

Technical training.
Product information.

G30 Chassis and Suspension



BMW Service

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General information

Symbols used

The following symbol is used in this document to facilitate better comprehension or to draw attention to very important information:



Contains important safety information and information that needs to be observed strictly in order to guarantee the smooth operation of the system.

Information status and national-market versions

BMW Group vehicles meet the requirements of the highest safety and quality standards. Changes in requirements for environmental protection, customer benefits and design render necessary continuous development of systems and components. Consequently, there may be discrepancies between the contents of this document and the vehicles available in the training course.

This document basically relates to the European version of left hand drive vehicles. Some operating elements or components are arranged differently in right-hand drive vehicles than shown in the graphics in this document. Further differences may arise as the result of the equipment specification in specific markets or countries.

Additional sources of information

Further information on the individual topics can be found in the following:

- Owner's Handbook
- Integrated Service Technical Application.

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The information contained in this document forms an integral part of the BMW Group Technical Qualification and is intended for the trainer and participants in the seminar. Refer to the latest relevant information systems of the BMW Group for any changes/additions to the technical data.

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G30 Chassis and Suspension

1. Introduction

The development code for the new 7th generation BMW 5 Series is G30. The G30 will be available starting in early 2017.

1.1. History



Historical overview of the BMW 5 Series

Index	Development code
1	E12 (1972–1981)
2	E28 (1981–1987)
3	E34 (1987–1995)
4	E39 (1995–2003)
5	E60 (2003–2010)
6	F10 (2010–2016)
7	G30 (production starts in late 2016 as a 2017 MY vehicle)

1.2. Overview of system descriptions

Many of the systems used are already known from the current BMW 7 Series G12. The “Comparison of G12 with G30” chapter lists the common elements and the differences. The explanations of the systems already familiar from the G12 are kept brief. Comprehensive system descriptions can be found in the G12 Technical Reference Manual for “ST1501 G12 Complete Vehicle”.

Topic	“ST1501 G12 Complete Vehicle”
Service brakes	G12 Chassis and Suspension
Parking brake	G12 Chassis and Suspension
Tire Pressure Control	G12 Chassis and Suspension
Dynamic Stability Control (DSC)	G12 Chassis and Suspension
Steering	G12 Chassis and Suspension
Electronic Damper Control (EDC)	G12 Chassis and Suspension
Conventional anti-roll bar	G12 Chassis and Suspension
Electric Active Roll Stabilization (EARS)	G12 Chassis and Suspension

G30 Chassis and Suspension

1. Introduction

1.3. Comparison of G12 chassis and suspension with G30

Some of the systems used in the G30 have already been introduced in the G12. The following table provides an overview of the differences and common features between the two vehicles.

System	G12	G30
Front axle	Double-wishbone front axle	Double-wishbone front axle
Front suspension	Air spring	Steel springs
Front damping	Electronic Damper Control (EDC)	Conventional shock absorber or Electronic Damper Control (EDC)
Anti-roll bar, front	Conventional anti-roll bar or electrical active stabilizer (EARSV)	Conventional anti-roll bar or electrical active stabilizer (EARSV)
Rear axle	Five-link rear suspension	Five-link rear suspension
Rear suspension	Air spring	Steel springs
Rear damping	Electronic Damper Control (EDC)	Conventional shock absorber or Electronic Damper Control (EDC)
Rear anti-roll bar	Conventional anti-roll bar or electrical active stabilizer (EARSH)	Conventional anti-roll bar or electrical active stabilizer (EARSH)
Centering mounting for rear axle support	Yes Special tools required	No
Front brake	Partially bonded brake pads	Partially bonded brake pads
Rear brakes	Combined brake caliper (electric parking brake)	Combined brake caliper (electric parking brake)
Electric parking brake control unit	Integrated into the DSC control unit	Integrated into the DSC control unit
Brake pad wear sensor	Single stage	Single stage
Wheel hub	66.5 mm	66.5 mm
Hole pattern	5 x 112	5 x 112
Tire pressure control	Tire pressure control (Schrader)	Tire pressure control (Schrader)
Tire pressure label	Label	Label and electronic
Front steering	Electronic Power Steering (EPS) or Integral Active Steering (with variable rack geometry)	Electronic Power Steering (EPS) or Integral Active Steering (with variable rack geometry)
Rear steering *	Rear axle slip angle control (HSR)	Rear axle slip angle control (HSR)

* Only available in conjunction with the Integral Active Steering optional equipment.

