

Transmission

New manual transmission SG-510/6.3

The new 6-speed manual transmission SG-S510/6.3 (711.670) is installed in the C 320 CDI model. The new manual transmission increases the transferable maximum torque from 400 Nm to 510 Nm.

This makes it unnecessary to reduce the engine torque in the C 320 CDI with manual transmission.

The increase in the maximum torque compared with the SG-S400/6.1 is mainly due to

- An additional partition with a third plane of bearings for the countershaft and main shaft to reduce shaft sag
- Wider gear wheels
- A new clutch with a larger diameter (Ø 260 instead of Ø 240 mm) and a new two-mass flywheel (ZMS)

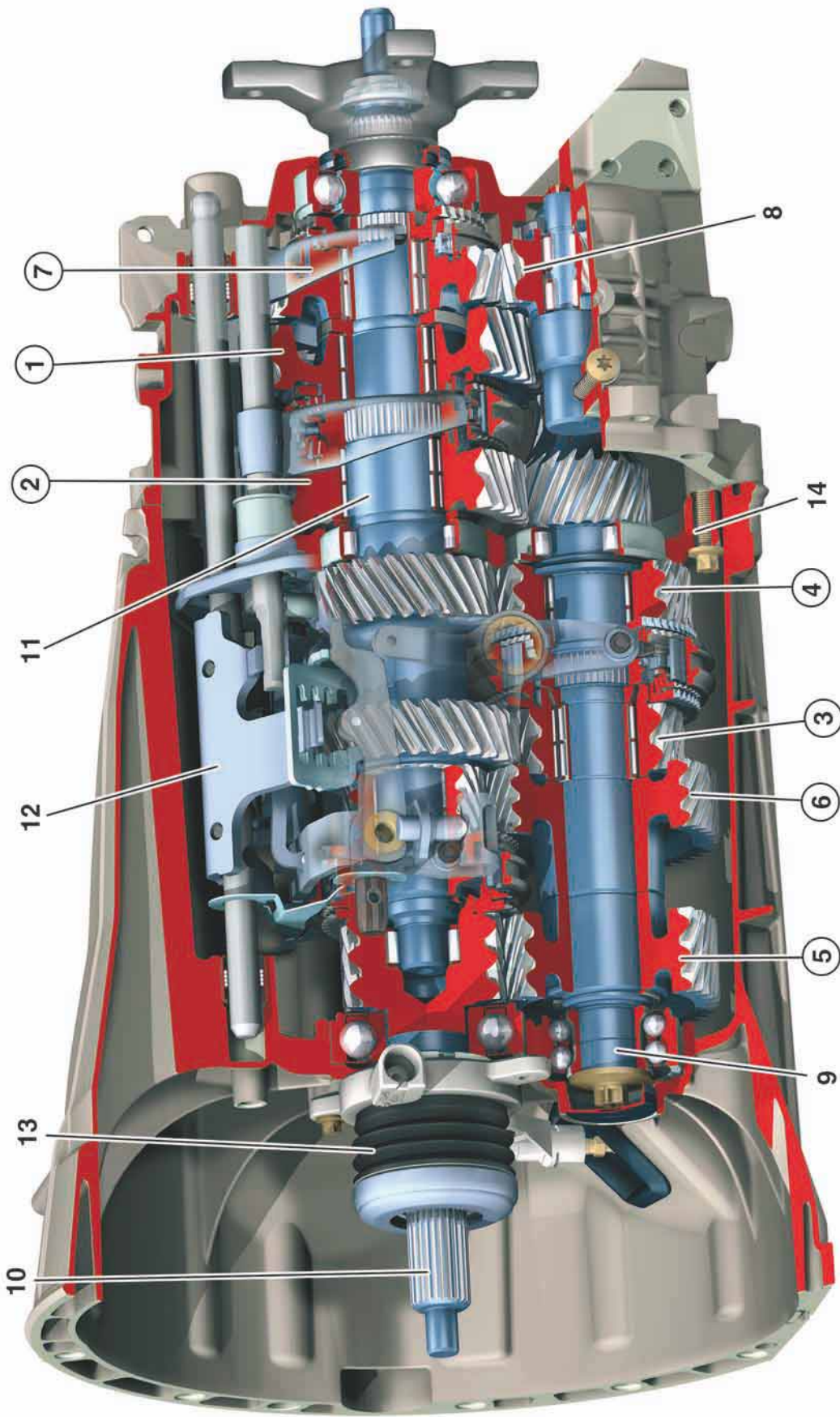
The widening of the gear wheels means that the length of the transmission has increased from 550.6 mm to 628.3 mm. At the same time the ratios in the individual gears have been modified.

