

- Differently sized anti-roll (stabiliser) bars (usually larger and firmer than the standard ones).

The Z4's sport suspension includes only the lowered ride height.

#### Benefits

The M Sport suspension provides more responsive handling, whilst maintaining high levels of comfort for the driver and passengers.

### Speed-rated wide radial tyres

Every BMW model is equipped with premium steel-belted tyres. Speed ratings vary according to model. The rated speed is the highest sustained speed the tyre is designed for and is designated by a letter:

- T = 118 mph.
- H = 130 mph.
- V = 149 mph.
- W = 167 mph.
- Z = over 149 mph (open-ended; dependent upon vehicle application).

#### Benefits

Premium steel-belted tyres provide confident traction in a wide variety of weather conditions.

### Variable-assist rack-and-pinion power steering

Variable-assist rack-and-pinion power steering is a very direct, sports-style steering layout that provides immediate feedback from the road surface, whilst suppressing jolting of the steering wheel. Power assist gives the driver natural road feel. However, there are differences in the way the assist varies:

- All steering racks are designed to be extremely sensitive when the steering is in the immediate centre area, but allow for excessive reactions as the steering angle increases excessively.
- Vehicle-speed-sensitive or Servotronic; Power assistance varies according to vehicle speed; greatest at low speeds, least at high speeds. This gives drivers good feedback at higher speeds and assists with parking manoeuvres at lower speeds.

#### Benefits

Variable-assist rack-and-pinion power steering provides a precise, responsive connection between the steering wheel and the tyres – providing superior operating dynamics, better ride comfort and greater vehicle safety.

## Safety and technology

### Active Cruise Control

In addition to the speed maintenance, acceleration and deceleration functions of standard cruise control, Active Cruise Control can adjust the driver's speed according to traffic conditions. Using a radar sensor at the front of the vehicle, Active Cruise Control senses the speed of vehicles travelling ahead, and adjusts vehicle speed to maintain a safe following distance behind.

- If the vehicle catches up to the vehicle ahead, the system automatically slows the vehicle down to retain an appropriate distance between the vehicles (there are four different settings available).
- Once the lane is free, Active Cruise Control automatically accelerates to return the vehicle to its preset speed.
- A light application of the brake pedal is enough to deactivate the system.

The capabilities of Active Cruise Control in no way relieve the driver of the responsibility to devote full attention to driving, to traffic and to all aspects of the driving environment.

#### Benefits

Active Cruise Control is particularly useful in steadily flowing traffic, often on motorways. It matches the vehicle speed to that of the vehicle in front. As a result the driver is more relaxed at the end of the trip.

### Active Cruise Control with 'stop and go' function

Whilst Active Cruise Control monitors the traffic ahead and reduces or increases the vehicle's speed in response to this, the new 'stop and go' system uses a computer to determine whether to brake or accelerate, and enables the car to remain at a fixed distance behind the vehicle ahead, incorporating the 'stop' function when stationary traffic occurs. The system works at high speeds or in

slow moving traffic situations, resulting in the car being brought to a standstill. If the car is stopped for less than three seconds, it will then resume its programmed speed. If the car remains at a standstill for more than 3 seconds, the driver is required to reactivate the moving-on function manually, either by pressing the accelerator or control stalk.

The system should be used as an aid by the driver and but should not be solely relied on; drivers are still fully responsible and must ensure they drive in a safe manner.

### Benefits

Active Cruise Control with 'stop and go' assists the driver in slow moving traffic or tailbacks. The system helps to make driving smoother in queuing traffic and assists drivers, through automatic acceleration and braking, where necessary.

## Active steering

Active steering increases or decreases the steering transmission ratio as a function of vehicle speed. At low and medium speeds, the steering is much more direct than with a conventional steering system, resulting in improved handling. At higher speeds, BMW Active steering is even more indirect than conventional steering systems. Active counter-steering intervenes in dangerous situations, such as over or under-steering, or when braking on surfaces with limited grip.

### Benefits

Benefits of Active steering include increased safety, as the vehicle stays on course in extreme circumstances. In addition, more brake pressure can be applied, which ensures reduced stopping distances. Using Active steering results in more agile handling and easier steering in any situation, particularly at low speeds.

## Adaptive headlights

The Adaptive Headlight system consists of electromechanically operated headlights, which illuminate a corner the second the driver steers into it. With the headlight switch in its automatic position whilst the vehicle is moving forward (the feature is inactive when reversing), the outer lights steer with the front wheels, guided by an electronic control system and swivelled by small servo motors. The system responds to the steering angle and the rate at which the vehicle is changing direction.

Speed-dependent light distribution is a new function introduced to the Adaptive headlight system. Working to improve off-side road verge illumination, 'country mode' improves illumination in urban traffic at low speeds (below 25mph) and on B roads. When driving at high speeds, 'motorway mode' automatically extends the light beam to provide the driver with a better view of the road ahead by extending the headlight reach.

