32 00 ... Additional work for camber correction

Note:
The camber adjustment is performed only with the replacement of the swivel bearing. There are 3 different swivel bearings for this!

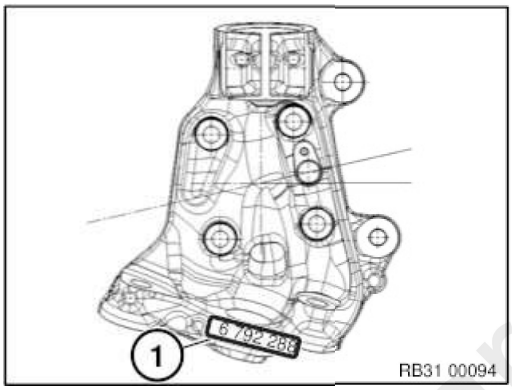
Important!

Changes in axle geometry caused by accidents must under no circumstances be rectified by camber adjustment!

Note:
The swivel bearing may only be replaced if the camber is outside the specified tolerance after toe adjustment.

Necessary preliminary tasks:

- Adjust toe-in.
- Check camber values; if necessary, replace swivel bearing with overâ€ or under-dimension variant.



Note:
Standard swivel bearings can only be identified from the BMW part number (1) (cast at the bottom).

See also the BMW spare parts catalogue!



Note:
Camber correction swivel bearings can only be identified from the BMW part number (1) (engraved at the top of the damper mount).

See also the BMW spare parts catalogue!

These camber correction swivel bearings are used to correct the camber values by 30 min. To be used only if the tolerance values are exceeded or undershot!

Version	BMW part number
Standard	6 792 287/ 288
+ 30'	6 854 197/ 198
- 30'	6 854 199/ 200

carDiagn.com

After Installation note:

- Check directional stability of car; if necessary, repeat toe-in adjustment

cardiagn.com

32 00 620 Adjusting rear axle

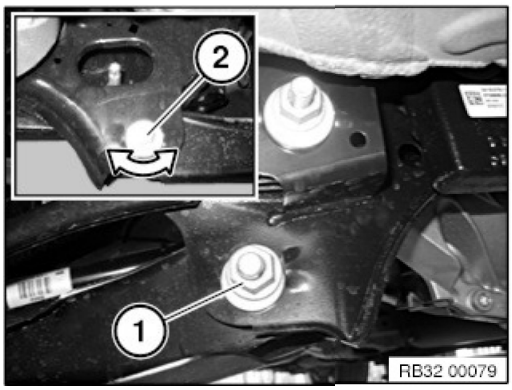
Note:
Vehicles with ACC only:

- After an adjustment of the rear axle, which alters the driving axis, check setting of ACC sensor and adjust if necessary

Necessary preliminary work:

- Remove left and right covers on the camber control arm

Note:
A camber change always means a toe change as well. The camber must therefore be adjusted first.



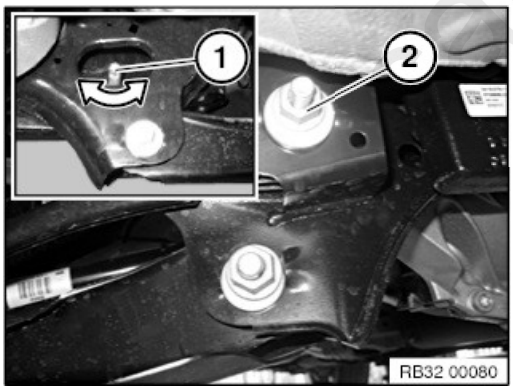
Adjusting camber:

Renew nut (1) and eccentric bolt (2) and tighten to 5 Nm.

Turn eccentric bolt (2) to adjust camber to setpoint value.

Tighten nut (1).

Tightening torque 33 32 9AZ.



Adjusting toe:

Replace nut (2) and apply 5 Nm.

Turn eccentric bolt (1) to adjust toe to setpoint value.

Tighten nut (2).