Note

Structure of the transmission designation on the example of: **SG-S510/6.3**

SG	<i>Manual transmission</i>
S	<i>Conventional drive layout</i>
510	<i>Torque transmission in Nm</i>
6.3	<i>Gear ratio spread (ratio of lowest gear to highest gear)</i>

Transmission	SG-S400/6.1	SG-S510/6.3
Max. torque	400	510
Distance between axes (mm)	86	86
Overall length (mm)	550.6	628.3
Gear ratios		
1st gear	5.014	5.099
2nd gear	2.831	2.781
3rd gear	1.789	1.751
4th gear	1.256	1.245
5th gear	1.000	1.000
6th gear	0.828	0.809
Reverse gear	4.569	4.625



Manual transmission S510/6.3

P26.10-2.149-00

- ① 1st gear
- ② 2nd gear
- ③ 3rd gear
- ④ 4th gear
- ⑤ 5th gear

- ⑥ 6th gear
- ⑦ Reverse gear
- ⑧ Reverse gear intermediate gear
- ⑨ Countershaft
- ⑩ Drive shaft

- ⑪ Main shaft
- ⑫ Inner shift module
- ⑬ Central clutch release bearing
- ⑭ Partition with 3rd bearing plane

Steering

Steering gear

A rack-and-pinion steering system with hydraulic power assistance is installed as standard equipment.

Speed-sensitive power steering is available as special equipment. Both the manual torque and the self-centering function of the steering are dependent on the vehicle speed.

A steering gear with a more direct steering ratio has been developed for the ADVANCED AGILITY package in combination with sports suspension. This is intended to underscore the sporty character of the package. This steering gear is only available as speed-sensitive power steering.

Steering column

If the driver's body impacts with the steering column, the steering column moves forward under a predefined force in order to reduce the loads on the driver. For this purpose the entire substructure of the jacket tube is suspended on a slide that runs in a mounting console rigidly mounted in the body.

The new C-Class sedan is equipped as standard with a steering column that is manually adjustable in the longitudinal and vertical directions. Optionally available as special equipment is an electric longitudinal and vertical adjustment version with Easy Entry function, which is included in the memory package.

Manually adjustable steering column

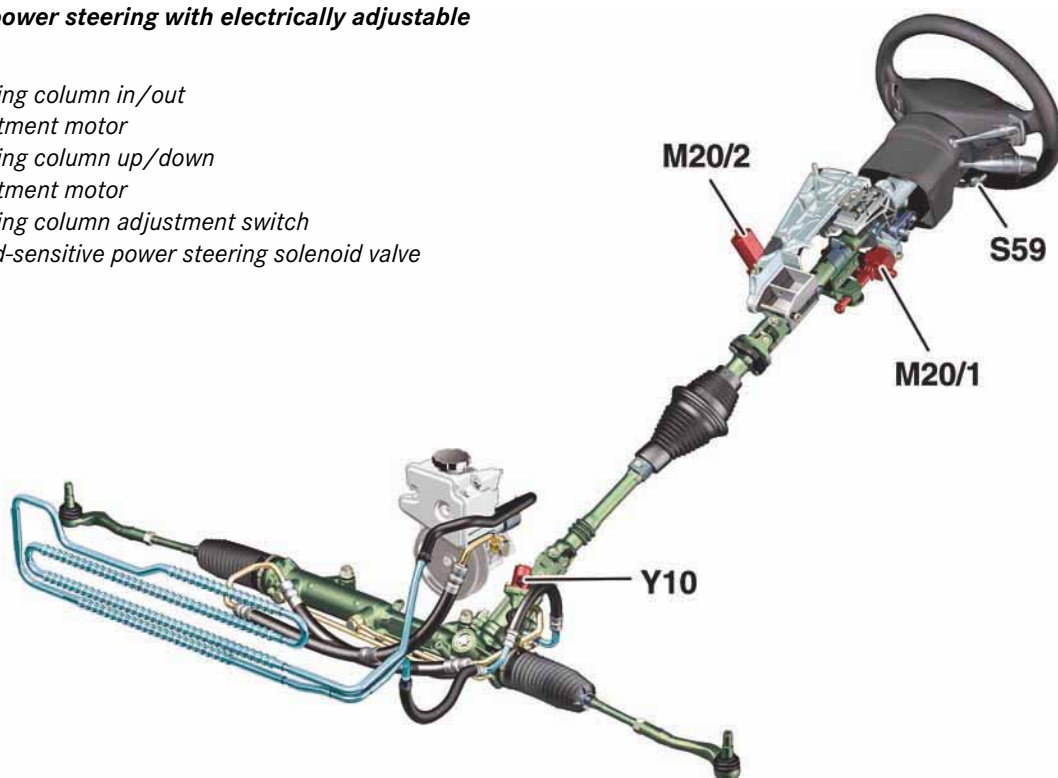
The steering wheel position can be unlocked and adjusted manually in the longitudinal and vertical directions. A swivel movement releases the steering wheel. The handle is embedded in the paneling of the steering column module so as to reduce the loads on the knee in the event of an impact.