G30 Chassis and Suspension

1. Introduction

1.4. Comparison of F10 chassis and suspension with G30

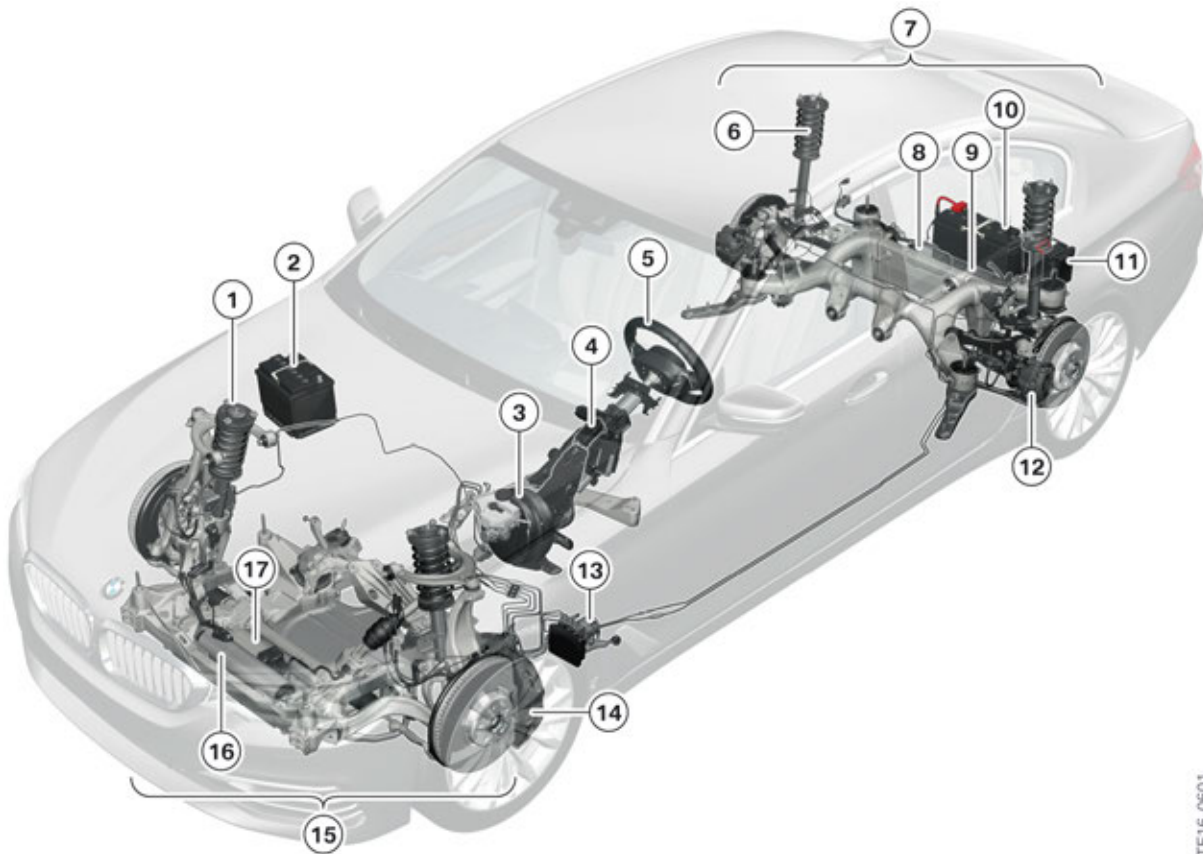
System	F10	G30
Front axle	Double-wishbone front axle	Double-wishbone front axle
Front suspension	Steel springs	Steel springs
Front damping	Conventional shock absorber or Electronic Damper Control (EDC)	Conventional shock absorber or Electronic Damper Control (EDC)
Anti-roll bar, front	Conventional anti-roll bar or hydraulic active stabilizer (ARS)	Conventional anti-roll bar or electrical active stabilizer (EARSV)
Rear axle	Integral V rear axle	Five-link rear suspension
Rear suspension	Steel springs	Steel springs
Rear damping	Conventional shock absorber or Electronic Damper Control (EDC)	Conventional shock absorber or Electronic Damper Control (EDC)
Rear anti-roll bar	Conventional anti-roll bar or hydraulic active stabilizer (ARS)	Conventional anti-roll bar or electrical active stabilizer (EARSV)
Centering mounting for rear axle support	Yes	Yes
Front brake	Greased pad backing plate	Partially bonded brake pads
Rear brakes	Combined brake caliper (electric parking brake)	Combined brake caliper (electric parking brake)
Electric parking brake control unit	Separate (EMF)	Integrated into the DSC control unit
Brake pad wear sensor	single stage	single stage
Wheel hub	72.5 mm	66.5 mm
Hole pattern	5 x 120	5 x 112
Tire pressure control	TPMS Run Flat Indicator (indirect)	RDCi Tire pressure control (direct)
Tire pressure label	Label	Label and electronic
Steering	Electrical and hydraulic or Integral Active Steering (with variable ratio rack)	Electronic Power Steering EPS or Integral Active Steering (with variable rack geometry)
Rear steering *	Rear axle slip angle control (HSR)	Rear axle slip angle control (HSR)

* Only available in conjunction with the Integral Active Steering optional equipment.

G30 Chassis and Suspension

1. Introduction

1.5. Overview of chassis and suspension



Overview of chassis and suspension in the G30

Index	Explanation
1	Front axle spring strut
2	Auxiliary battery in the engine compartment (optional equipment)
3	Brake servo
4	Steering column
5	Steering wheel
6	Rear axle spring strut
7	Five-link rear suspension
8	Rear axle slip angle control (HSR) (optional equipment)
9	Electric active roll stabilization rear (EARSH) (optional equipment)
10	Battery
11	Auxiliary battery for 24 V steering
12	Disc brake with electric parking brake on the rear axle
13	Dynamic Stability Control (DSC)

G30 Chassis and Suspension

1. Introduction

Index	Explanation
14	Disc brake for front axle
15	Double-wishbone front axle
16	Electric active roll stabilization front (EARSV) (optional equipment)
17	Electromechanical Power Steering (EPS)

The basic chassis on the G30 differs from the F10 by its enhanced dynamics with no loss of comfort. The critical contributions to enhancing comfort were achieved by optimization of the vehicle axles.

The G30 has 1, 2 or 3 batteries depending on the equipment specification.

