3. Driving Experience: The Comfortable Way to Even Greater Dynamics.

The new BMW 7 Series offers a fascinating driving experience and at the same time meets a wide range of different demands. Supreme comfort is just as natural in this unparalleled saloon as maximum performance combined with optimum driving safety in the luxury class. And just like the engines combine outstanding refinement with dynamic power and muscle, the chassis and suspension meets virtually all requirements.

Newly developed suspension technology guarantees absolutely superior body and roll comfort combined with a standard of agility in the new BMW 7 Series quite unique in the luxury segment. Ultimately the driver can decide at any time which of these features to choose, varying the set-up of his car as he wishes
by means of Dynamic Driving Control.

The unique driving qualities of the new BMW 7 Series result from a combination of modern construction features and innovative suspension control systems.
The interplay of the double-arm front axle and the Integral-V rear axle offers not only a wide range of additional benefits in terms of both comfort and dynamic performance, but also exceptionally harmonious roll and transition behaviour in bends.

A further important point is that the new BMW 7 Series comes with electronic Dynamic Damping Control masterminded by the driver via the Dynamic Driving Control function.

As an enhanced version of Active Steering, Integral Active Steering is now making its world debut in the new BMW 7 Series. For the first time this option also controls the steering angle of the rear wheels as a function of the car’s speed. The result in the new BMW 7 Series is impressive agility in city traffic and thrilling supremacy in dynamic driving manoeuvres at high speeds.

The various suspension control systems owe their perfect balance of functions to ICM Integrated Chassis Management networking the various units with
one another. This high-performance electronic control responds to even the slightest change in driving conditions by precise management of the actuators on DSC Dynamic Stability Control, Dynamic Damping Control and, when

fitted as an option, Integral Active Steering as well as the likewise optional Dynamic Drive anti-roll stability system.

The fast and precise response of ICM is ensured in practice by FlexRay high-speed data transmission introduced for the first time by BMW in a series production car.

Extra comfort, superior steering precision and enhanced driving dynamics ensured by the double-arm front axle.
Right from the start in the basic structure of its chassis and suspension, the new BMW 7 Series takes a new approach and follows a new philosophy. This is the first BMW saloon to feature a double-arm front axle, an extra-light aluminium structure separating the wheel guidance and damping functions in the interest of superior comfort. Almost completely relieved of lateral forces in this way, the dampers are able to respond with particular smoothness and perfect balance to any bumps or unevenness on the road, at the same time minimising the possible influence of adverse forces on the steering.

The kinematic configuration of the double-arm rear axle offers the further advantage of perfectly adjusting wheel camber to the road beneath. This optimises tyre/road contact in the interest of higher lateral acceleration. And since the transverse arm bearings connected to the front axle subframe are made softer as a result, the steering transmission is more direct, optimising the car’s directional stability both at medium and high speeds. Last but not least, this particular configuration also promotes extra driving stability when applying the brakes in a bend.

The patented Integral-V rear axle likewise developed for the new BMW 7 Series is also made of aluminium. Dynamic and drive forces acting on the suspension are taken up by the wheel bearing, the rear axle subframe, the swinging arm and three control arms. The innovative elastokinematic mounts for the swinging arm provide superior qualities previously not compatible with one another, enhancing both driving dynamics and motoring comfort at the same time. Lengthwise bumps, for example, are set off by the swinging arm giving way in
a straight line both forwards and backwards. This clearly separates both radial and axial forces acting on the rubber bearing of the swinging arm, serving
to promote, first, motoring comfort and, second, the margin available in setting up the car’s dynamic driving qualities.

Effectively disconnecting the road surface and the drivetrain, the Integral-V axle serves furthermore to optimise acoustic and vibration control to an unprece-dented level.

BMW 750Li and BMW 740Li featuring air suspension at the rear as standard.

Air suspension at the rear standard on the BMW 750Li and the BMW 740Li maintains consistent ride height under all driving and load conditions. Any change in the load the car is carrying is immediately taken into consideration and set off individually on each wheel, the degree of control and adjustment required on the springs due to bumps on the road and inclination of the surface in bends being restricted to a minimum.