Tightening torque 33 32 7AZ.

ardiagn.com

32 00 601 Adjusting toe-in on front axle

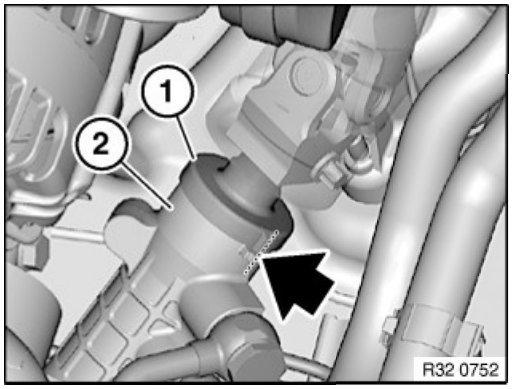
Attention!

Changes in axle geometry caused by accidents must under no circumstances be rectified by camber adjustment!

Note:
Camber and toe-in influence each other. Adjust the toe-in first in order to simplify the adjustment procedure.

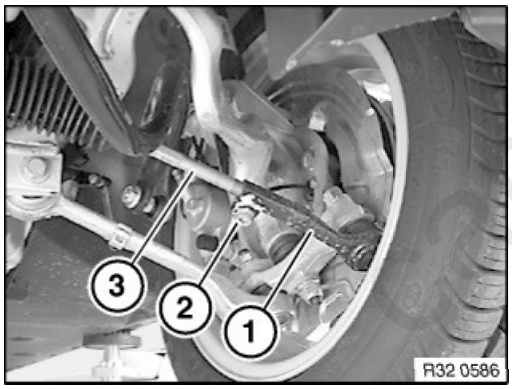
The camber adjustment is performed only with the replacement of the swivel bearing. There are various swivel bearings (+/ -30') for this purpose.

-> See also Additional work for camber correction and BMW Parts Catalogue!



Firstly align steering by means of markings on cap (1) and steering gear (2).

Then bring steering wheel into straight-ahead position and secure with steering wheel arrester.



Adjust toe-in:

Clean thread on track rod.

Loosen screw (2).

Turn track rod (3) to adjust toe-in to setpoint value, if necessary counterhold track rod end (1).

Tighten screw (2).

Tightening torque 32 21 2AZ.

If necessary, correct installation position of gaiter.

After Installation note:

- Check directional stability of vehicle; if necessary, repeat toe-in adjustment
- EPS steering: After adjustment work on the front axle/steering, **"EPS start-up**" must be carried out.

cardiagn.com

32 00 150 Carry out Kinematics Diagnosis System wheel alignment with vehicle load up to design position

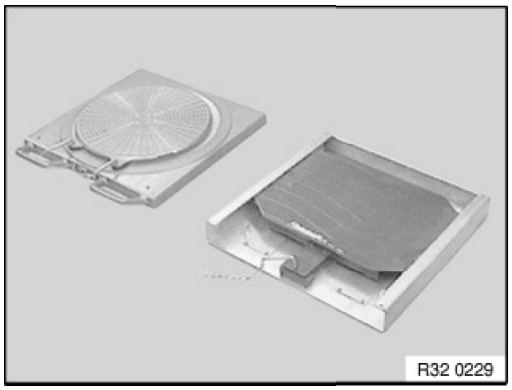
Attention!

Carry out wheel alignment with DIN load only:

- If the technical prerequisites for alignment with ride height input are not fulfilled
- If the vehicle in question is a damaged vehicle

Note:

- Read and comply with General information and definitions.
- Read and comply with General chassis definition.
- Update KDS data states
- Check compliance with test conditions, repair vehicle if necessary.



- If necessary, prepare vehicle hoist.
- Drive vehicle onto vehicle hoist.

  Note: The front and rear wheels must be positioned centrally on the rotary and sliding plates.

  Note: Rotary plates may vary from illustration depending on the manufacturer!

Note:

Vehicles with active steering:

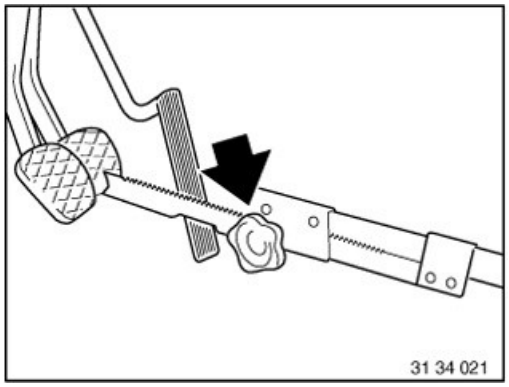
Start up active steering prior to wheel alignment!