G30	530i	
Technical data	Rear-wheel drive	xDrive
Wheelbase	2975 mm	2975 mm
Turning circle	12.05 m	12.22 m
Ground clearance	144 mm	139 mm
Vehicle US curb weight in kg / lbs	1699 kg / 3746 lbs	1759 kg / 3878 lbs

1.5.1. Highlights

The following optional equipment is available in addition to the basic chassis and suspension:

- M sports suspension (OE 704)
- M sport package (OE 337)
- Dynamic damper control (EDC) (OE 223)
- Integral Active Steering (OE 2VH)
- Adaptive Drive (OE 2VA) only available in the 540i and 540i xDrive
- Adaptive M Suspension (OE 2VF) only available in the M550i xDrive

All items of optional equipment are available for all drive variants (including xDrive).

G30 Chassis and Suspension

1. Introduction

The following table shows the different equipment specifications in the area of the chassis and suspension.

Systems	Basic chassis and suspension	Integral Active Steering	Dynamic damper control (EDC)	Adaptive Drive
Electronic Power Steering (EPS)	●			
EPS with variable rack geometry		●		
Rear axle slip angle control (HSR)		●		
Dynamic damper control (EDC)			●	●
Conventional anti-roll bar on front axle	●			
Conventional anti-roll bar on rear axle	●			
Electric active roll stabilization front (EARSV)				●
Electric active roll stabilization rear (EARSH)				●
Vertical acceleration sensors				●
Auxiliary battery in the engine compartment (12 V)				●

BMW M550i vehicles

The “Adaptive M Suspension” optional equipment can only be ordered with the BMW M550i drive variant.

Model	Adaptive Drive	Adaptive M Suspension
530i		
540i	●	
M550i		●

G30 Chassis and Suspension

1. Introduction

The table below shows the differences between the “Adaptive Drive” and “Adaptive M Suspension” optional equipment.

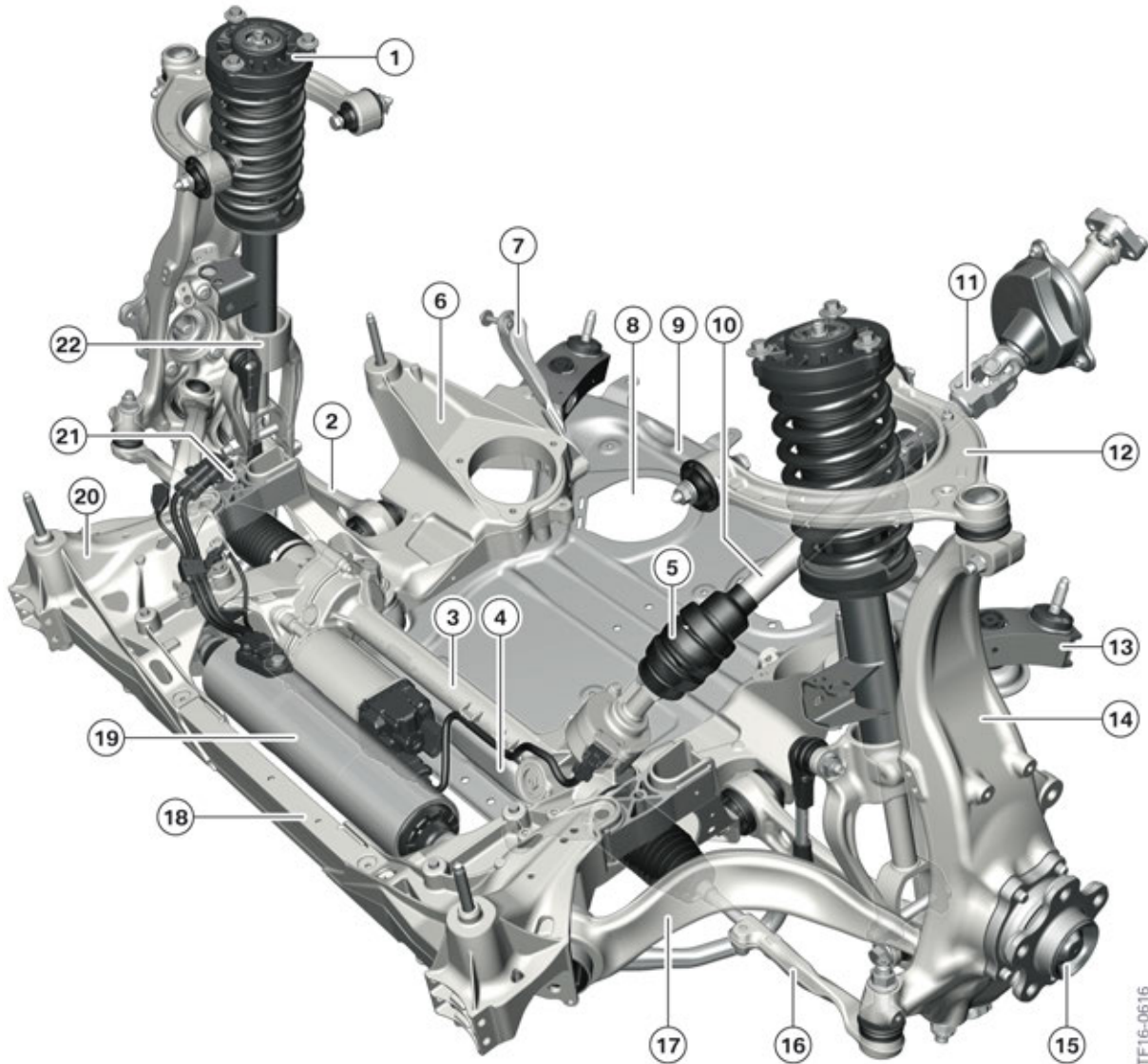
Systems	Adaptive Drive	Adaptive M Suspension
EPS with variable rack geometry		●
Rear axle slip angle control (HSR)		●
Dynamic damper control (EDC)	●	●
Electric active roll stabilization front (EARSV)	●	●
Electric active roll stabilization rear (EARSH)	●	●
Vertical acceleration sensors	●	●
Auxiliary battery in the engine compartment (12 V)	●	●
10 mm lowering		●

By contrast with all the other chassis variants, the Electronic Damper Control (EDC) is combined with a 10 mm lowering in the "M Dynamic Professional" optional equipment.

