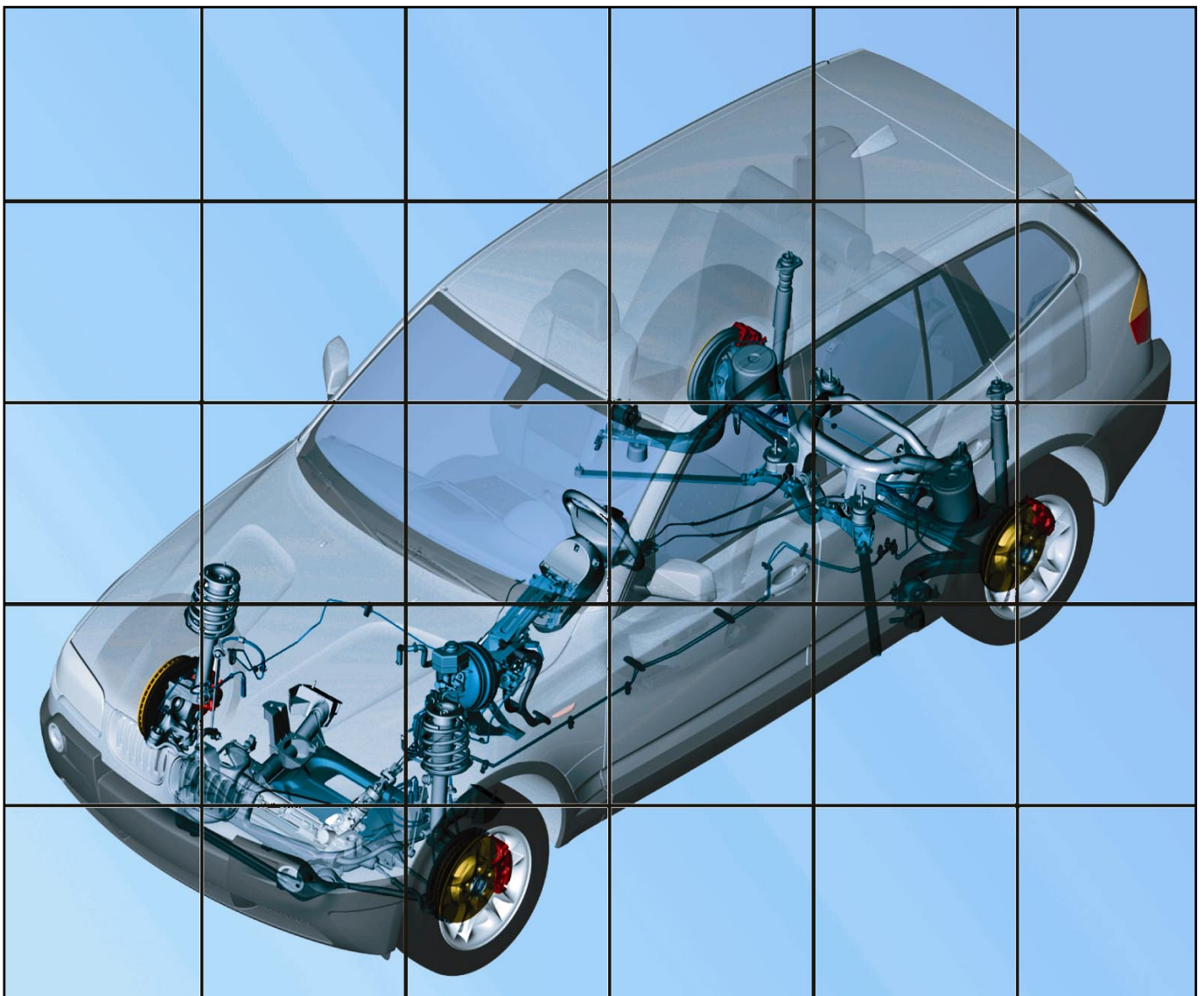




E83 Chassis
Participant Manual



NOTE

The information contained in this participant's manual is intended for participants of the Aftersales Training.
Refer to the relevant "BMW Service" information for any changes/supplements to the Technical Data.

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E83 Chassis and suspension

As with all BMW vehicles, the layout of the X3 chassis and suspension was designed with particular emphasis on driving pleasure, dynamics and favourable handling.

The main aim in the full development of the X3 was to achieve:

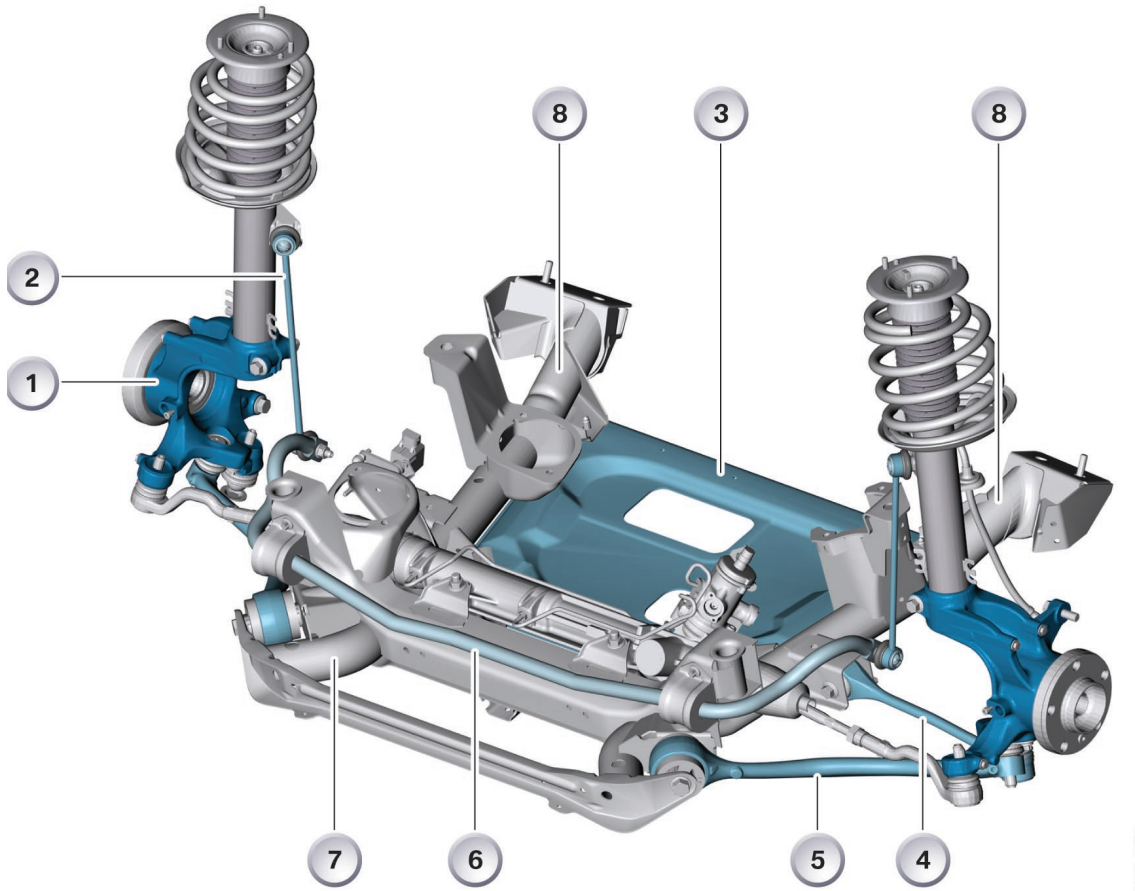
- Agility on the road,
- Driving dynamics,
- Stability and
- Traction.

The following areas are discussed on an E83-specific basis:

- Front/rear axle
- Suspension and damping
- Brakes
- Steering
- Wheels and tyres, tyre defect indicator

Front/rear axle

Front axle



KT-12437

TEVO 2624

Fig. 1: Front axle

Index	Explanation	Index	Explanation
1	Swivel bearing	5	Tension strut
2	Anti-roll bar link	6	Anti-roll bar
3	Thrust zone (reinforcement plate)	7	Front axle carrier
4	Control arm	8	Stoneguard disengaged

The double-joint spring strut axle with tension struts is essentially comparable to the front axle of the E53 (X5). The front axle components that are placed under particular load are designed as forged steel parts. This includes the control arm, tension strut and the swivel bearing.

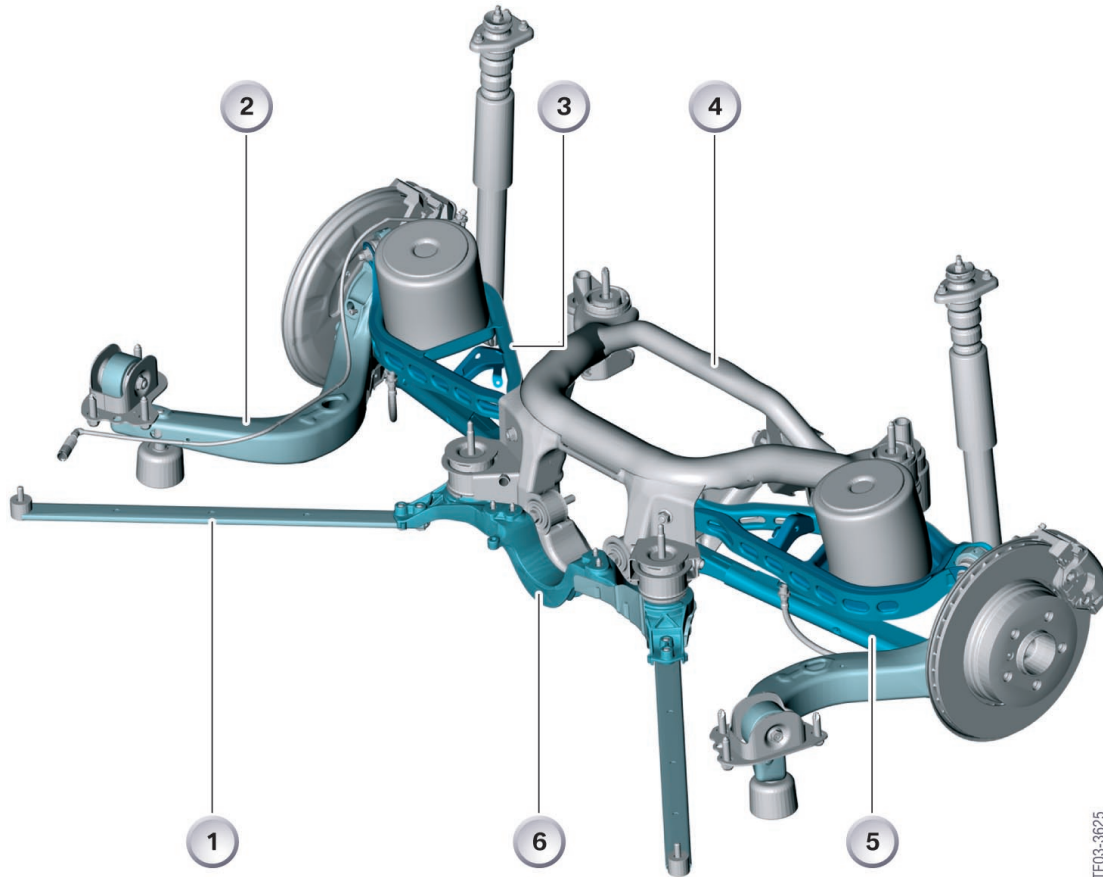
The front axle carrier is made of reinforced steel tubing onto which a thrust zone (reinforcement plate) is bolted. This thrust zone makes a decisive contribution to the precision of the axle kinematics and to the rigidity of the front end.