On vehicles with rear axle slip angle control:

The service function "Moving HSR actuator to the centre position" is included in the active steering start-up.

- Attach pickup/ride height marks to vehicle (observe specifications from the various equipment manufacturers).
- Enter customer and vehicle data
- Identify chassis version and select vehicle
- Enter tyre inflation pressure and tread depth
- Move vehicle into design position

cardiag.com



- Install brake pedal tensioner

- Remove locking pins from both rotating and sliding plates.
- Perform input measurement in accordance with equipment manufacturer's instructions.
- If necessary, adjust front axle and rear axle
- Perform output measurement in accordance with equipment manufacturer's instructions.
- Save and print out test record.
- Insert locking pins into both rotary and sliding plates
- Remove chassis/wheel alignment system

cardiagn.com

00 Danger of injury if oil comes into contact with eyes and skin



Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin



Protective measures/rules of conduct:

- Wear safety goggles.
- Wear oil-resistant protective gloves.
- Observe country-specific safety regulations.



First aid measures:

- Eye contact: Immediately flush eyes with lots of water for at least 15 minutes. In the case that it is available, use an eye wash bottle. If eye irritation persists, consult a doctor.
- Skin contact: Wash off with soap and water immediately. If irritation persists, consult a doctor.

  Note: Do not use solvents/thinners.

cardiagn.com

00 Danger of poisoning if oil is ingested/absorbed through the skin



Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness



Protective measures/rules of conduct:

- Fill oil in appropriately marked containers only.
- Do not fill oil in containers meant for drinking out of. (bottles for beverages, glasses or cups)
- Observe country-specific safety regulations.



First aid measures:

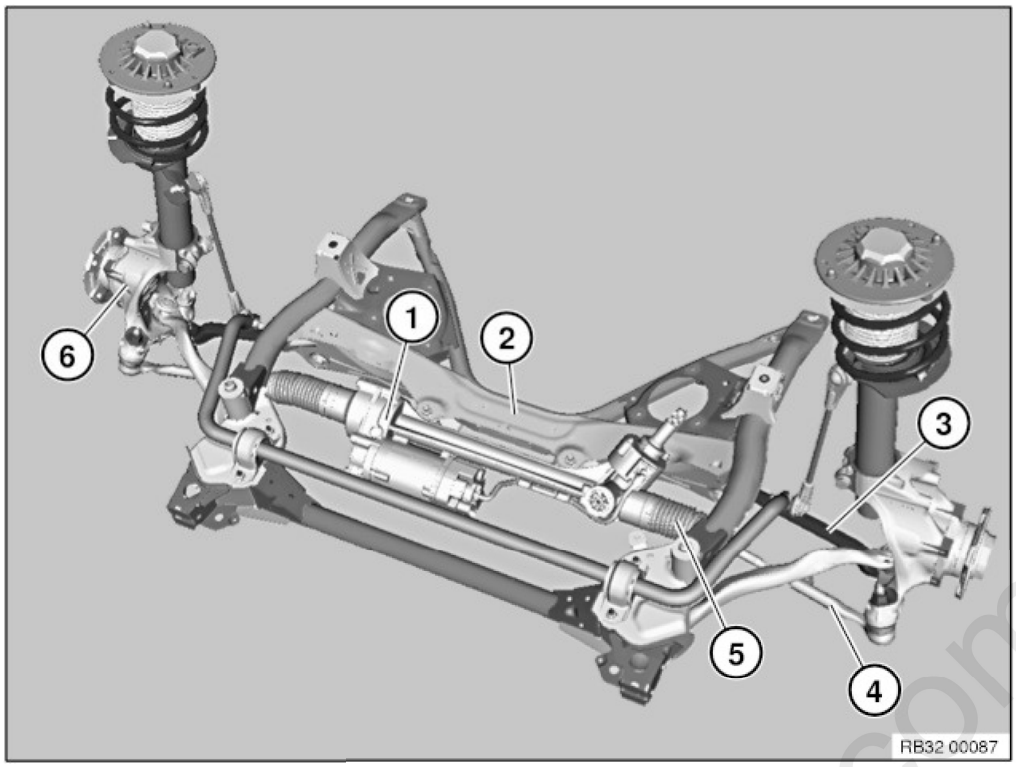
- Do not induce vomiting.