## Cornering lights

Cornering lights compliment the functionality of Adaptive headlights, giving better lighting when carrying out low-speed manoeuvres such as parking, turning into a driveway, U-turns and taking extremely winding roads. When the indicator is activated at speeds below 25 mph, the cornering lights are activated and illuminate the area to the side of the vehicle. After the corner is taken, the lights dim and extinguish automatically. Cornering lights also facilitate safe reversing: when reverse gear is selected, both the left and right lights illuminate the area around the vehicle.

### Benefits

Improved illumination of the road surface ahead at night enhances visibility, making night-time driving safer by helping the driver to spot obstructions and recognise dangerous situations earlier, whilst not hindering the vision of oncoming drivers.

Cornering lights provide additional illumination of the area to the side of the vehicle, making night-time manoeuvring and turning safer.

## Advanced Safety Electronics

Safety engineers at BMW's Engineering and Research Centre in Munich aimed to tailor the restraint system's response to a more precise reading of each collision sequence. To achieve this, ASE employs a number of sensors (model dependant). Together they help minimise unnecessary deployment of airbags. The sensors include:

- Deceleration sensors.
- Two 'delta-V' sensors that analyse the change in velocity that occurs during a collision.
- Satellite side-impact sensors that sense pressure changes within the door structure.

### Benefits

This elaborate constellation of sensors finely tunes airbag deployment to actual collision circumstances. System software can be updated over the life of the vehicle. Data useful to researchers can be retrieved from accident vehicles.

## Airbags

In a BMW, all safety features complement each other perfectly. BMW uses airbags in all of its cars; if an impact takes place, airbag sensors activate a substance which causes the airbags to inflate and create a protective barrier around passengers.

- Two-stage driver and front passenger airbags inflate immediately when sensors detect that a significant front impact is occurring, reducing the risk of injury to the driver and front passenger. To ensure that the force of airbag inflation is appropriate to the severity of the collision, both front airbags are designed to provide 'softer' deployment in low-speed collisions and 'harder' deployment in high-speed collisions.
- The front and rear side airbags provide two vital functions in the event of a collision from the side. Firstly, they protect the occupant's upper body from injuries caused by external objects intruding into the vehicle. Secondly, they move the occupant's body away from the danger zone, reducing the effects of a side impact on the body.
- Head airbags (not available on convertibles) and side airbags combine to provide excellent side impact protection for the vehicle's occupants.
  - Inflatable Tubular Structure (ITS) head airbags safeguard against the dangerous effect by which the occupants' heads are subject to immense force and contact with the car (hyperflexion). The sides of these airbags are integrated with the frame of the roof and inflate instantly thanks to their honeycomb structure, forming an area of protection. When expanded, they cover the safety belt's height adjuster and front side windows diagonally, thereby delivering the best protection irrespective of the occupant's size or position in their seat.
  - The next-generation Advanced Head Protection System (AHPS) front-to-rear curtain head airbags combines the advantages of an ITS head airbag and the splinter protection offered by a curtain airbag. The head airbag now forms a stable cushion – much like the ITS structure – whilst also covering the entire side window area. In a side impact, rear passengers are protected by the very stable body and intelligently placed cushioning.

#### Benefits

Front airbags help reduce the risk of injury to the driver and front passenger in a front end impact. Head airbags safeguard the occupant's head from impacting against the door in a side on impact or rollover situation, whilst protecting it from the intrusion of external objects. Front and rear side airbags help reduce the risk of injury at the chest and hip level from a side impact.

### Anti-lock Braking System (ABS)

The Anti-lock Braking System prevents wheels from locking under emergency braking to maintain steering control.

#### Benefits

The Anti-lock Braking System helps the driver steer whilst braking in an emergency by applying and releasing pressure on the locking wheel.

### Anti-roll bars

Together with the highly rigid A columns and reinforced windscreen frames of every BMW Convertible or Roadster model, the anti-roll bars create a safe occupant cell should the vehicle overturn. Rollover sensors activate special high-strength roll bars that are integrated in or behind the seats, ensuring there is sufficient clearance for occupant's heads in the event of an accident.

#### Benefits

The on-board safety system recognises the warning signs of an impact, and deploys two roll bars in just a fraction of a second to ensure a safe occupant cell in Convertible or Roadster models. The anti-roll bars are also incorporated in a way that ensures design is not compromised.

### Auto-dimming mirrors

Special interior and exterior mirrors (specification allowing) dim automatically when the headlights of other vehicles would otherwise dazzle the driver from behind. They immediately detect the dazzle effect and react within a fraction of a second.

A photocell pointing forward in the casing of the interior mirror measures the intensity of the light in front of the vehicle. A second photocell in the mirror itself measures the intensity of the dazzling light from the rear. An electronic regulating system compares the two light intensities – the greater the difference between the two light intensities, the stronger the dazzle effect and the stronger the dimming action. When the dazzle effect ceases, the mirror regains its original degree of reflection.

