- With its separately programmable engine response, transmission, suspension and DSC, the M5 offers six driver fully 279 possible combinations of driving and performance characteristics. The Gallardo offers just a Sport button, which affects the sequential transmission and DSC only; the transmission also has a Winter mode.
- M5's Servotronic vehicle-speed-sensitive power assist with 2 levels of assist, vs. Lamborghini's simple "power-assisted steering."
- Though AWD and available winter tires make the Gallardo more of a winter car than most exotics, auto motor und sport magazine (February 18, '04) reported that in automatic mode, the Gallardo's climate control can't keep the huge windshield clear. Like any BMW 5 Series model, the M5 has fully capable automatic climate control.
Comfort & luxury

- 5-passenger capacity vs. pure 2-seater.
- Limited seat adjustments in Gallardo. Auto motor und sport wrote that the “backrest is curved a bit too strongly” and Road & Track (October ’03) opined that “The power seats are upholstered in high-quality leather, but their lateral hold is insufficient for a car of such cornering abilities.” The M5’s standard seats are 16-way adjustable for the driver, 14-way for the front passenger.
- Also, heated front seats are standard in the M5; they’re not even available in the Gallardo.
- Lamborghini offers nothing to compare with the M5’s available M Multi-function sport seats with their Active Backrest Width, 4-way power lumbar support and adjustable upper-backrest width.
- M5’s optional M Head-up Display; Lamborghini offers nothing comparable.
- Standard GPS Navigation with 8.8-in. screen and full iDrive controls; a navigation system is optional in the Gallardo.
- Climate-controlled center console compartment in M5, not in Gallardo.
- For ultimate convenience in entering, exiting and starting/stopping the engine, M5 offers optional Comfort Access. Lamborghini offers no comparable feature.
- “Outward vision is typical of supercars,” reported Road & Track. “The driver does not see the front windows of the car and the thick A-pillars located far forward are a nuisance on winding roads. The three-quarter rear view is very limited and is best obtained by the external mirrors, although the view directly to the rear is good.”

Safety & security

- Front and rear Head Protection System – standard in M5, not available in Gallardo.
- Active Head Restraints are included in M5’s optional M Multi-function sport seats; Gallardo doesn’t offer this feature.
- Cost & experience of ownership
  - 4-year/50,000-mile limited vehicle/powertrain warranty vs. 2/24,000.
  - 15-year/ unlimited-mileage corrosion warranty vs. none.
  - Full maintenance for 4 years/50,000 miles, standard with every new BMW; Lamborghini doesn’t include any maintenance.
  - BMW is an independent carmaker with a well-established reputation for quality and consistency; Lamborghini is a member of the Volkswagen combine, interacting primarily with Audi.
  - BMW has 340 Centers in the U.S., Lamborghini just 17 dealers.

Gallardo strengths:
- 0-60 in 4.2 sec., top speed 193 mph (not electronically limited), Good cruising range on 24.8-gal. fuel tank; Standard AWD, specially developed winter tires available, same dimensions as standard 19-in. front/20-in. rear equipment, 8-piston front brakes, 4-piston rear.