There are two recesses in the thrust zone, a round one and a rectangular one. The two recesses ensure accessibility to the engine oil drain plug. On 4-cylinder engines this is round, on 6-cylinder engines is rectangular.

Modifications to the E53 front axle:

- Modified height-level sensor (same as with rear axle) with elongated hole and lug (twist prevention).
- The sealing bellows on the tie rods, control arms and tension struts have been modified and have a stainless steel ring.
- Double bolting on the left and right-hand side of the rear of the front axle carrier with impact resistance plate.
- Anti-roll bar link bolt connection with different nuts at the top and bottom, and a twin surface for countering.
- Clipped-on plastic covers are fitted as a stoneguard on the left-hand and right-hand sides of the front axle carrier in the rear area.

Rear axle



KT-12504

TF03-3625

Fig. 2: Rear axle

Index	Explanation	Index	Explanation
1	Tension strut	4	Rear-axle bracket
2	Trailing arm	5	Lower control arm with plastic cover shell
3	Upper control arm	6	Thrust rod

The E83 is fitted with a central steering axle with subframe and dual elastic differential mounting.

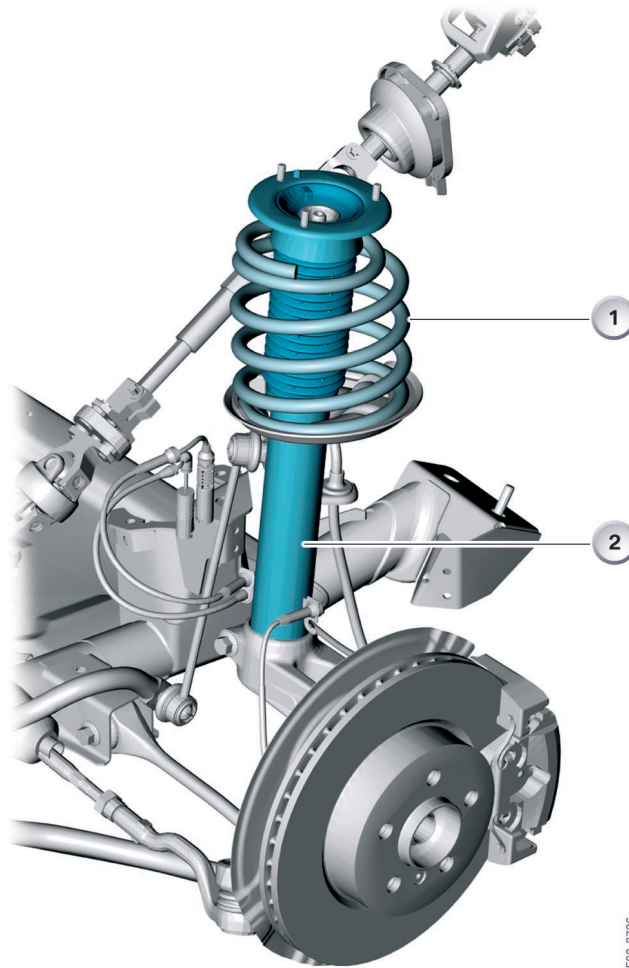
This basically corresponds to the design used on the E46/16 (3 Series with all wheel drive).

Modifications and additions to the E46/16 rear axle:

- Two tension struts added to the central steering axle and are secured to the thrust rod and the bodyshell in order to adapt axle kinematics to the vehicle design.
- Thrust rod with means of securing tension struts.
- Anti-roll bar secured to the rear-axle carrier by means of clamps.
- Front of rear axle carrier suspension converted to special bolts with thrust washers.
- Surface of control arms are galvanized steel plates.
- Anti-roll bar link with ball joint is secured directly to the control arm profile without additional retainers.
- Dampers with three-point bolt connection (thrust bearing on bodyshell).