The new BMW 730d comes as standard with 17-inch light-alloy wheels. The BMW 750i and the BMW 740i, in turn, feature 18-inch light-alloy wheels, while run-flat tyres measuring 245/55 R17 and, respectively 245/50 R18 likewise featured at standard on all models enable the driver to continue on his journey even after a complete loss of tyre pressure: Depending on the load
the car is carrying, the driver can go on under such circumstances for up to 250 kilometres or 155 miles. And last but certainly not least, the Tyre Defect Indicator permanently monitors tyre pressure and warns the driver whenever the pressure level drops by more than 20 per cent below the appropriate limit.

Integral Active Steering controlling the steering angle both front and rear.

The consistent use of aluminium on the chassis and suspension components is just as unique as the interaction of the suspension with the car’s innovative control and steering systems. Just one example is that the new BMW 7 Series may be fitted as an option with Integral Active Steering influencing the car’s steering forces as a function of road speed by way of Servotronic, acting on the steering angle through the add-on transmission on the Active Steering at the front and, for the first time, on the steering angle of the rear wheels through the concentrically arranged drive motor with spindle drive on the
rear axle.

Integral Active Steering varies the steering angle of the wheels both front and rear by means of an electric motor applying control data from the sensors on the speed of wheel rotation, movement of the steering wheel, the yaw rate, and lateral acceleration of the body in order to provide optimum steering behaviour at all times and in every situation.

The maximum steering angle on the rear wheels is 3°. At low road speeds the rear wheels are turned against the steering angle on the front wheels to significantly enhance the agile and nimble handling of the BMW 7 Series, reducing the car's turning circle, depending on speed, by up to 70 centimetres or 2.76".

The significant enhancement of agility and handling ensured in this way comes together with an even higher standard of motoring comfort thanks to the reduced steering effort.

At higher speeds Integral Active Steering gives the car an extremely comfortable and superior response when changing lanes and in bends. In this case the steering angle on the rear wheels consistently follows the movement of the front wheels in the same direction, ensuring that the BMW 7 Series follows the course set by the driver precisely and in superior style even in an abrupt steering manoeuvre.

Intervening at the same time, Active Steering optimises the response of the steering transmission and reduces the degree of movement required on the steering wheel.

Yet a further effect of rear axle steering comes out particularly in the rear passenger compartment, any change in direction under dynamic driving conditions generating lateral acceleration without the usual increase in the yaw rate of the car. In practice this means extra comfort with the car remaining stable despite such an increase in lateral acceleration, since the two factors – lateral forces and yaw – are distinctly separated from one another.

This combination of Active Steering on the front axle and rear axle steering unique the world over benefits both the motoring comfort and driving agility of the car. In addition to the increase in driving stability under rapid directional changes, Active Steering in the new BMW 7 Series ensures even greater supremacy and ease of control in braking manoeuvres.

Consistent interplay of Active Steering with the sensors on DSC Dynamic Stability Control prevents the car from swerving out of control when applying the brakes on different surfaces (modal split) by intervening in the steering as required.

Driving dynamics tailored to actual requirements:
Dynamic Damping Control and Dynamic Driving Control.

The new BMW 7 Series comes as standard with electronic Dynamic Damping Control. Featuring this innovative technology, the newly developed dampers adjust adaptively both to road conditions and the driver's style of motoring, thus preventing any undesired movement of the car caused by bumps on the
road or a high level of lateral acceleration.

The driver is able to vary the Dynamic Damping Control function and control map via the car's Dynamic Driving Control, choosing from a more comfortable, the normal or a more sporting set-up.

BMW is the world's first car maker to introduce a damping system able to adjust and vary the inbound and rebound stroke both continuously and independently on each damper. The result is a unique combination of a firm suspension set-up and superior comfort on bumpy road surfaces, the vertical movement of each wheel being detected by sensors and transmitted to a central control unit determining the body movement of the car in accordance with this information as well as the ride height signals.