  If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

  Do not administer anything to an unconscious person via their mouth; place them in a stable position on their side. Call the emergency doctor immediately.

cardiagn.com

31 00 ... Front axle + steering: wheel/chassis alignment check must be carried out after the following work



A wheel alignment check must be carried out after the following work:

Release the following screw connections:

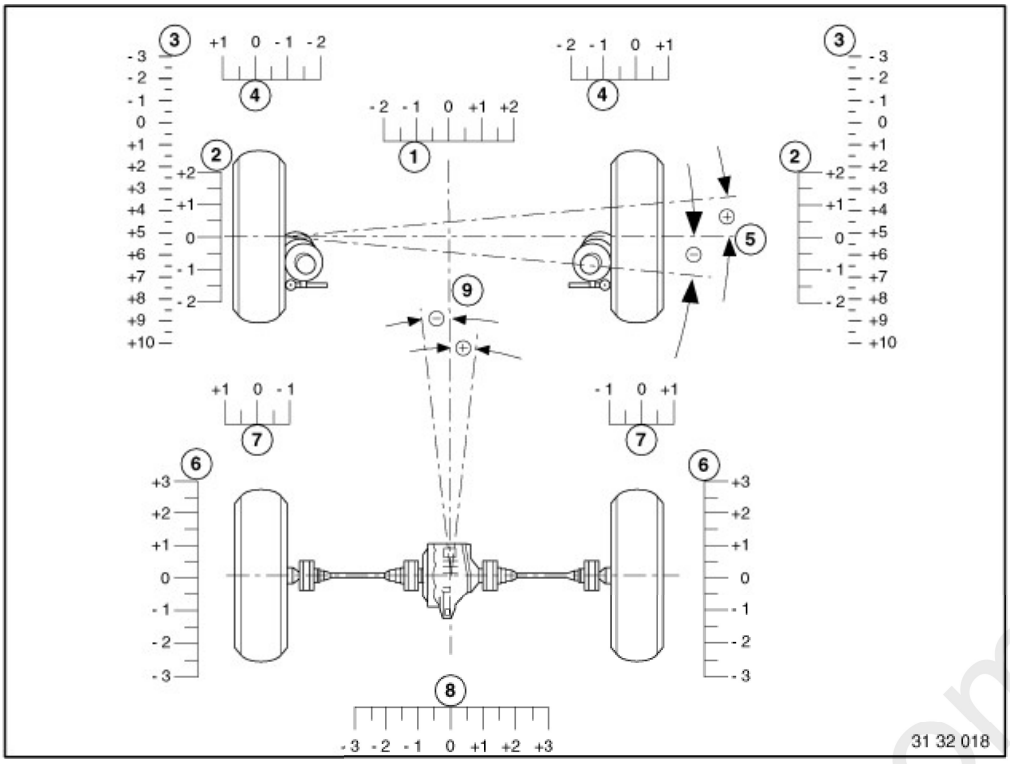
- Steering box to front axle support
- Lower wishbone to front axle support
- Track rod end to track rod

Replace the following components:

- Steering box (1)
- Front axle support (2)
- Wishbone, bottom (3)
- Track rod end (4)
- Track rod (5)
- Swivel bearing (6)