Electrically adjustable steering column

The steering wheel position can be adjusted in the longitudinal and vertical directions by the motor/transmission units on the steering column module. The switch for electrical adjustment is located on the left side of the steering column module.

Speed-sensitive power steering with electrically adjustable steering column

M20/1	Steering column in/out adjustment motor
M20/2	Steering column up/down adjustment motor
S59	Steering column adjustment switch
Y10	Speed-sensitive power steering solenoid valve



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Steering wheel

The four-spoke steering wheel with a diameter of 380 mm is designed as a multifunction steering wheel.

The standard variant of instrument cluster features a 4-button multifunction steering wheel, while the superior variant includes a 12-button comfort multifunction steering wheel with 4.5-inch display in the instrument cluster.

The 4-button multifunction steering wheel is operated by means of two button panels each containing two buttons.

Left button panel:

- Scroll in a menu level
- Call up further displays

Right button panel:

- Volume control

The superior comfort multifunction steering wheel is operated by means of two button panels, each consisting of four single buttons, one central button and another single button below it.

Left button panel:

- Scroll menu up/down
- Move right/left
- Confirm
- Back/SDS abort

Right button panel:

- Operate telematics with volume control
- Lift/hang up telephone
- Mute speakers
- Launch SDS

The comfort multifunction steering wheel with 12 buttons is installed in the ELEGANCE and AVANTGARDE lines.

In the ELEGANCE and AVANTGARDE lines the steering wheel rim, spokes and gearshift lever are covered with leather. The leather version is available as special equipment (SA) for the CLASSIC line.



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4-button multifunction steering wheel