Taking also the road speed of the car and the Dynamic Damping Control function chosen by the drive into account, the system applies the damping force required to set off body movements on each wheel. This data is fed back to the damper units almost instantaneously within just 2.5 milliseconds. The adjustment of actual measurements to the target data is individualised on each wheel by controlling the respective inbound and rebound valves in the dampers.

Dynamic Driving Control button on the centre console.
The Dynamic Driving Control function unit is positioned directly next to the gear selector lever on the side of the cockpit facing towards the driver. Benefiting from Dynamic Driving Control, the driver is able to vary the set-up of the car in the four stages COMFORT, NORMAL, SPORT and SPORT + at the touch of a button. This adjusts not only the set-up of Dynamic Damping Control and the response thresholds of DSC Dynamic Stability Control,
but also the dynamic shift function of the automatic transmission as well as the control maps of the gas pedal and the level of steering assistance.

Another button placed immediately in front serves to select the various DSC settings. Pressing this button whenever required, the driver is able to activate a special traction mode serving to facilitate the process of setting off, for example, on snow. This is done by activating DTC Dynamic Traction Control as a special mode of DSC Dynamic Stability Control, raising the response

thresholds of the driving stability system in the process. And by pressing this button somewhat longer, the driver is able to completely deactivate DSC Dynamic Stability Control whenever he wishes.

The appropriate drivetrain and suspension settings ensure a well-balanced overall configuration in each mode of Dynamic Driving Control. Each change from one mode to another offers the driver a clearly perceptible change in the set-up of the car.

Dynamic Driving Control furthermore allows individual configuration in the SPORT mode providing a sporting configuration of both the powertrain and suspension functions. Via the iDrive control system, the driver is able to influence either of the two functions as he wishes, giving each function the usual configuration in the NORMAL mode. So as a result the driver is able, for example, to enjoy the sports set-up of the powertrain components even if, due to poor road conditions, the harder set-up of the dampers is not recommendable.

As an option the suspension on the new BMW 7 Series may be upgraded by Dynamic Drive anti-roll stability control. This high-tech feature reduces body roll in fast bends and in a sudden change of direction. Depending on current driving conditions, sensors determine the side forces currently acting on the body, swivel motors in the anti-roll bars subsequently counteracting such side forces quickly and precisely. The result is a significant improvement of the
car’s steering and load change behaviour, enabling the driver to take even fast and sharp bends with even greater precision and agility.

Superior handling thanks to high-performance brakes and DSC.
The compound brakes in the new BMW 7 Series ensure excellent deceleration in all situations, bringing the car securely to a standstill quickly and with minimum stopping distances even from a high speed. Inner-vented swing-calliper brake discs ensuring optimum brake power on the front and rear axle guarantee outstanding resistance from fading and maximum brake comfort.

The brake discs are extra-light and come with a friction ring riveted directly on to the aluminium brake cover. Together with the aluminium callipers in frame design on the front axle, this principle patented by BMW and now also used by other car makers, serves to significantly reduce unsprung masses and prevents deformation of the brake discs on account of high temperatures even under extremely high loads.

The brake system is supported and reinforced by a wide range of functions offered by DSC Dynamic Stability Control. Apart from intervening in the suspension for extra stability, DSC also comprises further functions in the new BMW 7 Series in the interest of safe and dynamic motoring. These include ABS anti-lock brakes, ASC Automatic Stability Control, Trailer Stability Control, CBC Cornering Brake Control as well as DBC Dynamic Brake Control auto-matically maximising brake pressure on the two axles whenever the system realises that the driver wishes to apply the brakes with full power.

At extremely high brake temperatures appropriate increase in brake pressure eliminates any loss of brake power commonly referred to as fading, giving the driver virtually the same, unchanged braking behaviour at all times.

Regular Dry Braking optimises brake performance in the wet, while the Brake Standby function builds up moderate brake pressure whenever the driver takes his foot off the gas pedal very quickly and abruptly, thus ensuring spontaneous brake response at all times.