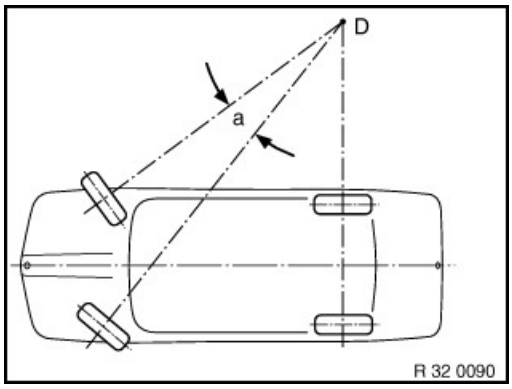
cardiagn.com

32 00 ... General chassis and suspension definitions



1. Toe
2. Camber
3. Caster (with 10° or 20° wheel lock)
4. Toe angle difference (with 20° wheel lock)
5. Wheel misalignment
6. Camber
7. Rear-wheel position
8. Toe
9. Geometrical driving axis

cardiagn.com



Toe angle difference

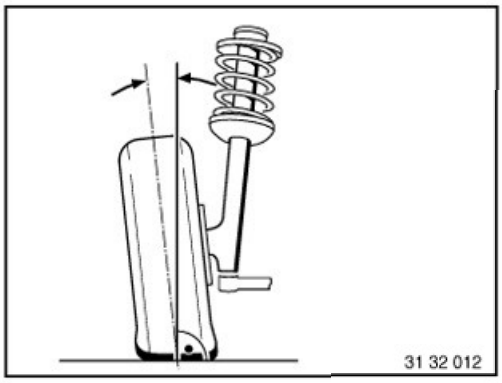
a Toe difference angle

D Centre point of operating circle

The toe angle difference is the angle adjustment of the inner cornering wheel relative to the outer cornering wheel when negotiating a curve. Steering is designed in such a way that angular position of wheels changes as steering lock progresses.

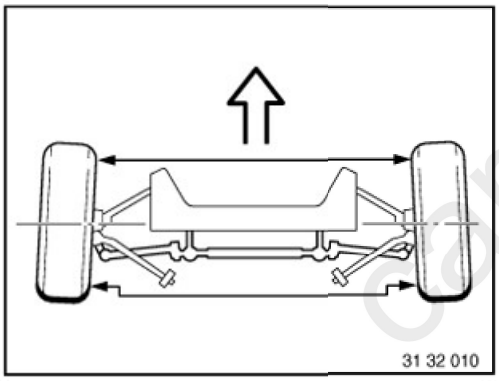
A correctly adjusted toe angle difference produces equal values for left and right lock with consideration of factory tolerances.

Toe angle difference provides information on corresponding operation of steering trapezoid for left or right steering lock from centre position.



Camber

Inclination of the wheel from the perpendicular.

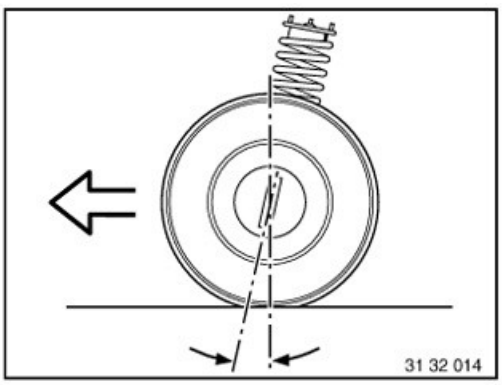


Toe

Reduction in distance of front of front wheels to rear of front wheels. The toe-in prevents the wheels from moving apart during driving and thus:

- the wheels from vibrating and grinding
- excessive tire wear
- excessive strain on the steering linkage and its links/joints
- heavy vehicle steering

Measurement is performed in ”straight-ahead mode”.

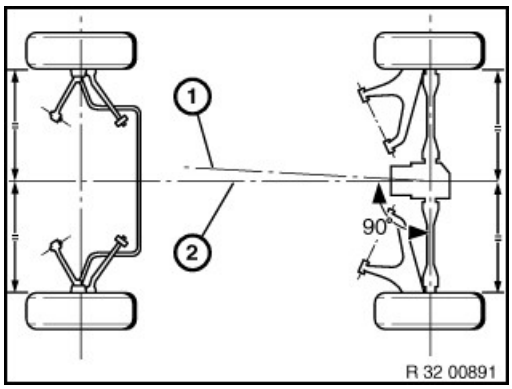


Castor

Is the inclination of the kingpin in the direction of travel viewed from the side. The line through the centre point of the spring strut support bearing and the control arm ball joint corresponds to the ”kingpin”.