#### Benefits

Auto dimming mirrors enhance safety by allowing the driver to concentrate all attention on traffic and road conditions rather than adjusting mirrors to reduce glare.

### Automatic Differential Brake (ABD-X)

Automatic Differential Brake works as part of the Dynamic Stability Control system. If a wheel threatens to slip or lose grip, it is braked individually: blocking momentum is then directed to the wheel opposite which guarantees optimum drive power. ABD-X still works, even if DSC or DTC are deactivated by the driver; here, ABD-X focuses on maximum forward drive and applies braking force only.

#### Benefits

ABD-X helps drivers to enjoy and experience the dynamic ability of their car, even when driving on difficult road surfaces.

## Automatic headlight control

When switched on, automatic headlight control automatically switches on the headlights and all related lighting when ambient light drops below a certain level. In addition to brightness, the automatic headlight control system also monitors the number of sweeps of the windscreen wipers. This information enables the controller to switch on the low-beam headlights if visibility is impaired during the daytime on account of rain or snow.

### Benefits

Automatic headlight control relieves the driver of the bother of switching the headlights on and off manually when driving along alternating bright and dark stretches of road, or when driving at dusk or dawn. Automatic headlight control is also a safety enhancing feature because it turns the low-beam headlights on in deteriorating weather conditions.

## Automatic Stability Control (ASC)

ASC uses an intelligent regulation system to prevent the driven wheels from spinning, e.g. when accelerating, thus helping to ensure the best possible driving stability. If one wheel of the driven axle is on a high-grip surface whilst grip is lacking at the other wheel, the wheel threatening to slip can be braked allowing the drive torque to be delivered to the wheel with good traction. Engine power may also need to be restricted if severe wheel spin is encountered. If the wheel continues to slip the brakes will also be applied.

### Benefits

ASC keeps the vehicle in control in difficult road situations by preventing the drive wheels from spinning, ensuring optimum safety on slippery road surfaces such as ice, snow, loose gravel etc.

## BMW restraint system

The BMW restraint system consists of a combination of the three-point seat belt, pyrotechnic belt pre-tensioner, belt force governor and anti-submarining ramp in the seat. In the event of a collision, the belt pre-tensioner pulls back the belt buckle within a fraction of a second, tightening both the shoulder and lap belts in one process. A further advantage of this pyrotechnic device is its fast activation, increasing the effect of the safety system. The anti-submarining ramp, a wedged section at the front of the seat, ensures that the driver and front passenger cannot 'dive' beneath the lap belt.

Another key feature of the restraint system is its ability to release seat belt tension during an accident, if time permits. A seat belt that is pulled in too tightly

may, in some circumstances, cause harm to the occupants by applying too much pressure to the rib section. By releasing some of this pressure, the occupant still remains secure within the seat belt, but a greater proportion of the body's deceleration forces come from the appropriate airbag being deployed.

### Benefits

The interaction of the seat belt, belt pre-tensioner, belt force governor and the anti-submarining ramp in the seat ensures optimum restraint in a collision.

## Brake Force Display

Brake Force Display provides an additional lighting area and/or brighter illumination under heavy braking or any time the ABS goes into action. This signals to following motorists that the vehicle is braking hard. The function of Brake Force Display differs from model to model. Please refer to the BMW UK InfoNet for further details.

### Benefits

The larger, brighter signal of the brake lights conveys the information that drivers behind need to gauge the urgency of their own braking manoeuvres and to react more quickly.

## Condition Based Servicing

Condition Based Service is an intelligent vehicle maintenance system that employs sensors to monitor the condition of parts and to ascertain the extent to which servicing is necessary. This enables the vehicle itself to recognise when certain parts need to be replaced.

A microchip in the vehicle's remote control regularly stores this data and other information such as mileage, along with general information about the vehicle such as the model, chassis number, colour and upholstery code.

The key is therefore the interface between the vehicle and the BMW Dealer, who can access the stored data with a special KeyReader.

### Benefits

With Condition Based Servicing, maintenance is not necessary until the vehicle actually needs it and therefore savings are measurable in terms of both time and outlay. Only those components that the vehicle calculates to be due for maintenance are serviced. The handover procedure is also streamlined by this process, as BMW Service reads the general information needed about the vehicle directly from the remote control in the key.

## Cornering Brake Control (CBC)

If a vehicle is cornering (with a transverse acceleration of over 0.6g) and the driver applies the brakes, there is a possibility of the vehicle oversteering. Cornering Brake Control reduces the brake pressure to the inside rear wheel in order to maintain stability.

### Benefits

Cornering Brake Control minimises the risk of the vehicle entering an oversteer situation when applying the brakes whilst cornering, thereby enhancing the stability and safety of the vehicle.

## Crash sensors

When crash sensors detect a severe impact, the hazard lights automatically flash, the interior lights turn on and the doors unlock.