G30 Chassis and Suspension

2. Axles

2.1. Front axle



Double-wishbone front axle in the G30

Index	Explanation
1	Support bearing
2	Wishbone, lower
3	Steering box
4	Cross member
5	Universal joint of steering shaft to steering gear
6	Cast side section
7	Strut

G30 Chassis and Suspension

2. Axles

Index	Explanation
8	Service opening
9	Rear stiffening label
10	Steering shaft
11	Universal joint of steering shaft to steering column
12	Triangle wishbone, top
13	Side member
14	Swivel bearing
15	Wheel bearing unit
16	Track rod end
17	Trailing link
18	Transverse tube
19	Electric active roll stabilization at the front (EARSV) (optional equipment)
20	Cast corner
21	Cast corner connection
22	Spring strut holder

The double wishbone front axle offers the following advantages:

- Lower wishbone level broken down into tension strut and wishbone.
- Outstanding driving dynamics, high agility thanks to high achievable lateral acceleration.
- Outstanding roll stabilization when cornering without any reduction in ride comfort.
- High comfort due to minimum influence of disturbance variables.
- High comfort thanks to shock absorbers that are practically free of lateral forces.
- Smooth, good spring response of the axle and good directional stability.

Since the wheel guide is taken care of by the two wishbone planes, practically no more lateral forces act on the shock absorber. Because of the lower friction that results from this, the shock absorber can react sensitively to irregularities in the road surface. The piston rod can be made thinner because of the freedom from lateral forces, which means that the friction in the shock absorber is reduced resulting in a more similar displacement volume in the traction and compression directions for the shock absorber. This is important for the use of an electronically adjustable shock absorber system.

The front axle is almost entirely made of aluminium, which helps with axle-load distribution and the vehicle weight.

The steering gear can be easily removed for repair if needed. Time-consuming dismantling of the front axle is unnecessary.

2.1.1. Notes for Service

The following table shows when wheel alignment is necessary on the front axle when a component is replaced.

G30 Chassis and Suspension

2. Axles

Replacement of a component on the front axle	Wheel alignment required
Front axle support	YES
Steering rack	YES
Wishbone, lower	YES
Rubber mount for wishbone, lower	YES
Trailing link	NO
Rubber mount for trailing link	NO
Triangle wishbone, top	NO
Rubber mount for top wishbone	NO
Track rod	YES
Swivel bearing	YES
Wheel bearing	NO
Spring strut	NO
Support bearing	NO

The following table shows when wheel alignment is necessary on the front axle when a component is removed.

Undoing the screw connection at the front axle	Wheel alignment required
Front axle support to body	NO
Steering box to front axle support	YES
Bottom wishbone to front axle support	YES
Bottom wishbone to swivel bearing	NO
Trailing link to front axle support	NO
Trailing link to swivel bearing	NO
Top wishbone to body	NO
Top wishbone to swivel bearing	NO
Track rod to steering box	NO
Track rod end to track rod	YES
Track rod end to swivel bearing	NO
Spring strut to bottom wishbone	NO
Support bearing to body	NO
Bottom steering shaft to steering box	NO
Upper steering shaft to steering column	NO

G30 Chassis and Suspension

2. Axles

Index	Explanation
1	Support bearing
2	Shock absorber
3	Rubber mount of the rear axle support on the body
4	Rubber mount of the rear axle support on the rear axle differential
5	Air deflector
6	Camber control arm
7	Wishbone
8	Camber link
9	Wheel bearing unit
10	Wheel carrier
11	Trailing arm
12	Control arm
13	Compression strut
14	Axle support

The five-link rear axle is characterized by precise wheel guidance with outstanding driving dynamics. This is particularly noticeable with respect to the following characteristics:

- Directional stability, target precision
- Load transfer characteristics
- Self-steering response
- Lane changing stability
- Transient handling characteristics (cornering/straight-ahead driving)

It has been possible to substantially reduce the conflict between the goals of driving dynamics and comfort by implementing the following measures:

- Double-elastic mounting.
Rubber mounts between rear axle differential, rear axle support and body.
- Preload-reduced rear axle mounts.
Lower torsion stress on the rear axle bearings thanks to spring struts positioned wide to the outside.
- Large support area for the rear axle support.
- Low unsprung mass thanks to innovative sheet steel wishbone technology in conjunction with aluminium forged wishbones and aluminium-wheel carriers.

The large support for the rear axle support and the preload-reduced axle construction are of great significance for the outstanding driving dynamics on the one hand and for acoustic decoupling on the other hand. This makes it possible to install powerful, high-torque engines and to reduce the introduction of road noise into the vehicle.

G30 Chassis and Suspension

2. Axles

It has been possible to produce the various wishbones, with the exception of the upper wishbone, in a sheet steel design. Sheet steel wishbones offer similar weight advantages to aluminium forged wishbones, but are cheaper to produce. They are always used when a simple mounting geometry is used (straight wishbones). The top wishbone has been manufactured as an aluminium forged wishbone because of its more complex design.