P46.10-2814-00

12-button comfort multifunction steering wheel

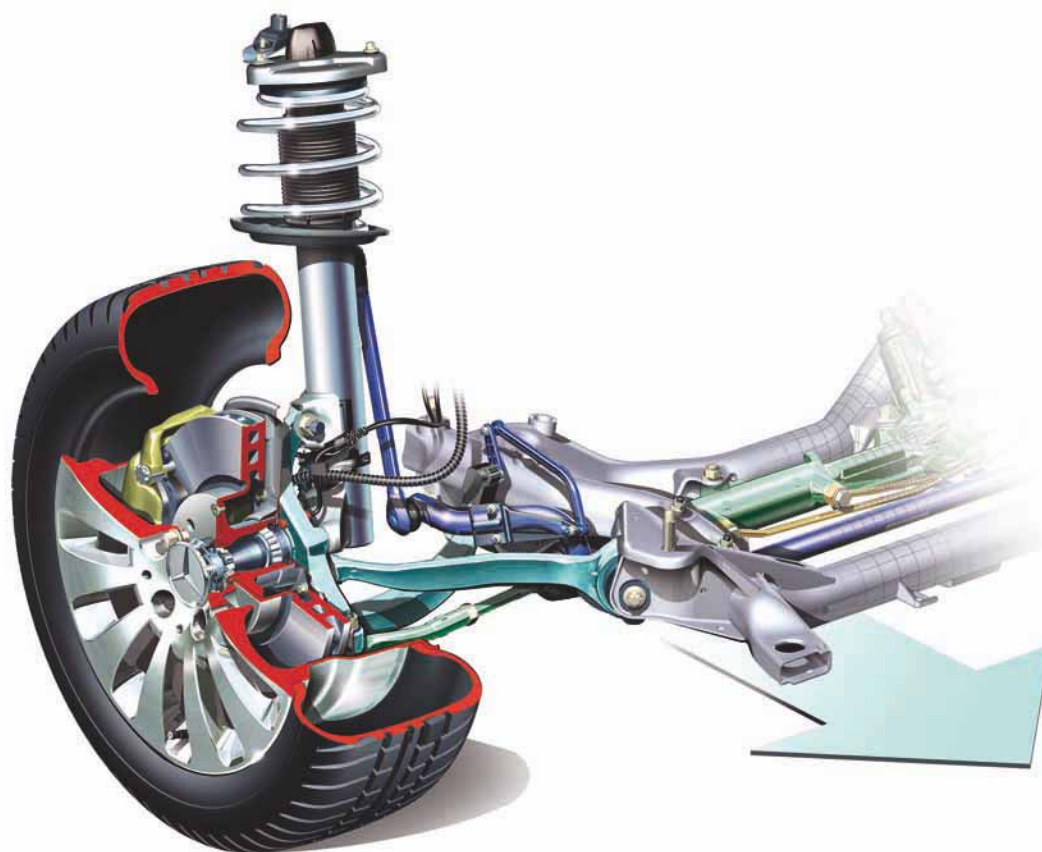
Axles

Front axle

For the best possible vehicle dynamics and ease of installation, the front axle and steering gear are pre-installed on a frame-type integral support together with the engine and transmission. The remarkably rigid and low-weight frame-type integral support is made of high-strength steel and is bolted directly onto the longitudinal members of the body.

As in model 203, an advanced principle of the three-link front axle was selected for the front suspension. The most important features of this are two individual links (the torque strut and cross strut) in the lower plane, whose force requirements have been reduced in the interests of ride comfort. The third link is the tie rod, which forms part of the new rack-and-pinion steering.

The arrangement and design of the wheel control parts, and in particular the splitting of the lower wishbone control arm into two individual links, provide more favorable characteristics for the axle kinematics than the fixed wishbone control arm.



Front axle

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Rear axle

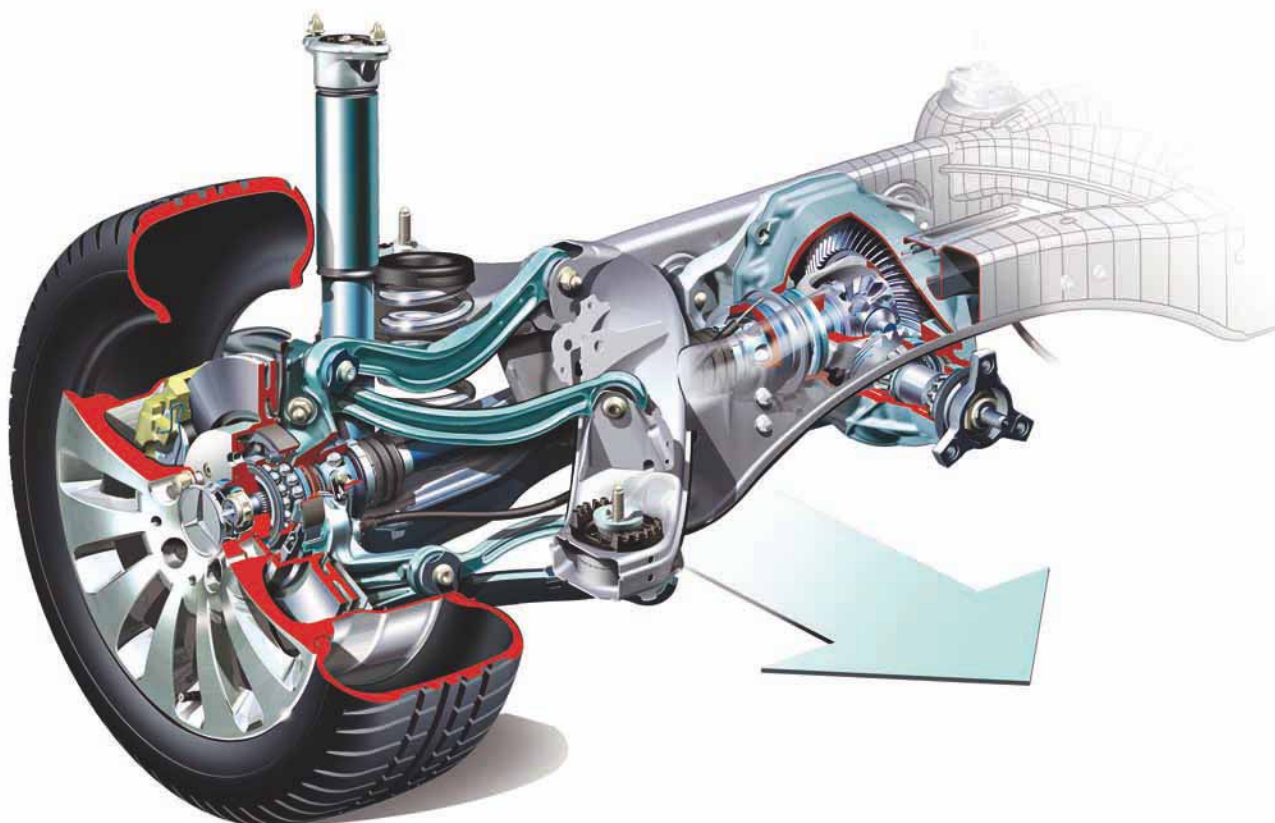
The principle of the independent multilink rear suspension has been adopted from the predecessor model series. All the components have been modified in the interests of greater ride comfort and lightweight design.