Suspension and damping

Front axle



KT-12506

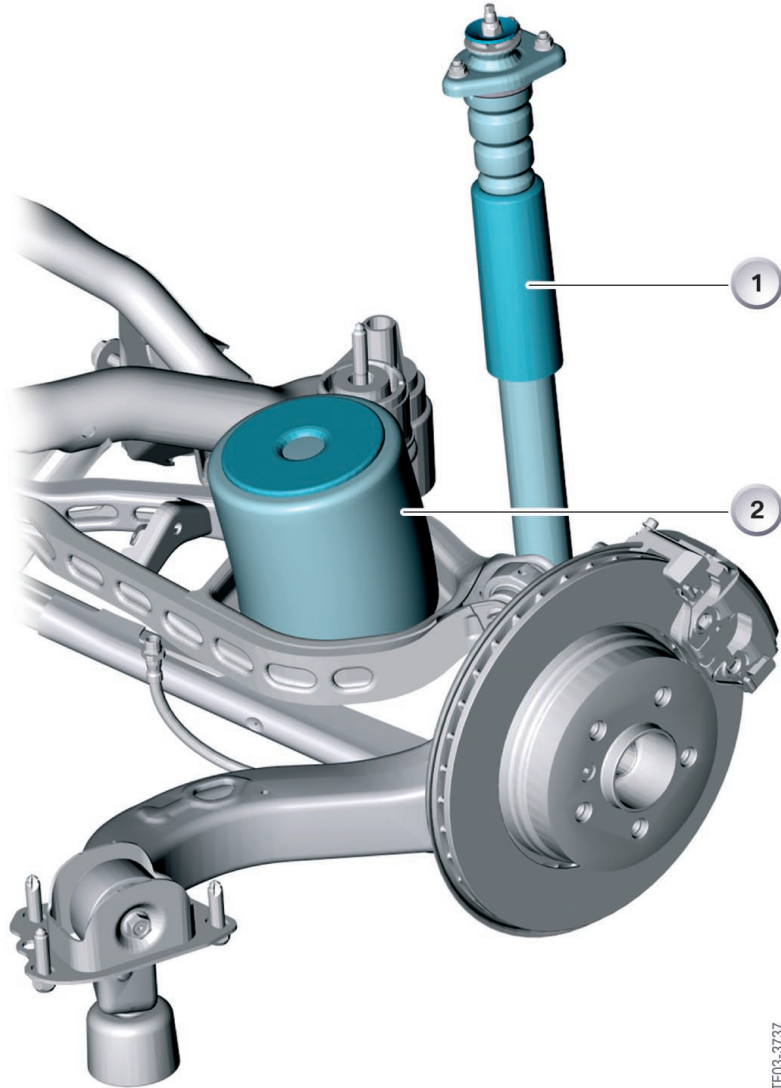
TF03-3736

Fig. 3: Front axle spring strut

Index	Explanation
1	Coil springs
2	Support tube

Spring struts with coil springs and twin tube gas-pressure dampers are used on the front axle. The spring strut design of the rear axle is the same as that of the E53 (X5). The anti-roll bar link is not articulated on the spring strut plate but rather on the damper holder. The support tube on the damper is made from steel and has a positioning aid as a twist prevention device.

Rear axle



KT-12505

TF03-3737

Fig. 4: Rear axle spring/damper

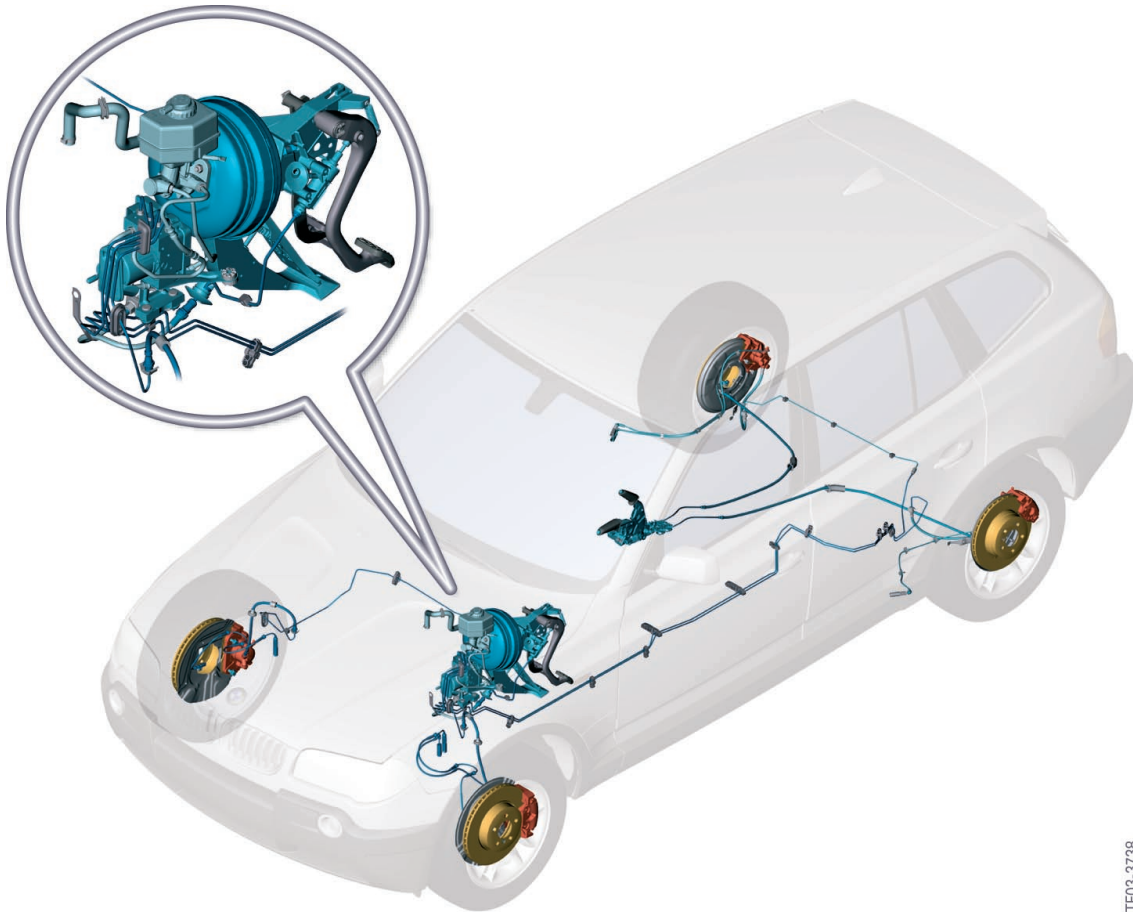
Index	Explanation
1	Gas pressure damper
2	Barrel spring

Barrel springs and separate twin tube gas-pressure dampers are fitted to the rear axle.