Replacement of the rubber mounts on sheet steel wishbones as a service operation is not permitted. The entire wishbone must be replaced in the event of wear to a rubber mount.

2.2.1. Notes for Service

The following table shows when wheel alignment is necessary on the rear axle when a component is replaced.

Replacement of a component on the rear axle	Wheel alignment required
Rear axle support	YES
Rubber mount for rear axle support	YES
Camber control arm	YES
Camber link	YES
Trailing arm	YES
Wishbone	YES
Ball joint in the wheel carrier	YES
Control arm	YES
Wheel carrier	YES
Wheel bearing	NO
Spring strut	NO
Support bearing	NO

The following table shows when wheel alignment is necessary on the rear axle when a component is undone.

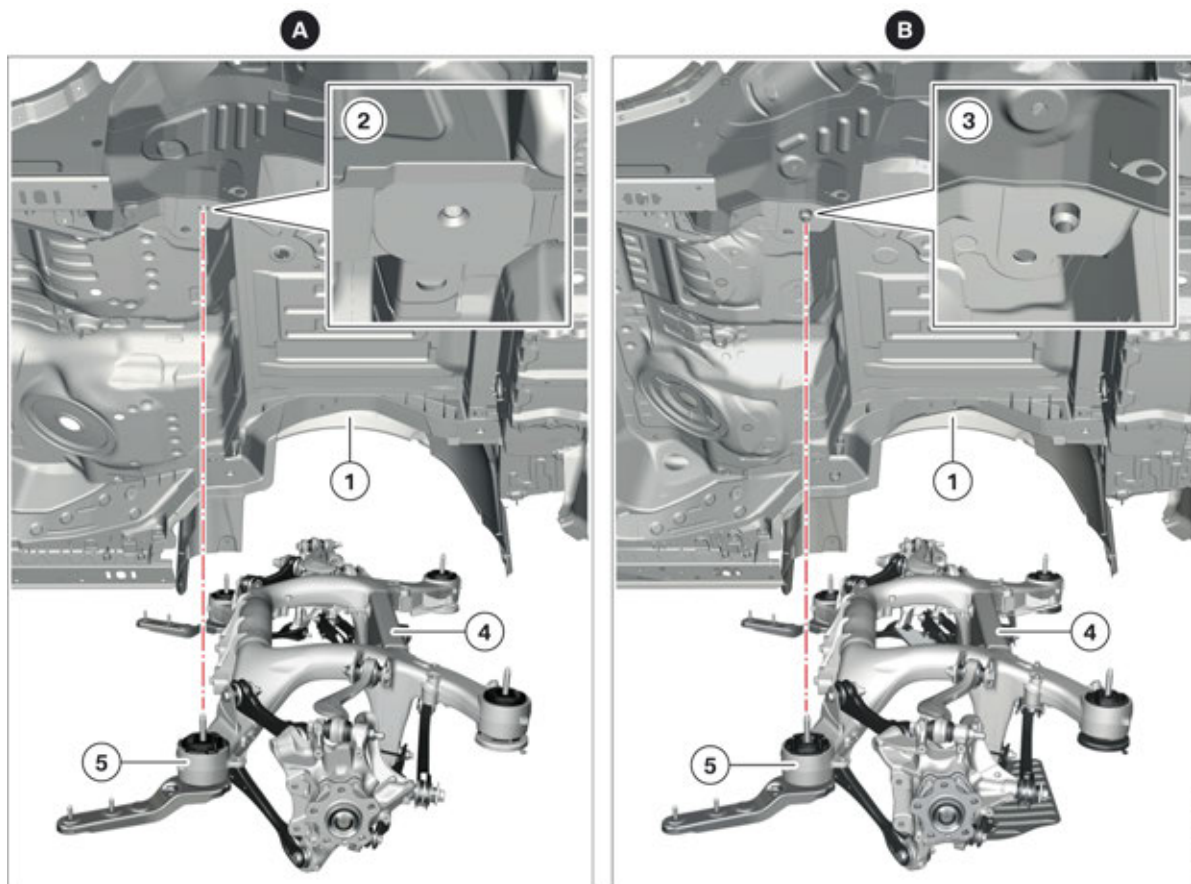
Undoing a component on the rear axle	Wheel alignment required
Rear axle support to body	YES
Front compression strut to body	NO
Camber link to rear axle support	YES
Camber control arm to wheel carrier	YES
Camber link to rear axle support	YES
Camber link to wheel carrier	NO
Trailing arm to rear axle support	YES

G30 Chassis and Suspension

2. Axles

Undoing a component on the rear axle	Wheel alignment required
Trailing arm to wheel carrier	YES
Control arm to rear suspension subframe	YES
Control arm to hub carrier	NO
Wishbone to rear axle support	NO
Wishbone to wheel carrier	NO
Spring strut to wheel carrier	NO
Support bearing to body	NO