The kinematics and elastokinematics of the axle have been optimized, contributing significantly to the improved ride comfort due to the new layout and the lower resultant forces.

Another comfort-related feature is the use of an additional support for the front subframe mounting on the body, which considerably increases the rigidity.

The lighter-weight rear axle carrier (subframe) made of high-strength steel has been adapted to the new dimensional concept. The box-shaped profile of the two side parts and the rear cross brace are formed from two half shells welded together. The front cross brace is a single shell.

Rear axle gear	M 271		M 272			OM 646		OM 642
	204.041 204.046	204.052	204.054		204.056	204.007	204.008	204.022
	187 FE	187 FE	MT 200 FE	AT 187 FE	200 FE	187 FE	200 FE	215 FE
Ratio	3.07	3.27	3.07		2.82	2.65	2.65	2.47



Rear axle

P35.00-2072-50

Suspension

Suspension systems

The new C-Class sedan is fitted with conventional steel suspension with wheel control suspension struts, torsion bars on the front axle, rear axle springs and rear axle dampers. A rear axle torsion stabilizer bar is installed in all non-derated engine variants.

The new C-Class is equipped with the "AGILITY CONTROL suspension with selective damping system" as standard. This considerably improves lateral agility and at the same time increases ride comfort levels in comparison with the predecessor model.

Available as special equipment (SA) is a sports suspension system or special suspension for countries with rough roads, as well as the main innovation in terms of vehicle dynamics in the new C-Class: the "ADVANCED AGILITY package with Sport driving mode".

AGILITY CONTROL suspension with selective damping system

The comfortably-tuned conventional spring/damper system is equipped with a vibration-dependent damping system as standard. The function module of the selective damping system (Stroke Dependent Damping) consists of a small elastomer piston that, when caused to move a short distance, opens a bypass for the oil stream parallel to the conventional damper compression.

This serves to reduce the damping effect in the case of small irregularities in the range +/- 10 mm. This provides particular benefits for driving comfort and suspension response without any attendant sacrifices in the area of driving safety. In the case of larger road bumps, however, the selective action of the damper ensures that the full damping function is reactivated.

Sports suspension (code 486) (in combination with AMG sport package or the ADVANCED AGILITY package with Sport driving mode)

The sports suspension offers the customer a 15 mm lower vehicle with harder damping. Roll support is also increased, leading to smaller roll angles when a dynamic driving style is used.

In technical terms it differs from the basic suspension in its harder, shorter springs, harder dampers and thicker torsion stabilizer bars with strengthened torsion bar linkages.

Suspension for countries with rough roads (code 482)

For selected countries a special "suspension for countries with rough roads" is available, which differs from the basic suspension in that the overall level of the vehicle is 15 mm higher. The increased level is achieved by means of longer springs.

ADVANCED AGILITY package with Sport driving mode (code 483)

The "ADVANCED AGILITY package with Sport driving mode" is the main innovation in the field of vehicle dynamics. It allows the driver to change the characteristics of the vehicle between comfortable and sporty handling. This package already includes the "sports suspension".

Properties, advantages:

- Substantial improvement in ride comfort in terms of body behavior and jolting thanks to continuously changing adjustable damping instead of the otherwise stepped damping adjustment as in model series 216 or 221.
- Vehicle level 15 mm lower than normal level
- Speed-sensitive power steering with variable centering compensation, including more direct steering transmission

Regulation with the SPORT switch

Damping

In Sport driving mode the hydraulic forces of the shock absorbers are optimized to improve vehicle dynamics.