### Benefits

The visual signals activated by the crash sensors alert others of the collision. Unlocking the doors facilitates emergency aid access.

## Cruise Control

Cruise control operates via a stalk on the steering column, or by a multi-function steering wheel button that is easy to reach and easy to use. The system allows the driver to set a cruising speed which will be maintained until the system is switched off. The system is automatically switched off if the brake pedal or clutch pedal are pressed.

### Benefits

Cruise control provides enhanced safety and driving comfort by reducing driver fatigue.

## Cruise control with braking function

Working on the same principle as Cruise control, the braking function works to keep the vehicle at the pre-set speed in situations where the car may naturally accelerate or decelerate. Situations where the natural deviation from the pre-set speed may occur include travelling down a steep hill, or travelling around a corner.

Pre-conditions for the operation of this function include the vehicle speed being above 20mph, with the vehicle travelling in a forward gear (or 'Drive' for

automatic gearboxes), and the brake pedal must not be depressed. The parking brake must not be engaged, whilst DSC must be switched on, with no system faults present. The speed of the vehicle may still be altered by the driver manually if required.

### Benefits

Cruise control with braking function allows drivers to control the car at a pre-set speed, with reassurance that this speed will remain constant in all driving situations, including cornering and steep gradients.

## Daytime running lights

Daytime running lights illuminate both corona rings, helping other drivers to detect the vehicle earlier. Brighter than the parking lights or side lights, the daytime running lights provide BMWs with a distinctive presence on the road, and increase the vehicle's level of safety.

### Benefits

Daytime running lights ensure that the car remains visible to other drivers during the day, even in poor weather conditions. As well as increasing safety, the lights add to the sporty character of the car, enhanced by horizontal LED light rods which add to the unique and unmistakable presence of the car on the road.

## Door reinforcements

BMW doors are reinforced by diagonal aluminium cross braces complemented by door catch hooks. This combination – together with sturdy locks and hinges – results in particularly rigid doors.

### Benefits

Door reinforcements enhance protection for the occupants of the vehicle, in the event of a side impact.

## Dynamic Brake Control (DBC)

Dynamic Brake Control is a combination of Maximum Brake Support (MBS) and Dynamic Brake Support (DBS). MBS assists the driver in normal, non-panic braking, whilst driving a heavily loaded vehicle. When the ABS control range is reached at the front axle, MBS increases the pressure at the rear axle until the ABS control limit has been reached. DBS was designed because many drivers do not apply enough force to the brake pedal. The brake pressure generated by the driver is increased by a pump to such an extent that the front and rear axles go into ABS control mode. The driver can therefore achieve maximum deceleration.

### Benefits

In the event of an emergency stop, Dynamic Brake Control ensures that maximum brake pressure is applied. This results in a significant reduction of the overall stopping distance.

## Dynamic Drive (active anti-roll stabilisation)

Dynamic Drive minimises the roll ('lean') that would otherwise occur when cornering aggressively or changing lanes suddenly. Dynamic Drive also reduces the degree to which the steering wheel needs to be turned, rendering the vehicle more agile.

The system consists of:

- Active anti-roll bars, replacing conventional purely mechanical front and rear bars. (Each bar consists of left and right portions, twisted in opposite directions using a hydraulic motor.)
- A valve/sensor block containing various system valves and sensors.
- A lateral-acceleration sensor to detect the available traction when cornering.
- An Electronic Control Unit (ECU) regulating the entire system.
- A tandem oil pump with two sections to provide hydraulic pressure for Dynamic Drive and the power steering.

Whenever the vehicle enters a corner or bend, or begins an avoidance manoeuvre, 'lateral acceleration' is generated. This is read by the lateral acceleration sensor, which transmits a signal to the Electronic Control Unit. The ECU processes this signal and transmits it to the valve/sensor block. In turn, the valve/sensor block determines the hydraulic pressure to be applied to the active anti-roll bars to counter the body roll.

### Benefits

Dynamic Drive reduces body roll when cornering. It improves handling by virtue of better suspension geometry (wheel angles relative to vertical), but there is a psychological component as well: drivers and passengers alike will marvel at the 'flat cornering' that results from Dynamic Drive.

## Dynamic headlight range control

Dynamic headlight range control ensures that the range of the headlights remains constant, whatever the driving situation. Within milliseconds, the range of the headlights is adjusted in response to any change in vehicle attitude due to the load in the vehicle or due to aggressive acceleration or emergency braking. Axle sensors in the suspension measure the degree of spring

compression at the front and rear axes. A control unit compares these two figures and determines the vehicle's position at any given moment. To ensure that the dynamic headlight range control does not respond unnecessarily to minor irregularities in the road surface, the control unit also processes signals from the wheel-speed sensors, which enables it to determine if the vehicle is braking or accelerating.

The control unit uses the values it computes to optimise headlight beam throw. It drives motors that change the angle of the headlights and the throw of the headlight beams.