The Start-Off Assistant facilitates the process of setting off on a gradient by preventing the car from rolling back for a defined, predetermined period. And last but certainly not least, Cruise Control with Brake Function uses the option to automatically build up brake pressure through DSC in the interest of highly comfortable cruise control whenever required.

Driving stability tailored to the driver's requirements by DTC and electronic locking function on the rear axle differential.
Pressing the DSC Off button on the new BMW 7 Series, the driver is able to activate DTC Dynamic Traction Control as a special mode of DSC Dynamic Stability Control. This raises the DSC response thresholds, making it easier to set off on snow or loose sand in the TRACTION mode. Via DTC, the driver is also able to activate Dynamic Driving Control as a special function of the SPORT + mode for a particularly sporting and active style of motoring.

Pressing the DSC Off button somewhat longer, the driver is also able to fully deactivate the Dynamic Stability control function. In the DSC Off mode an electronic locking function for the differential on the rear axle is activated, helping the driver in a particularly sporting and ambitious style of motoring, for example when accelerating out of a bend or hairpin. To optimise traction under such circumstances, a drive wheel spinning when accelerating in a tight bend is slowed down appropriately by the brakes to maintain ample traction
as before on the opposite drive wheel.

Parking brake and Auto-Hold function.
The new BMW 7 Series comes with a parking brake operated either electro-mechanically or hydraulically, depending on current conditions, in the interest of optimum safety and comfort. With the engine running, the brake effect is generated by actively building up pressure in the hydraulic system masterminded by DSC. As soon as the engine is witched off, the brake power required is generated electromechanically.

To activate the parking brake, all the driver has to do is pull the appropriate button on the centre console. To release the parking brake, he merely presses the brake pedal and pushes the same button at the same time.

Given this configuration, there is no risk of inadvertently releasing the parking brake while the ignition is switched off. While driving, in turn, the driver is able to apply the parking brake as an automatic emergency brake function by pulling the parking brake button several times in a row.

The brake effect is generated by actively building up hydraulic pressure on all four wheels, the intensity of stopping power being masterminded by the DSC control unit, taking the ABS function into account for additional stopping power. This also serves to activate the brake lights.

The parking brake on the new BMW 7 Series comes with an Auto-Hold function. This combination quite unique in the market enhances motoring comfort above all in stop-and-go traffic. Then, as soon as the car comes to a standstill, the vehicle is automatically held in position by consistent brake pressure also on a gradient, until the driver presses the gas pedal again. He is therefore not required to keep the brake pedal pressed down as long as the car is at a standstill.

The Auto-Hold function is activated and deactivated by a separate switch on the centre console.

Intelligent management of driving dynamics:
Integrated Chassis Management and FlexRay Technology.
The suspension systems are perfectly masterminded by ICM Integrated Chassis Management networking the various systems and functions with one another. This high-performance electronic management analysing the car’s driving behaviour by evaluating numerous sensor signals is able to coordinate and harmonise various drivetrain and chassis functions within fractions of a second, ensuring maximum stability at all times and under all conditions. Even when driving conditions suddenly change, for example on changing surfaces, when suddenly moving round the steering wheel, or

when abruptly accelerating or applying the brakes, ICM responds appropriately by precisely intervening in the DSC, Dynamic Damping Control and, where fitted as an option, in the integral Active Steering and Dynamic Drive actuators.

Yet another feature absolutely unique worldwide is the networking of chassis control systems and the drivetrain in the new BMW 7 Series. The high-speed FlexRay data transmission system serves to coordinate the various function units with one another in an ultra-fast and reliable process. Developed to production standard by a consortium of specialist companies under the leadership of BMW, this high-tech system offers a level of data transfer never seen before, with a transmission rate 20 times higher than that of a conventional transmission system.

On the new BMW 7 Series up to 16 control units are able to communicate with one another via FlexRay, offering extremely fast, precise and perfectly coordinated interaction of the control units for the drivetrain, suspension, damping, steering, and brake systems in the new BMW 7 Series.

The result is highly precise control of longitudinal, transverse and vertical movements unparalleled by any other car in the market. Indeed, BMW is the first car maker in the world to introduce FlexRay technology in its production models.