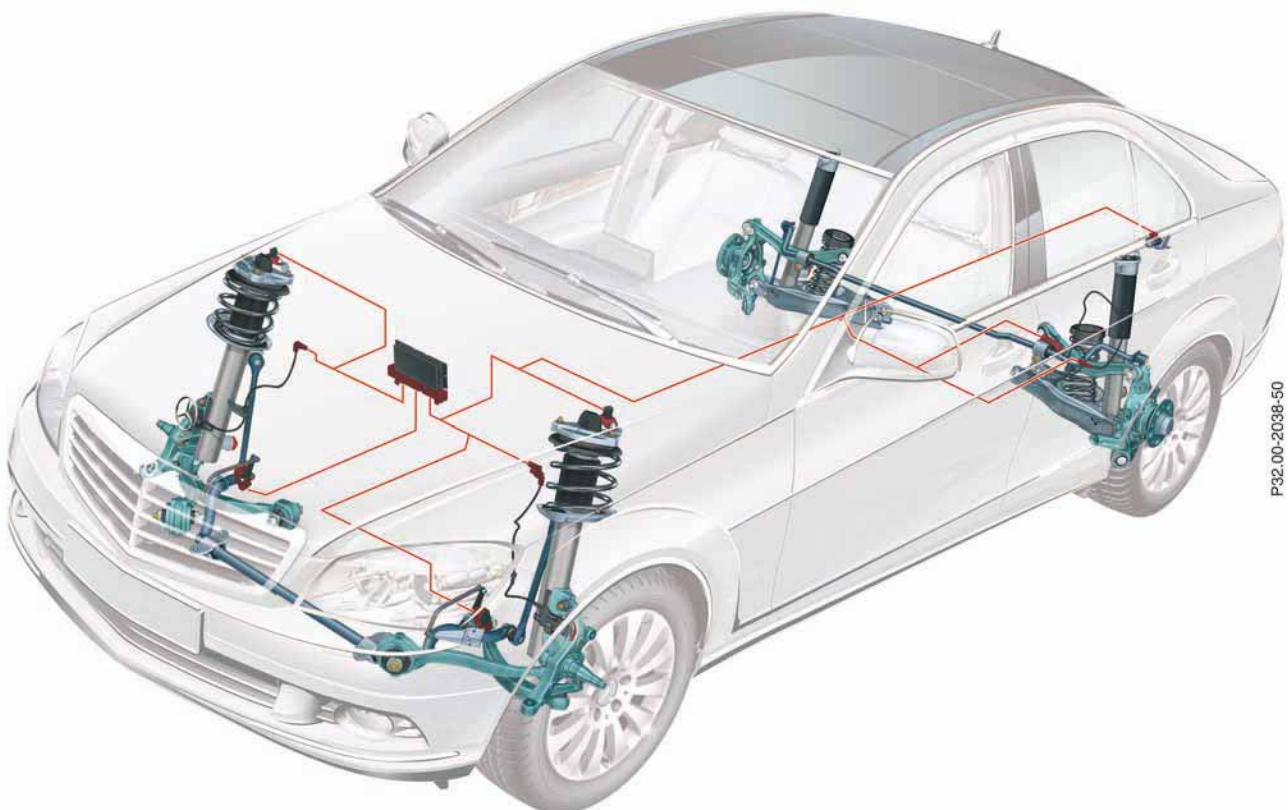
- For better control of the vehicle
- To reduce understeer at speeds up to 120 km/h
- For better directional stability and road adhesion at higher speeds

Accelerator pedal

The characteristic of the accelerator pedal changes with the aim of giving the driver the feeling of better engine response.

Steering

The steering moment is increased at speeds above 80 km/h in order to make the steering feel more sporty.



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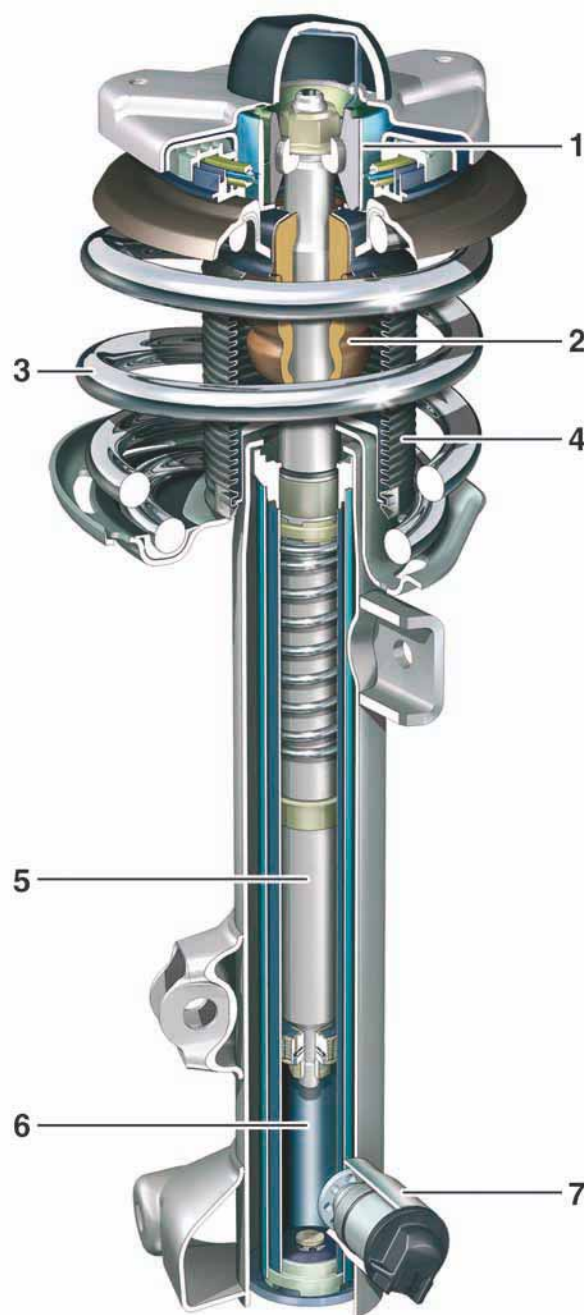
Suspension