### Benefits

Dynamic headlight range control ensures that the range of the headlights remains constant, whatever the driving situation. In this way the headlights always correctly illuminate the road surface, but do not dazzle oncoming traffic or vehicles in front.

## Dynamic Performance Control

Twinned with BMW's benchmark xDrive four-wheel-drive system, Dynamic Performance Control enables exceptional roadholding and noticeably faster cornering by varying the power distribution between the left and right rear wheels. To enhance cornering agility, the system increases the drive torque applied to the outer rear wheel. This creates an additional steering force and ensures that the car enters bends willingly, and remains very easy to control.

### Benefits

Dynamic Performance Control results in more responsive steering, increased stability and more traction, especially when accelerating out of corners. This allows the driver to corner at higher speeds with greater precision and higher levels of safety, and assists in challenging driving situations.

## Dynamic Traction Control (DTC)

Dynamic Traction Control (DTC) is a sub function of Dynamic Stability Control. DTC is used to regulate traction by providing active stability control, whilst enabling a sportier style of driving.

### Benefits

DTC limits wheelspin and improves driver control on slippery road surfaces such as sand or gravel or on road surfaces affected by rain, ice or snow. DTC allows increased levels of traction without a loss of power, enabling the driver to retain complete control over the car.

## Dynamic Stability Control (DSC)

Dynamic Stability Control is an advanced traction control system which works to achieve optimum levels of grip. By monitoring each wheel, the system's computer can reduce the amount of power developed by the engine or apply the brakes to ensure the car stays on course.

Various sensors are used to continuously monitor the vehicle's actual status:

- Lateral acceleration sensor (measures how much grip the vehicle has during cornering).
- Brake pressure sensor and brake electric switches (inform the system of any application of the brakes by the driver).

Several sensors measure the vehicle's desired status as defined by the driver. The steering angle sensor measures the angle of the steering wheel and wheel speed sensors provide information relating to vehicle speed, wheel spin and wheel lock. If the system finds that the vehicle's actual and desired status differ to such an extent that an unstable vehicle condition is likely to develop, DSC steps in and performs a brake or engine management intervention. The vehicle can then be stabilised by means of braking individual wheels and dangerous swerving can be prevented within the limits imposed by the laws of physics.

DSC encompasses a complete set of subsidiary control systems:

- Anti-lock Braking System (ABS) helps the driver steer whilst braking.
- Automatic Stability Control (ASC) prevents the wheels from spinning during acceleration.
- Cornering Brake Control (CBC) reduces the brake pressure to the inside rear wheel when cornering in order to maintain stability.
- Dynamic Brake Control (DBC) reinforces the driver's pedal effort in emergency braking.
- Dynamic Traction Control (DTC) allows more wheelspin on limited grip surfaces to provide optimum traction.
- Electronic Brake-force Distribution (EBD) distributes braking force based on vehicle load distribution.
- Engine Drag Torque Control (MSR) prevents the rear wheels from locking on rapid downshifts.

## Dynamic Stability Control Plus (DSC+)

DSC+ includes extended functions in addition to the standard DSC system.

- Brake drying automatically and regularly dries the brake pads in wet conditions improving brake response.

- Brake fade compensation ensures consistent braking even after repetitive heavy braking manoeuvres.

If the brake temperature continues to rise the DSC will reduce engine power before damage to the braking system occurs.

- Brake pre-tensioning reduces the time taken to apply full braking power in an emergency by moving the brake pads and brake disks closer together when the driver releases the accelerator pedal quickly.
- Hill-start assistant prevents the vehicle from rolling backwards when driver moves their foot from the brake pedal to the accelerator on an uphill gradient.
- Soft stop automatically reduces the braking pressure on the rear axle just before reaching a standstill, resulting in smoother stops and reduced brake drive.

\* Please note: Features may vary slightly from model to model, so please check relevant marketing literature.

### Benefits

If sensors indicate that the driver may be losing control of the vehicle, the Dynamic Stability Control (DSC) system immediately intervenes, in conjunction with the Engine Management System, and brakes individual wheels as required to regain stability. DSC enhances overall driving stability and improves control on a variety of surfaces.

In addition DSC+ enables more comfortable and faster braking capabilities in both wet and dry conditions whilst eliminating brake fade and preventing the vehicle from rolling backwards when driving uphill from a standing start.

## Electromechanical Parking Brake (EPB)

The Electromechanical Parking Brake, controls all braking processes whilst the vehicle is stationary. Operated by a switch in the centre console which replaces the traditional handbrake, it works whether the engine is switched on or off.

Offering 'Autostop', the brake is automatically applied when the vehicle comes to a stop. Also, 'Hillhold' works by applying the parking brake when the vehicle is stopped on a slope. This prevents unwanted rolling, and disengages once the car starts to move again.