The spring/damper design on the rear axle is the same as that of the E46/16 (3 Series all wheel drive).

Brakes

System overview



KT-12556

TF03-473R

Fig. 5: E83 brake system

Components

The brake system in the E83 comprises the following components:

- Four wheel brakes with brake calipers, brake pad and brake disc.
- Hydraulic unit with brake booster and DSC hydraulic module.
- Brake lines and brake hoses.
- Foot controls with brake and clutch pedals
- Parking brake with handbrake lever, ASZE, cables and duo-servo brakes

The E83 has a hydraulic dual-circuit brake system with "front/rear split." One brake circuit each for the front and rear axles.

The parking brake is operated using a conventional handbrake lever and an automatic cable adjuster (ASZE). The handbrake lever is located on the centre console and bolted to the floor pan.

An important development and technical highlight of the E83 is the DSC8 in the total function xDrive (see the chapter on Chassis controlling system xDrive).

Four wheel brakes with brake calipers, brake pad and brake disc

The following brakes are fitted to the E83, regardless of the engine variant:

- Front brake
Internally ventilated brake disc Ø 325 x 25 mm with 1-piston floating caliper, brake piston Ø 57 mm.
- Rear brake
Externally ventilated brake disc Ø 320 x 22 mm with 1-piston floating caliper, brake piston Ø 42 mm.

The housings of the brake calipers are made of spheroidal casting.

All brake discs are coated with geomet.

M14 bolts are used to bolt the wheel.

Hydraulic unit with brake booster and DSC hydraulic module

On left-hand-drive vehicles, the hydraulic unit is fitted at the front on the left-hand side (when viewed in the direction of travel) under the main brake cylinder. The electric precharging pump is no longer fitted.

All X3 vehicles are equipped with a 8"/9" brake booster and have a tandem master brake cylinder with a diameter of 25.4 mm.

Brake lines and brake hoses

On right-hand-drive vehicles, the master brake cylinder is fitted at the front on the right-hand side (when viewed in the direction of travel) and the hydraulic unit at the front on the left-hand side. With this layout, the two connecting intake lines are designed with a diameter of 8 mm.

The large diameter and the unfavourable installation location of these intake lines will make it necessary to carry out a bleeding operation using the DIS tester if components are replaced or the lines run dry.

Foot controls with brake and clutch pedals

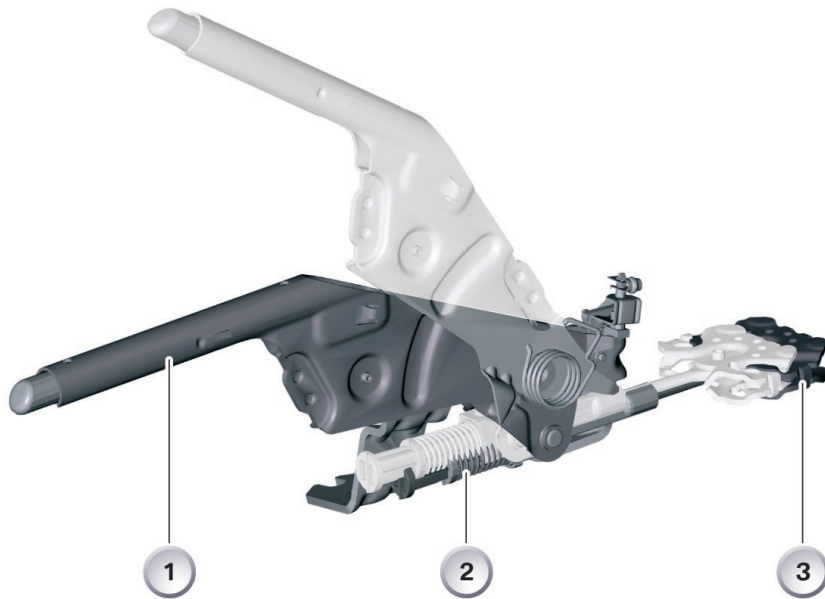
The pedal mounting block is made of aluminium and is bolted to the bulkhead. The vehicle has a wide, suspended brake pedal made of steel. The clutch pedal is also suspended and made of plastic.

Parking brake with handbrake lever, ASZE, cables and duo-servo brakes

The duo-servo brakes on the X3 basically correspond to the duo-servo brakes on the E53/E65 (dia. 185 x 30).

The parking brake is actuated by means of a conventional handbrake lever. The handbrake lever is located on the centre console and bolted to the floor pan.

The parking brake is equipped with an automatic cable adjuster (ASZE) and a compensating element as already fitted to the E85 (Z4) and E60 (5 Series).