Functionality

The electronically controlled, continuous damping system operates fully automatically. Compared with conventional steel suspension, it provides significant improvements in tire comfort and driving safety.

The damping is set harder or softer by the electronics according to the driving situation. If the sensors register a sporty driving style, for example, the comfortable standard damping automatically becomes harder. This automatic program can be adjusted manually via the SPORT switch in the center console for more sporty or more comfortable handling characteristics.

The electronic system operates steplessly within a wide damping performance map. The damping force at each wheel is automatically adjusted independently to suit the current requirements, the road conditions and the driving situation. This allows the vehicle to travel smoothly over rough roads with no detrimental effects on directional stability and road adhesion.



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Suspension strut in *ADVANCED AGILITY* package

- 1 Head bearing
- 2 Stop buffer
- 3 Steel spring
- 4 Boot
- 5 Piston rod
- 6 Shock absorber
- 7 Damper adjustment

Brake system

The brake system is a hydraulic dual-circuit brake with the two brake circuits split between the front and rear axles.

Brake booster

Instead of the 7"/8" tandem brake booster used in model series 203, a new, larger 8"/8" tandem brake booster is installed in model series 204. The housing of the new brake booster is now made not of steel as before, but of aluminum in order to optimize weight.

The Brake Assist function in model 203 employed an active brake booster that implemented this function with the brake booster itself by means of a diaphragm sensor and a solenoid valve. In model 204 this function is implemented entirely by the hydraulic unit via pressure sensors. For this reason the system in the new C-Class is referred to as a passive brake booster.

Master brake cylinder

The aluminum master brake cylinders are dual-circuit units with the brake circuits arranged in series. The compressive force is introduced by the push rod of the brake booster via a spherical cap into a primary piston which converts the force into the brake pressure of the primary circuit.

A pre-compressed push spring ensures that the secondary piston also traverses the operating travel distance simultaneously, so that the spring is captured. Compared with a system in which the secondary piston is moved by the pressure buildup in the primary circuit, the capture of the spring significantly shortens the idle travel distance.

Parking brake

The foot-operated parking brake features a plastic pedal with an integrated, automatic cable adjuster. This means that readjustment of the brake cables during service work is no longer necessary, leading to a reduction in the operating costs. The brake cables are routed in the center tunnel to save space. The cable force is distributed to the two integrated parking brakes by a reaction force principle.

Pedal assembly

For the first time the pedal bearing bracket is a steel/plastic hybrid structure in order to save weight and space. The brake pedal, however, is made of two shells of high-strength steel and the clutch pedal is made of plastic. Both pedals are mounted in a hybrid bearing bracket. In contrast to the predecessor model series, the brake light switch integrated in the bearing bracket is a non-contact switch.

Note

To detach the Electronic Stability Program control unit (N30/4) from the hydraulic unit, a 70 mm long T20 Torx bit is required.

Brake system

ADAPTIVE BRAKE

The new C-Class features the newly developed brake control system ADAPTIVE BRAKE, which has already seen service in similar form in the S-Class and the E-Class (after the model refinement).

The system expands the control and enhancement functions required for traction control and vehicle dynamics, and thereby further improves the performance of the vehicle in terms of traction potential, driving safety and operator convenience.

ADAPTIVE BRAKE contains the base functions of antilock brake system, acceleration skid control and yaw moment control. The Brake Assist (BAS) function, the cruise control and the tire pressure loss warning, as well as the enhancement functions of Hill Start Assist, dry braking and precharging, are included as before.

New features of the ADAPTIVE BRAKE system are the PRE-SAFE function and the function of the adaptive brake lights.

i Note

The adaptive brake lights are described in detail in chapter "Overall vehicle" in the "Exterior lights" section.