### Benefits

The Electromechanical Parking Brake ensures that the vehicle remains at a reliable standstill. Whether the engine is switched on or off, positioned on a slope or a flat surface, the driver can be assured that the car will remain stationary.

## Electronic Brake-force Distribution (EBD)

Electronic Brake-force Distribution is a function of DSC. Whenever the brakes are applied, a vehicle's front end becomes more heavily loaded and the rear becomes lighter. To deal with this, BMW vehicles have technologies that adjust the front-to-rear proportioning of braking force according to braking severity. Via the wheel-speed sensors, Electronic Brake-force Distribution actually measures the amount of deceleration at each wheel when the brakes are applied and regulates pressure accordingly to the front and rear brakes.

### Benefits

Braking force is apportioned optimally at all times, making best use of the available braking traction at the tyres and helping distribute brake and tyre wear more evenly.

## Electronic Damper Control (EDC)

The Electronic Damper Control system uses sensors to continuously monitor all movements of the vehicle which influence its driving behaviour. The measurements are evaluated by a microprocessor and commands are sent to the dampers, where solenoid valves serve to infinitely adjust damper forces to changing road, load and driving conditions. Brake dive and body movements, for example on bumps, in bends or when accelerating, are reduced significantly. EDC has two programmes, Comfort and Sport, which are continuously variable depending on driving conditions.

### Benefits

Electronic Damper Control combines supreme driving comfort with similarly outstanding safety on the road. At the same time, the system consistently guarantees optimum vibration control regardless of the load the vehicle is carrying.

## Electronic Immobiliser (EWS)

BMW vehicles have a sophisticated protection system. The electronic immobiliser works to prevent people gaining unauthorised access into a BMW. Further, it prevents the car from being started unless the correct individual code from the key is recognised; once the ignition is switched on, a code will be read by the immobiliser, along with a changing code. If both pieces of information are received and are correct, a signal will then be sent to the Digital Motor Electronics in order for the engine to be unlocked. The key is equipped with a tiny transponder that stores an electronic code transmitted by a ring antenna around the ignition switch. Each time the key is removed, this code is changed. The vehicle can only be started if the key matches the new code.

### Benefits

This feature has been shown to be highly effective in reducing the frequency of theft of BMW vehicles. Further, if a key is lost, it can be deactivated and replaced by a dealer without delay, preventing any unnecessary inconvenience to the customer.

## Front seatbelt pre-tensioners and force limiters

Automatic pre-tensioners tighten the front seat belts in a collision, further optimising the restraint of occupants. They are integrated into the belt buckles, mounted on the inboard side of each front seat.

Upon impact the mechanism moves the buckle downward to tighten the shoulder and lap belt portions directly, thus removing any slack as a result of the occupant wearing bulky clothing.

All current BMW front seat belts are also equipped with force limiters which, once the belts are tensioned, place an upper limit on the amount of force they can exert on the occupant's body.

### Benefits

Pre-tensioners and force limiters help reduce the risk of injury to front seat occupants in certain frontal collisions.

## Head-up Display

Head-up Display helps to enhance drivers' comfort and all-round safety when driving. A unit within the dashboard projects a virtual image into the driver's direct line of sight. This image displays a variety of information, and because it appears to be at the tip of the bonnet, the driver does not need to remove his or her focus or eye line from the road ahead and therefore can maintain their concentration on driving.

The image can display, for example, the speed at which the vehicle is travelling or arrows indicating directions supplied by the Navigation system. Driver assistants such as Active Cruise Control and the Check/control can also be added to the display.

Measuring some 18 x 10 cm in size, the projection is clearly visible in all driving conditions and the brightness of the image can be varied in accordance with personal settings, stored in the vehicle's Personal Profile.

### Benefits

Head-up Display provides essential information about the vehicle's performance without requiring the driver to remove his or her focus from the road ahead.



## High-beam assistant

High-beam assistant manages the operation of dipped and main beam lights whilst driving at night. The system comprises primarily of a camera located in the interior rear-view mirror housing. The camera monitors the light from any source at the front of the vehicle (e.g. rear lights of a vehicle in front, street lights, headlights of an approaching vehicle) which then triggers the system to automatically operate the dipped or main beam function of the Xenon headlights. This system can be overridden by either manually selecting the 'On' position for the headlights or by using the dipped beam selector on the indicator stalk.

deformation zones at the front (and rear on some vehicles) absorb impact forces at speeds of up to 9.5 mph without damage to the body.

### Benefits

Impact-absorbing bumpers minimise damage to the vehicle's body and simplify repairs. Compressible 'crush tubes' help minimise damage to the chassis.

## ISOFIX attachment

ISOFIX stands for International Standards Organisation FIX and is a recognised system to make fitting child seats safe and simple. The child safety ISOFIX attachment allows placement of a child seat comfortably and safely in the rear or front passenger seat. The child seats are firmly attached to the vehicle's body via extendable rods that are integrated within the seat. The retention rods fitted in the gap between the child seat backrest and base seat are barely visible. When fitted on the front passenger seat, optional de-activation of the front passenger airbag is available.