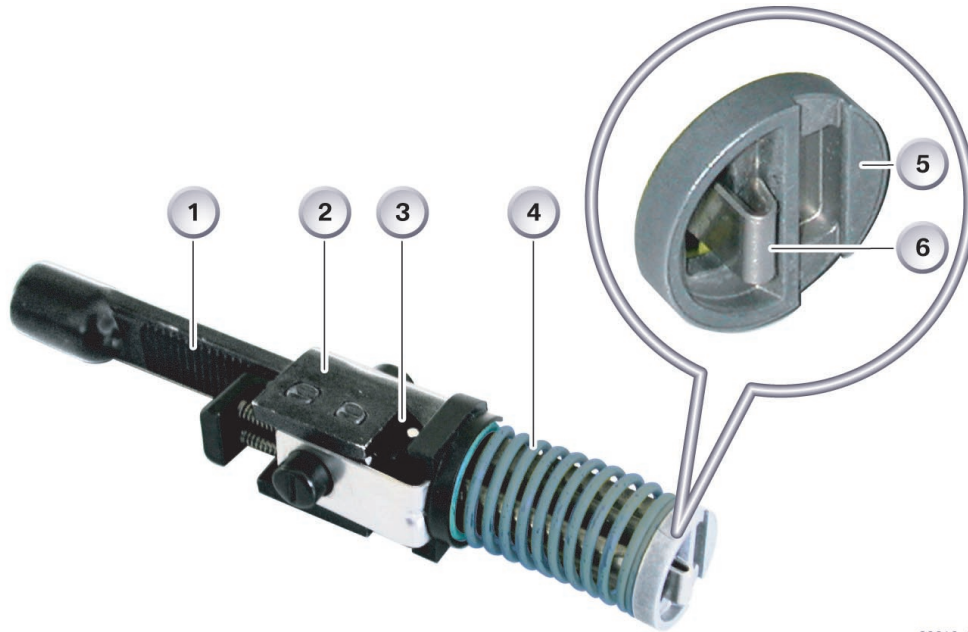


KT-10906

Fig. 6: Parking-brake actuating unit

Index	Explanation
1	Parking-brake lever
2	Automatic cable adjuster
3	Compensating element with mounting clip

The mounting clip locks the cables in the compensating element.



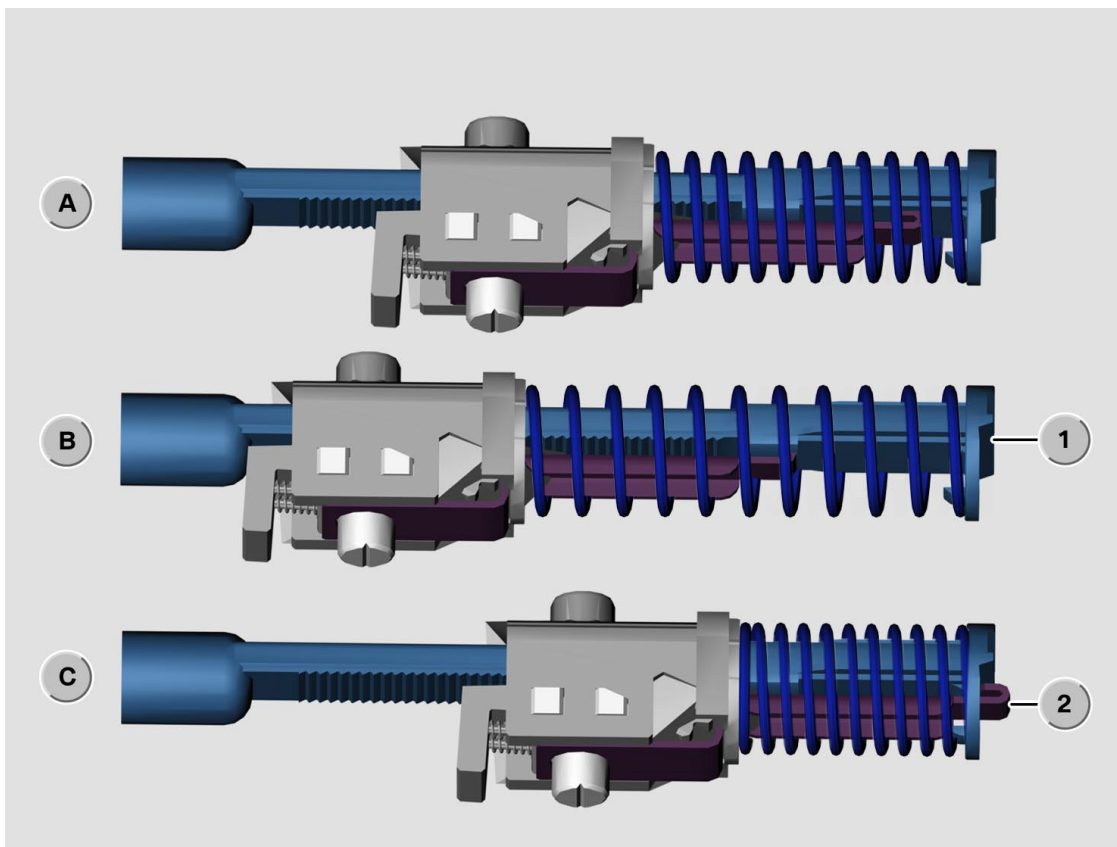
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Fig. 7: ASZE in assembly position

Index	Explanation	Index	Explanation
1	Rack	4	Tensioning spring
2	ASZE housing	5	Locking clip
3	Clamping jaw	6	Locking hook

The function of the ASZE is to adjust the handbrake cables and compensate longitudinal variations and settling. It does not, however, adjust the to the wear of the duo-servo brake. This must, as before, be adjusted at the expander lock in the brake. The function of the compensating element is to distribute the actuating force uniformly to both handbrake cables.