Front brake disk, perforated with aluminum composite brake caliper and Mercedes-Benz lettering (sports version)

P42.47-2008-00

Hill Start Assist

The Hill Start Assist function prevents the vehicle from rolling back on hills (within the physical limits) while the driver changes from the brake pedal to the accelerator.

The function cuts in automatically when stationary whenever the moving-off process occurs above a certain gradient.

The Hill Start Assist function holds the pressure for only approx. 0.7 s when the driver takes his foot off the brake pedal.

If the driver changes to the accelerator pedal before the holding time expires, the brake pressure is reduced in proportion to the drive torque and the gradient. If the driver does not operate the accelerator pedal after the brake pedal, the brake pressure is dissipated.

The Hill Start Assist is deactivated in the event of a malfunction in the ESP system. The vehicle is not held if a system error occurs while the Hill Start Assist is active.

Dry braking

The dry braking function improves the braking effect in wet conditions. Brief, light applications of the brakes remove the film of water present on the brake disks in wet conditions.

The rain/light sensor detects whether these brake applications are necessary. This function is activated automatically, without driver intervention.

Precharging

The precharging function is constantly active and improves the braking effect by applying pressure to the brake linings (precharging) when the driver switches quickly from the accelerator pedal to the brake pedal. This reduces the brake actuation time and reduces the stopping distance required in case of emergency braking.

PRE-SAFE

PRE-SAFE evaluates the driving situation and the driver's reactions, and activates reversible occupant protection measures in potential accident situations. To bring the occupants into the best possible sitting position, the backrest of the front passenger seat rises to the upright position and the reversible emergency tensioning retractors tighten the belts on the driver and front passenger seats. In addition, the side windows and the sliding roof are closed if necessary.

i Note

The ADAPTIVE BRAKE system is bled in the conventional way.

To detach the brake caliper from the rear axle, either a short 7 mm hexagon socket approx. 30-33 mm long or an articulated hexagon socket is required.

i Note

A separate system description is available on the subject of the "Adaptive Brake System".
Order no. 6516 1328 02

Brake system

Cruise control and SPEEDTRONIC functions

The cruise control and SPEEDTRONIC functions are coupled with the equipment package of vehicles with automatic transmission. The functions can be ordered as special equipment under code (440) for vehicles with manual transmission.

The previous cruise control and SPEEDTRONIC functions have been expanded to include automatic brake intervention to prevent the vehicle from exceeding the set speed when driving downhill. In model 204 the brake intervention is initiated by the ESP hydraulic pump, and not via the brake booster as in model 203. For the driver this change means that the pedal remains in the usual place during a cruise control/SPEEDTRONIC brake application, i.e. it is no longer retracted.

The movement of the familiar cruise control lever has been extended by one step in each direction to enable the set speed to be changed more quickly. The set speed is now displayed in a status line in the instrument cluster, or via a segmented arc in the instrument cluster with central display. This gives the driver better control of the functions. Furthermore, the SPEEDTRONIC can also be used to limit the vehicle speed for operation with winter tires.

ESP® trailer stabilization

On its market launch, the new C-Class will be available with the ESP® trailer stabilization system that was first introduced in the new S-Class. When the vehicle is operated with a trailer, critical oscillations of the car/trailer combination can occur for a number of reasons, which impair the directional stability and road adhesion of the car/trailer combination. To improve active safety in trailer operation, the vehicle dynamics control system is used to stabilize the vehicle. The control system must perform the following functions:

- Oscillations of the car/trailer combination are detected via the yaw rate signal of the towing vehicle
- Oscillations of the car/trailer combination are decreased by means of wheel-specific brake intervention in the towing vehicle

Brake intervention is ended when the oscillations of the car/trailer combination have died away

Model		C 180 C 200 CDI	C 200, C 230, C 280 C 220 CDI	C 350, C 320 CDI
Wheel size		16"		17"
Brake system, front				
Type of brake		1-piston floating caliper		
Brake disk diameter	mm	288	295	322
Brake disk thickness	mm	25	28	32
Service dimensions	mm	23	26	30
Minimum dimensions	mm	22.4	25.4	29.4
Lining area	cm ²	2 x 60.6		2 x 76
Version		Internally ventilated		
Brake system, rear				
Type of brake		1-piston floating caliper		
Brake disk diameter	mm	278	300	
Brake disk thickness	mm	9	10	22
Service dimensions	mm	7.8	8.8	20
Minimum dimensions	mm	7.3	8.3	19.4
Lining area	cm ²	2 x 38		2 x 40
Version		Not ventilated		Internally ventilated