Thanks to caster, wheels are pulled and not pushed. In a similar manner to king pin inclination, when driving in curves or around corners, returning forces are reproduced to help return wheels to straight-ahead position.

cardiagn.com



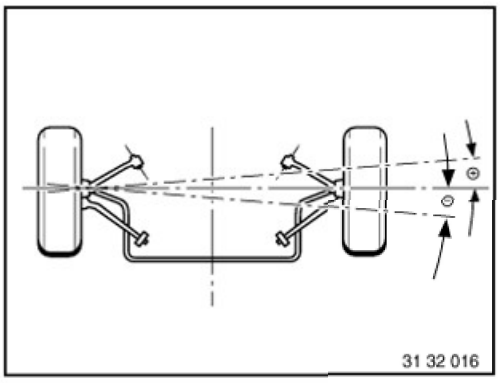
Geometrical driving axis 1

Is the angle bisector from the total rear-wheel toe.

Front-wheel measurements are taken in reference to this axis.

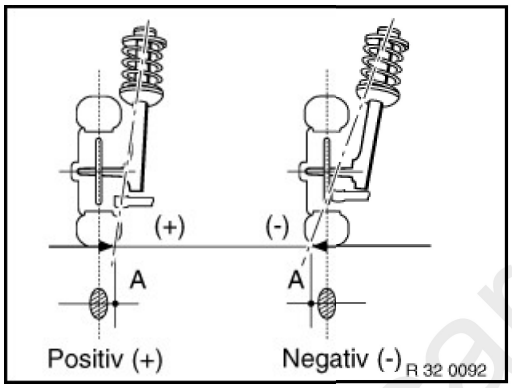
Symmetrical axis 2

Centre line running through front and rear axles.



Wheel misalignment

Angle by which one front wheel is displaced more towards front or rear than the other front wheel. The wheel offset angle is positive when the right wheel is displaced towards the front and negative when it is displaced towards the rear.



Kingpin offset/scrub radius

Is the distance from the centre of the wheel contact face to the intersection point of the kingpin extension.The line through the centre point of the spring strut support bearing and the control arm ball joint corresponds to the ”kingpin”.

The scrub radius is influenced by camber, kingpin angle and wheel offset of the wheel rim.

cardiagn.com

32 00 ... Identification of suspension without label

Note:
If the frontÂ spring strut does not have a label for suspension identification, the type of suspension can be identified from the part number in the Electronic Parts Catalogue.

cardiagn.com

32 00 ... Instructions and specifications for replacement of steering gear/steering column/steering shaft following accident damage

Steering gear facts:

In the event of accidents or driving conditions similar to accidents, shock-like loads can cause different types of damage to front axles and steering gears. When a steering box is externally undamaged, it is sometimes only possible to identify damage with great difficulty and with great effort. However, damage of this nature poses an unacceptable risk to the vehicle because this can result in failure of the steering system.

Because of the disproportionate amount of effort involved, it is generally not sensible to check thoroughly all the individual components of the steering box and as an alternative it is necessary to take into account other components which can be checked more easily.

Steering gear procedure:

The steering box must be replaced if one or more of the following points apply:

A. Visible or noticeable damage to the steering box
   - Version with electric steering box (EPS): Examine in particular the control unit with all plug connections for damage and hairline cracks.

B. Unacceptable torque increase and jamming when the steering gear is turned from lock to lock (without hydraulic/electrical assistance).