KT-9890

Fig. 8: Possible positions of ASZE unit

Index	Explanation	Index	Explanation
A	Operating position	1	Locking clip
B	Position in case of a cable break	2	Locking hook
C	Assembly position		

Adjusting the duo-servo brakes:

The basic clearance of the duo-servo brake is adjusted at the adjustment bolt of the duo-servo brake shoes.
The parking brake is automatically adjusted when the ASZE unit is activated.

Steering

Conventional rack-and-pinion power steering is used in the E83. Servotronic is also available as an option.

The design and functioning principle of the Servotronic option are nothing new but have been modified as described in this chapter.

Servotronic

The steering system controls the amount of power assistance based on the current road speed as opposed to the conventional way, which is based on engine speed.

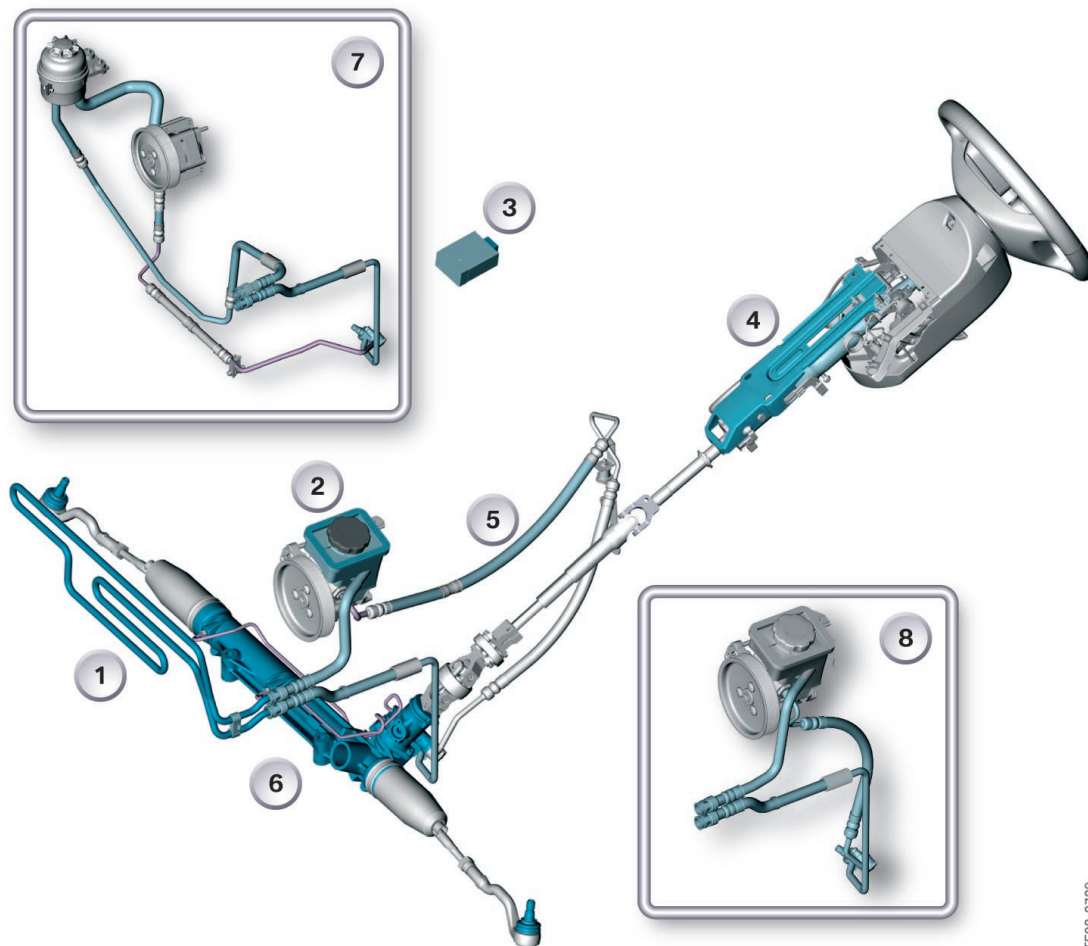
The hydraulic pressure is electronically adapted to the current road speed, with greater power assistance available at lower road speeds and less power assistance available at greater road speeds.

System advantages

Only minimum force is required to turn the steering wheel at low road speeds and the amount of power steering assistance is continuously and proportionately reduced (controlled by characteristic curves) as the speed increases.

Contact with the road surface is therefore more direct and the steering more precise. The driver also enjoys maximum comfort and greater manoeuvrability when parking, for example, or when driving along narrow and winding lanes.

System overview



KT-12542

TF03-3739

Fig. 9: E83 steering systems (items 1-6, M57TU illustration, left-hand drive vehicle)

Index	Explanation	Index	Explanation
1	Power-steering cooler	5	Flexible hoses
2	Hydraulic pump with supply reservoir (M57TU, left-hand drive)	6	Steering gear
3	Servotronic control unit	7	Hydraulic pump with separate supply reservoir (M54B25 and M54B30, left-hand drive)
4	Upper steering column assembly	8	Hydraulic pump with supply reservoir (M47TU, left-hand drive)

Steering gear

The E83 is fitted with hydraulic steering gear with a linear rack and pinion.

The total transmission ratio of the steering is: $i = 18.9$.

The total transmission ratio of the steering gear is:
 $i = 47.75$, i.e. the rack's stroke is 47.75 mm with a full turn of the steering wheel (360 degrees).

Hydraulic pump

The E83 is fitted with different hydraulic pumps depending on the engine variant.