Rear axle positioning



Comparison of rear axle on the G12 with the G30

G30 Chassis and Suspension

2. Axles

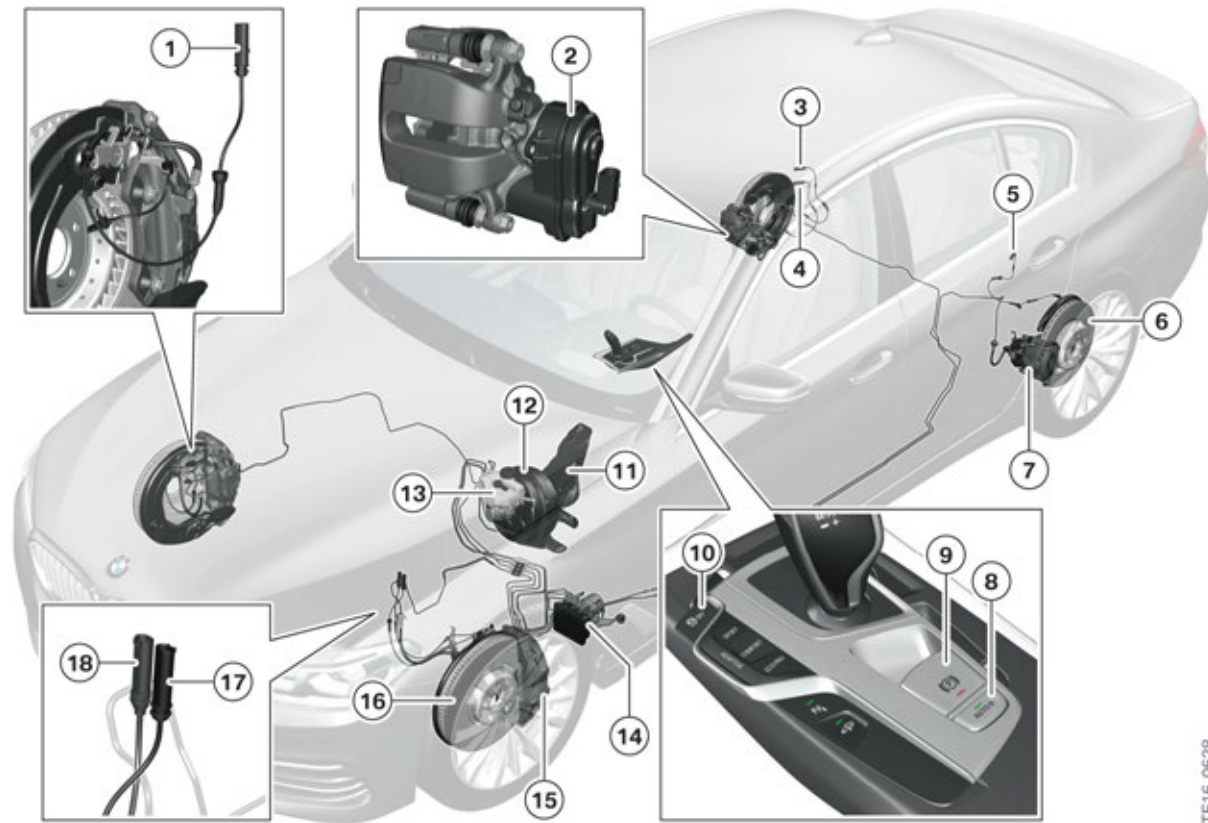
Index	Explanation
A	Rear axle of the G12
B	Rear axle of the G30
1	Body
2	Mounting for rear axle support
3	Centering mounting for rear axle support
4	Rear axle support
5	Rubber mount of the rear axle support

On the G12, no centering mounting dowels are fitted on the body for alignment of the rear axle. A new special tool was used to align the thrust angle when installing the rear axle support.

The centering mounting dowels are used on the G30. No special tool is required for installing the rear axle support.

G30 Chassis and Suspension

3. Brakes



TF16-0628

Overview of the brake system on the G30

Index	Explanation
1	Wheel speed sensor connector, front right
2	Electric parking brake actuator
3	Brake pad wear sensor connector, rear right (single-stage)
4	Wheel speed sensor connector, rear right
5	Wheel speed sensor connector, rear left
6	Brake disc, rear
7	Brake caliper, rear
8	Automatic-hold button
9	Button for electric parking brake
10	DSC button
11	Pedal mechanism
12	Brake servo
13	Expansion tank
14	DSC unit

G30 Chassis and Suspension

3. Brakes

Index	Explanation
15	Brake caliper, front left
16	Brake disc, front left
17	Brake pad wear sensor connector, front left
18	Wheel speed sensor connector, front left