C. Fire damage

D. Damage, permanent deformation or fractures to:
   - Wheel rims in the event of a negative result from the wheel alignment check
   - Spring struts, steering stubs, swivel bearings
     If the damage found is due only to the damper pipe sliding in the swivel bearing, then it is **not necessary** to replace the steering gear under the following conditions:
     1. There is no further damage to the chassis and suspension components, body parts, wheels etc., that can be attributed to violent effects similar to that caused by an accident.
        Note: If the spring cup abuts the tyre or if the lower end of the damper touches the output shaft, this is to be taken as subsequent damage of the damper pipe's sliding and does not necessarily result in damage to the steering gear.
     2. After the repair (swivel bearing and spring strut), no noticeable noises and no noticeable breaks or stiff positions can be observed when turning of the steering wheel slow and fast in both directions from one limit position to the other.
   - Wishbones
   - Struts or trailing links or anti-roll bar with this function
   - Body-side screwing/attachment points for wheel guide/control components
   - Front axle support
   - Track rods
   - Steering box fixtures
   - Steering column

   A lopsided steering wheel, significant deviations of camber/track values and noises when cranking the steering can be additional indications for the damage/deformations listed here.

Note:

If the steering box replacement work which is required for safety reasons is refused by the customer or an insurance company for cost reasons, a memorandum to that effect must be drawn up and countersigned by the party bearing the costs of the accident repair.

For corresponding specimen of memorandum, refer to Service Information (bulletin) 320188(828) Appendix 1

Actual situation of the steering column and steering shaft:

In the event of accidents or driving conditions similar to accidents, shock-like loads can cause different types of damage to the steering shaft and steering column. In case no external damaged of the steering column and the steering shaft can be noticed, it is sometimes only possible to identify damage with great difficulty and with great effort.

Proceedure for steering column and steering shaft:

The steering column and steering shaft must be replaced if one or more of the following points apply:

- Visible or noticeable damage, deformation or breakage of the steering column or steering shaft
- Damage, permanent deformation or breakage of the track rod
- Unacceptable torque increase and jamming when the steering column is cranked from limit position to limit position (without hydraulic/electrical assistance)
- If, after all damaged axle components are exchanged, the axle measurement target data during wheel alignment cannot be reached (exceeding of the permitted axle measurement tolerances). If required, enclose the measurement protocol of the invoice/certificate.
- Positive check for activated crash system of the steering column:
- If no damage is visible on the steering column, the mechanical steering column must be checked for an activated crash system:
    1. Open steering column lock
    2. Pull steering wheel out towards the driver (towards the body) until the physical limit position is reached, but do not use excessive force
    3. Push steering wheel towards engine compartment (approx. 20-30 mm away from body) into the comfort position and lock

       If no end stop is present when pulling out the steering column or the gaiter of the steering column shroud has tension, the crash system has activated and the steering column is to be renewed.

Note:

If the steering column/steering shaft replacement work which is required for safety reasons is rejected by the customer or an insurance company for cost reasons, a memorandum to that effect must be drawn up and countersigned by the party bearing the costs of the accident repair.

For corresponding specimen of the memorandum, refer to Service Information 320188(828) Appendix 1

Attention!

The vehicle's operating licence will be invalidated whenever the function of any of its safety components is compromised!

This guideline is binding for all accident repairs to all BMW F3x vehicles.

cardiagn.com

32 00 ... KDS data statuses

Setpoint values for wheel alignment are not published in ISTA.

The current setpoint values are made available in the workshop equipment portal.

See:

- www.bmwbroup-wep.com
  - Workshop Equipment catalogue:
  - Select Wheel alignment
  - Select KDS nominal values
  - e.g. select ”Beissbarth KDS update”, copy data

Or:

- Aftersales Assistance Portal (ASAP)
  - Profile: Select Service/Technology
  - Select Workshop equipment
  - Select Start BMW
  - Select Workshop equipment catalogue
  - Select Wheel alignment
  - Select KDS nominal values
  - e.g. select ”Beissbarth KDS update”, copy data

We recommend that the data records are updated on a regular basis.

Please contact your subsidiary if you do not have access to the portals listed.

cardiagn.com

32 00 155 Kinematics Diagnosis System wheel alignment with ride height measurement without loading the vehicle

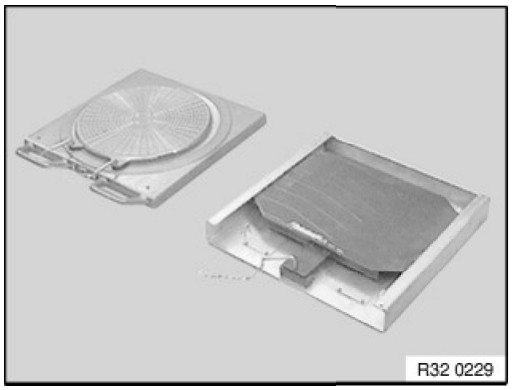
Attention!