### Benefits

ISOFIX makes tilting or oscillating of the child seat almost impossible and is an extremely easy system to use. Furthermore, the ISOFIX system does not cause any discomfort to adult passengers when not in use.

## Lane Departure Warning System

Lane Departure Warning System warns the driver instantly if the car is about to leave its current lane unintentionally. Using an integrated camera fixed in the rear-view mirror which monitors and feeds back information to a computer regarding road markings and vehicle positioning, the driver is notified by a vibration through the steering wheel, to the threat of the car leaving its lane. This enables the driver to correct the positioning of the car before the car has left the lane completely, reducing the chance of collisions with other vehicles or pedestrians. The wheel will not vibrate if the indicator has been activated prior to the car leaving its lane, which alerts the system that the driver is intentionally moving the car out of its lane.

If the system is blinded by strong sunlight or fails to detect any road markings ahead, the Lane Departure Warning System will be turned off, as indicated by a symbol on the dashboard.

### Benefits

This new driver assist system works well to prevent drivers from inadvertently moving out of their current driving lane, often caused by in-vehicle distractions, fatigue or long, monotonous journeys.

### Benefits

High-beam assistant enables optimum light control and visibility at all times with improved focus on the road and a reduction of actions required from the driver. It also reduces the possibility of dazzling from approaching drivers by automatically selecting dipped or main beam headlights.

## Hill Descent Control (HDC)

Hill Descent Control (HDC) enables the driver of a BMW SAV to drive smoothly and safely down even the steepest hills or gradients. Without the driver having to apply the brakes, the SAV moves forward only slightly quicker than walking speed. This automatic speed control works as a part of the Dynamic Stability Control system to apply the brakes individually on all four wheels as necessary. Additionally, the brake lights come on automatically to warn drivers behind. By slight modulation of the accelerator or brake, the driver can vary the target speed.

HDC may also be operated via the cruise control buttons on the Multifunction steering wheel. Pressing the minus button (-), the driver can reduce target speed; pressing the plus button (+), the driver can increase target speed. HDC is switched on and off by a separate button in the centre console, but only becomes active at speeds below 21 mph. HDC is temporarily deactivated when the driver brakes to a halt.

### Benefits

HDC helps the driver maintain a reduced speed and stability on steep downhill runs. The driver needs only to press a dedicated button on the console; HDC then takes over, gently applying the brakes as necessary to keep the speed to a brisk walking pace.

## Impact-absorbing bumpers and deformation zones

Impact-absorbing bumpers and compressible 'crush tubes' at the front and rear of the vehicle help absorb the force of impact in collisions up to 2.5 mph. Special

## Night Vision

Night Vision incorporates an infrared camera into the lower front bumper which picks up heat signatures emitted from objects such as vehicle exhaust systems, humans or animals. The data picked up is then displayed onto the Control Display as a monochrome image.

### Benefits

Night Vision enables improved visibility in low light conditions and awareness of potential hazards by offering an extended view of the road up to 300 m (instead of 150 m with Xenon headlights). Even far away objects are more easily identified due to digital zoom and panning facilities.

## On-Board Diagnosis (OBD)

On-board diagnosis continuously monitors various sensors and systems for operational faults.

Faults are recognised and stored in electronic control unit memories, then read out by the service technician on a sophisticated diagnostic machine.

### Benefits

Computerised on-board diagnosis makes servicing the vehicle easier and more cost-efficient.

## Park Distance Control (PDC)

Park Distance Control employs four ultrasonic sensors in the front bumper (if applicable) and four sensors in the rear bumper to warn the driver when the vehicle is approaching objects or obstructions that may not be visible to the driver. All forward sensors and the rear corner sensors trigger a warning beep at approximately 60 cm distance from the object. The beeping becomes faster as the bumper approaches the object, turning into a constant tone when the distance closes to less than 30 cm.

The centre sensors in the rear bumper first trigger beeping at about 150 cm; when the distance is less than 30 cm, the beep becomes a constant tone. The front sensors cause a higher pitched tone; those at the rear trigger a lower-pitched tone. (The tones emanate from the appropriate end of the interior). PDC activates whenever the ignition is on and reverse gear is engaged. A button is included with front PDC which can also be used to turn the system on. Drivers of certain models also have available a diagrammatic representation in the iDrive Control Display, supplementing the audio warning signal. The system automatically deactivates when the vehicle is driven

approximately 50 metres or reaches a speed of about 18 mph, and can be deactivated with the button.

### Benefits

Park Distance Control helps drivers to avoid colliding with unseen obstructions. On current BMW vehicles, it comes in two forms: rear only and both front and rear.