G30 Chassis and Suspension

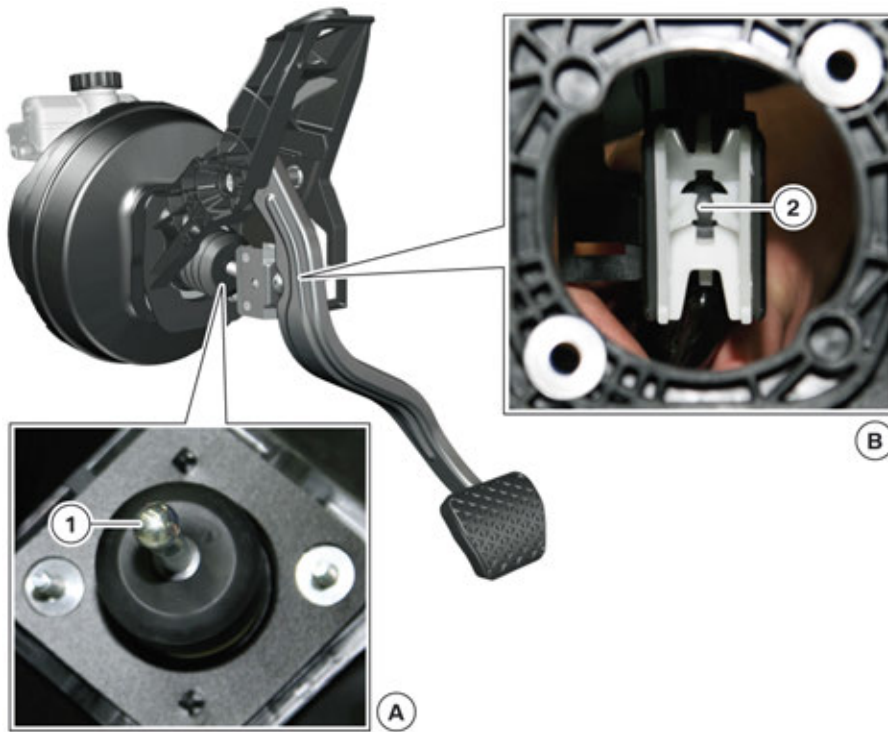
3. Brakes

3.1. Service brakes

The electric parking brake on the F10 was actuated by a separate EMF control unit. This function has been integrated into the DSC control unit on the G30.

3.1.1. Pedal mechanism mounting

The pedal mechanism mounting using ball head and plastic clip was taken from the G12 and is identical on the G30.



Mounting of the pedal mechanism on the brake servo linkage in the G30

Index	Explanation
A	Brake servo linkage
B	Pedal mechanism
1	Ball head
2	Plastic clamp

G30 Chassis and Suspension

3. Brakes

A special tool is needed to undo the connection (part number: 83 30 2 409 646).



TF15-0311

Special tool for removing the pedal mechanism




G30 Chassis and Suspension

3. Brakes

3.1.2. Front brake

Overview of the brake calipers

Different brake calipers are used depending on the engine installed and equipment specification. The following table provides an overview of the various brake calipers for the front axle.

Supplier	Brake disc size [mm]	Caliper	Caliper design/ brake pad
Continental	348 x 30		Fixed caliper 1-part 4-piston Bonded pad backing plate
Brembo	348 x 36		Fixed caliper 2-part 4-piston Bonded pad backing plate
Brembo	374 x 36		Fixed caliper 2-part 4-piston Bonded pad backing plate

All front brake calipers are made from aluminium.

G30 Chassis and Suspension

3. Brakes

Bonded brake pads

Bonded brake pads are used on the front brakes of the G30. The bonded brake pads are substantially less intrusive with regard to interference noise.



Bonded brake pad on the front axle of the G30

Index	Explanation
1	Brake pad paste
2	Adhesive film
3	Pad backing plate

The bonding surface of the brake pad must not be greased with the brake pad paste. The guides on the side must still be greased to ensure ease of movement of the brake pad in the brake caliper slot.

Vibrations which may arise from movement between the pad backing plate and brake piston are prevented thanks to the rigid connection of the brake pad to the brake piston.



The bonding surface must never be greased with the brake pad paste.

The surface of the brake piston connected to the bonded pad backing plate must be cleaned thoroughly before new bonded brake pads are fitted.

The brake pedal must be depressed for about 1 minute after new bonded brake pads have been fitted. This ensures that a reliable bonded connection is achieved between the brake piston and pad backing plate.

The brake pads must be replaced if the bonded connection does not hold. Reusing the original pads is not permitted.



The bonded connection between the brake piston and pad backing plate must not be separated with a hammer or screwdriver, but only with a plastic wedge, so as not to damage the brake caliper.

G30 Chassis and Suspension



3. Brakes

Refer to the latest valid repair instructions for the exact procedure for working on the brake system.

3.1.3. Rear brakes

Overview of the brake calipers

Two different brake calipers are used depending on the engine installed and equipment specification. Both variants have an actuator for applying the electric parking brake. The following table provides an overview of the various brake calipers for the rear axle.

Supplier	Brake disc size [mm]	Figure	Features/brake pad
TRW	330 x 20	 TF16-1192	Aluminium Electric parking brake actuator Greased pad backing plate
TRW	345 x 24	 TF16-1197	Grey cast iron Electric parking brake actuator Greased pad backing plate

Brake pads

Bonded brake pads are **not** used on the rear axle.

G30 Chassis and Suspension

3. Brakes

3.1.4. M Sport brake



Sport brake optional equipment in the G30

An M Sport brake is available on the G30 as optional equipment. The M Sport brake is included in the M Sport Package (OE ZMP) for the vehicles listed below.

In addition, the M Sport brake can be ordered as a separate optional equipment (OE 2NH) for 530i and the 540i including xDrive versions.

The M Sport brake is included as standard equipment of BMW M550i xDrive vehicle.




G30 Chassis and Suspension

3. Brakes

Overview of the variants

The following table provides an overview of the various optional equipment levels and engine versions with which the sport brake is offered.

Engine	M Sport brake in the M sport package (OE ZMP)	M Sport brake as separate optional equipment (OE 2NH)
530i / 530i xDrive	●	●
540i / 540i xDrive	●	●
M550i xDrive	Standard	Standard

Vehicle	Brake disc size [mm]	Brake pad	Figure	Installation location
530i / 530i xDrive	348 x 36	Bonded pad backing plate		Version 1 front
540i / 540i xDrive & M550i xDrive	374 x 36	Bonded pad backing plate		Version 2 front
530i / 530i xDrive 540i / 540i xDrive & M550i xDrive	345 x 24	Greased pad backing plate		rear

3.2. Parking brake

The electric parking brake is implemented by means of a combined brake caliper on the rear axle, as on the G12. The electric parking brake functions are integrated into the Dynamic Stability Control DSC.