Engine	Hydraulic pump	Fluid reservoir
M47	FP-4 pump/Saginaw ports	flanged
M57	FP-4 pump/Saginaw ports	flanged
M54B25	FP-4 pump/Saginaw ports	separate
M54B30	FP-4 pump/Saginaw ports	separate

Caution

The hydraulic pumps do not have a pump end shutdown feature. The hydraulic pump could be damaged after approximately > 1 minute if the steering is kept on the block (end stop) for a long period.

Power-steering cooler

E83 vehicles with petrol engines are fitted with cooling loops shaped as a W to assist in cooling.

E83 vehicles with diesel engines have finned coolers. These finned coolers comprise four pipes of rectangular cross-section and soldered fins.

The power-steering cooler is located on the engine-cooling module.

Wheels and tyres, tyre defect indicator

Seven different wheel stylings are available for the X3.

Four different 17" wheel stylings are fitted as standard.

Three 17" wheel stylings, two 18" wheel stylings and one 18" wheel set with mixed tyres (8Jx18/9Jx18) are available as an option, depending on the type of engine.

Anti-theft wheel bolts are fitted to all optional wheels on ECE models. These are fitted as standard on the 3.0i/d.

The tyre defect indicator (RPA) is a standard feature. The RPA function is integrated in the DSC control unit.

A compact wheel (spare wheel/emergency wheel) is supplied as standard, regardless of the vehicle version.





E83 Chassis and Suspension

The following wheel/tyre combinations are available as standard:

Model	Wheels/tyres	Styling number	Styling
Series			
KT-12348 ECE 2.0d, ECE 2.5i	7.0Jx17 EH2 IS39* 215/60 R17 LI 96** tyres A/S H-rated tyres, M+S Snow chains only possible on RA	109	 TF03-3666
KT-12342 ECE 3.0i, ECE 3.0d Option: ECE 2.0d, ECE 2.5i	8.0Jx17 EH2 IS46* 235/55 R17 LI 99** tyres A/S H-rated tyres, M+S Snow chains only possible on RA	148	 TF03-3660
KT-12349 US 2.5i Option: ECE 2.0d, ECE 2.5i, ECE 3.0i, ECE 3.0d US 3.0i	8.0Jx17 EH2 IS46* 235/55 R17 LI 99** tyres A/S H-rated tyres, M+S Snow chains only possible on RA	111	 TF03-3661
KT-12344 US 3.0i Option: ECE 2.0d, ECE 2.5i, ECE 3.0i, ECE 3.0d US 2.5i	8.0Jx17 EH2 IS46* 235/55 R17 LI 99** tyres A/S H-rated tyres, M+S Snow chains only possible on RA	112	 TF03-3662

E83 Chassis and Suspension

The following options are available:

Model	Wheels/tyres	Styling number	Styling
	Option		
KT-12345	Option for all 8.0Jx18 EH2 IS46* 235/50 R18 LI 97** tyres A/S H-rated tyres, M+S Snow chains only possible on RA	113	 TF03-3663
KT-12345	Option for all except: US 2.5i US 3.0i 8.0Jx18 EH2 IS46* 235/50 R18 LI 97** tyres S V-rated tyres	113	 TF03-3663
KT-12346	Option 8.0Jx18 EH2 IS46* 235/50 R18 LI 97** tyres S (ECE, with V-rated tyres) A/S (US, with H-rated tyres, M+S) Snow chains only possible on RA	143	 TF03-3664
KT-12347	Option for all except: US 2.5i 8.0Jx18 EH2 IS46* 9.0Jx18 EH2 IS51* 235/50 R18 LI 97** tyres 255/45 R18 LI 99** tyres S V-rated tyres No snow chains possible	114	 TF03-3665

* IS = insert size (press depth)

** LI = load index

A = all-season tyres

S = summer tyres

Spare/emergency wheel (compact wheel) standard equipment

The E83 has a special bracket for a compact wheel which is located in the vehicle floor under the luggage compartment and is operated from the vehicle interior.

The compact wheel is a 4Bx17 IS18 steel wheel with T135/90 R17 104 M tyres.

The compact wheel bracket has a special service opening to make it possible to check the tyre pressure without having to lower the bracket itself.



KT-12360

Fig. 10: Service opening (1) in the compact wheel bracket

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Tyre defect indicator (RPA)

The function of the RPA is integrated in the DSC control unit. The system uses the rotation speed of the diagonally opposite wheel to compare the dynamic circumferences of the four wheels.



The RPA system does not monitor the uniform diffusion loss over all 4 tyres. If the pressure loss is the same in all four tyres, the wheel speeds change to the same extent and the pressure loss cannot be detected. The customers must therefore continue to monitor inflation pressures themselves on a regular basis. The system must be reinitialized if tyre inflation pressures are modified or if the tyres/wheels are replaced.

Initializing the RPA:

1. Start the engine but do not pull away.
2. Press and hold the RPA button in the centre console until the indicator light in the instrument cluster lights up yellow for several seconds.
3. Pull away.

After a certain distance, the system stores the new wheel speeds as reference values and is then able to display a detected deviation as described.

The RPA has an indicator light in the instrument cluster that may light up yellow or red.

Indicator light	Effect
<div style="text-align: center;">  </div> <p>Fig. 11: Flat tyre</p>	<p>Indicator light lights up red: indicates a loss of pressure of more than 30% in one of the tyres.</p> <p>This is accompanied by a gong sound.</p>
<div style="text-align: center;">  </div> <p>Fig. 12: Run Flat Indicator failure</p>	<p>Indicator light lights up yellow: possible faults in the system.</p> <p>Have the system checked by your BMW Service as soon as possible.</p>

KT-9982

KT-10014

E83 Chassis and Suspension