## Safety Battery Terminal

Within milliseconds of a collision, where there is a danger of a short circuit occurring within the starter motor system, the starter cable is pyrotechnically detached from the battery. The device triggers whenever an airbag deploys. Once the connection is severed, the engine cannot be cranked; however, separate wiring provides power for all operating and safety systems such as electric window lifts, the central locking system and hazard warning lights.

### Benefits

The Safety Battery Terminal reduces the risk of fire in the event of a collision.

## Service Interval Indicator

The Service Interval Indicator alerts the driver when the next routine service is approaching. A digital display in the instrument panel gives a precise indication about how far the vehicle can go before the next service must be carried out. Similarly, the scheduled date for the replacement of brake fluid is given by month and year. The system learns from each individual's style of driving and adjusts accordingly.

### Benefits

The Service Interval Indicator enables the owner to plan for the next service and rewards careful driving.

## Tyre Puncture Warning System (TPWS)

The Tyre Puncture Warning System regularly monitors the tyre pressures of all four tyres by comparing their rotational speed when the vehicle is being driven. Whenever tyre pressure drops by approximately 30% or more, the wheel's rolling radius changes significantly and rotates at a different speed from the other wheels. Via DSC's wheel-speed sensors, the Tyre Puncture Warning System recognises any such major deviation. Within one to three minutes, this system triggers a pressure-loss indication on the instrument panel,

plus an audible warning. In a vehicle equipped with the iDrive interface, the warning appears on the Control Display.

### Benefits

Monitoring tyre pressure provides the driver with an early warning that helps prevent uneven tyre wear and reduces the risk of tyre damage. This is especially important with the use of Run-flat tyres as it is not always possible to detect a loss of pressure.

## xDrive

xDrive is BMW's highly sophisticated four-wheel drive system, designed to provide drivers with the perfect balance of all-road traction and agile handling. In vehicles with a conventional four-wheel drive system, the distribution of drive forces is initially determined and remains fixed e.g. 62:38%. If one axle is moving over a slippery surface, then no force can be distributed to it and the wheels start to spin. In other words, fixed distribution means that the drive force on this axle is completely lost. With xDrive however, distribution of driving force is variable. The driving force is always distributed onto the axle that currently has the better traction. If, in addition, the wheels of one axle are rotating at different speeds, the faster spinning wheel is braked using DSC.

Four-wheel xDrive operates proactively, thus eliminating unstable driving conditions before they occur. The key component of xDrive lies in the drivetrain: a transfer case uses a multi-plate clutch to distribute the driving force variably and infinitely between front and rear axles. In this way xDrive continuously adjusts the distribution of the driving force to the current driving situation.

- Under normal driving conditions, the multi-plate clutch will regulate the available torque between both axles.
- The system determines which axle has the most grip and the available torque is applied to that axle. For example, if the vehicle's rear wheels are on ice and the front wheels are on tarmac, the front wheels will have more grip and therefore the torque will be applied to that axle.

xDrive constantly monitors and controls the current driving situation and correspondingly distributes the driving force between the two axles. With its variable distribution of power, xDrive guarantees exceptional traction on hill ascents over difficult terrain. BMW SAVs (Sports Activity Vehicles) master steep descents without danger thanks to Hill Descent Control (HDC).

xDrive also improves the agility and safety of the BMW SAVs. The system recognises imminent oversteer and understeer before they occur. By redistributing the driving torque (onto the rear axle in the case of understeer; onto the front axle in the case of oversteer), the vehicle is easy to steer and maintains stability whilst cornering. xDrive enables complete manoeuvrability

even at parking speeds. The driving force distribution between front and rear axes takes place quickly and sensitively. This leads to extreme agility in twisty bends and tight situations such as in multi-storey car parks.

### Benefits

Thanks to the advantages of improved traction, the X3, X5 and X6 are able to set off on different slippery surfaces and especially on steep gradients without difficulty. The result is not only increased comfort for the driver, but also the comforting feeling that the vehicle will always move forwards with ease, even on extremely steep gradients in winter road conditions.

xDrive actively manages driving agility, continuously ensuring optimal traction and road holding, resulting in safe, precise vehicle behaviour in every situation. This added dynamism and agility translates into even more driving pleasure.

## Xenon headlights for low and high beam (Bi-Xenon)

Xenon technology uses a light arc instead of an incandescent coil to create an intense light. Compared to conventional halogen headlights, Xenon lamps produce brighter, more daylight-like illumination.

All BMW Xenon headlights now include the bi-xenon function which now includes the enhanced high beam functionality. The feature that enables this functionality is a mechanical shutter:

- When low beam is selected, the shutter moves into position to shut off the higher range of the light, to avoid dazzling oncoming traffic.
- When high beam is selected, the shutter moves clear and all the light from the bulb can pass unhindered.

### Benefits

Bright Xenon headlights throw a light similar to ordinary daylight to illuminate the side of the road and the area in front of the vehicle much more brightly than conventional low-beam halogen units. At the same time, Xenon headlights consume less energy than conventional halogen headlights and have a much longer service life.