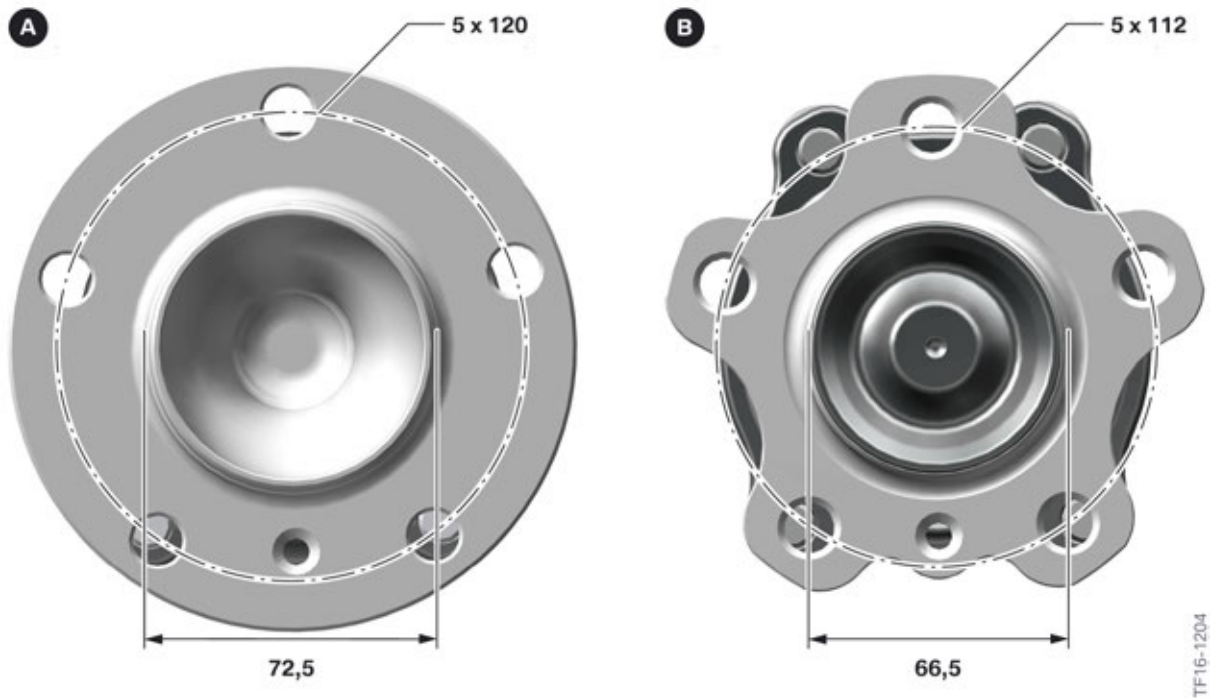
The electric parking brake has automatic roller detection for measuring the brake forces on a brake test stand.

G30 Chassis and Suspension

4. Wheels/Tires

4.1. Wheel hub

The hub and hole circle diameter on current vehicles produced by the BMW Group was modified in 03/2014. The hub diameter was reduced from 72.5 mm to 66.5 mm. The hole pattern was modified from 5 x 120 (F01/F10) to 5 x 112 (G12/G30).



Comparison of wheel hub on F10 with that on G30

Index	Explanation
A	F10 hub
B	G30 hub

G30 Chassis and Suspension

4. Wheels/Tires

4.2. Tire pressure control

The G30 is fitted with the RDCi system that has been used in other BMW vehicles with the wheel electronics sensors manufactured by Schrader. The control unit for the system is incorporated into the DSC module.

The following conditions are required to teach-in the new wheel electronics.

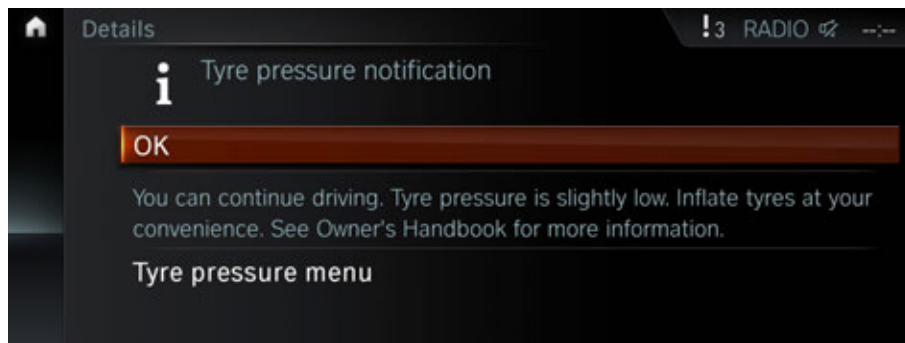
Vehicle condition	5 minutes	17 minutes
Parking (asleep)	●	
Residing (awake)	●	
PAD (testing-analysis-diagnosis)	●	
Steady driving		●

4.2.1. Warnings

The warning system for the tire pressure control has been continually developed and modified to meet customer needs during the various development stages. The warning system provides information promptly in the event of pressure deviations and thus makes an important contribution to avoiding vehicle breakdowns as a result of insufficient tire pressures.

At present it is possible to distinguish between three warning levels.

Warning level 1



Warning level 1 Check Control message in the G30

Index	Explanation
1	Tire pressure information
2	Tire pressure slightly below the setpoint value, continued driving permissible

Warning level 1 is a message to the customer that the tire pressure has dropped as a result of natural diffusion (tire pressure loss). There are no technical problems and it is possible to drive on without concern. For this reason, the KOMBI instrument cluster is showing an information symbol only.