Do not perform wheel alignment with the vehicle unladen.

- If the technical prerequisites for alignment with ride height input are not fulfilled
- If the vehicle in question is a damaged vehicle

Note:

- Read and comply with General information and definitions.
- Read and comply with General chassis definition.
- Update KDS data states
- Check compliance with test conditions, repair vehicle if necessary.



- If necessary, prepare vehicle hoist.
- Drive vehicle onto vehicle hoist.

  Note: The front and rear wheels must be positioned centrally on the rotary and sliding plates.

  Note: Rotary and sliding plates can vary from the graphic depending on the manufacturer!

Note:

- Vehicles with active steering:

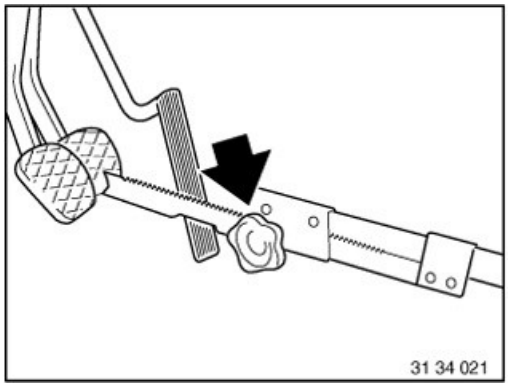
  Start up active steering prior to wheel alignment.

  On vehicles with rear axle slip angle control: The service function "Moving HSR actuator to the centre position" is included in the active steering start-up.

- Attach pickup/ride height marks to vehicle (observe specifications from the various equipment manufacturers).
- Enter customer and vehicle data
- Identify equipment specification of the chassis and suspension and select vehicle
- Enter tyre inflation pressure and tread depth
- Measure vehicle ride height with tape measure (only Beissbarth KDSII wheel alignment equipment)

  If the ride height is outside the tolerance range (+40/-20 mm), load or unload the vehicle accordingly to adjust the vehicle in this ride-height window.

cardiag.com

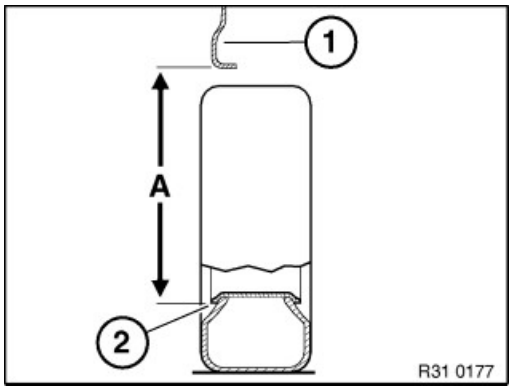


- Install the brake pedal tensioner.

- Remove locking pins from both rotating and sliding plates.
- Perform wheel alignment according to the instructions of the equipment manufacturer.
- If necessary, adjust front axle and rear axle.
- Perform wheel alignment according to the instructions of the equipment manufacturer.
- Save and print out test record.
- Insert locking pins into both rotary and sliding plates.
- Remove pickup/ride height marks from vehicle (observe specifications from the various equipment manufacturers).

cardiagn.com

31 33 ... Measuring vehicle ride height



Determine actual ride height (A) - to do so, attach tape measure to rim flange (2) at bottom middle and measure to wheel arch lower edge (1).

cardiagn.com

32 00 ... Moving vehicle into design position

Necessary preliminary work:

- Move vehicle into normal position

- <u>F01/F02/F07/F11/F15/F16/F85/F86: Version with air suspension system:</u>
  - Remove ignition key
  - Pull fuse for air supply unit control unit
- Add/distribute weights in area of spring struts until the vehicle ride height is within the tolerance (refer to TechnicalÂ Data).

  Measure vehicle ride height

cardiagn.com

32 00 ... Moving vehicle into normal position

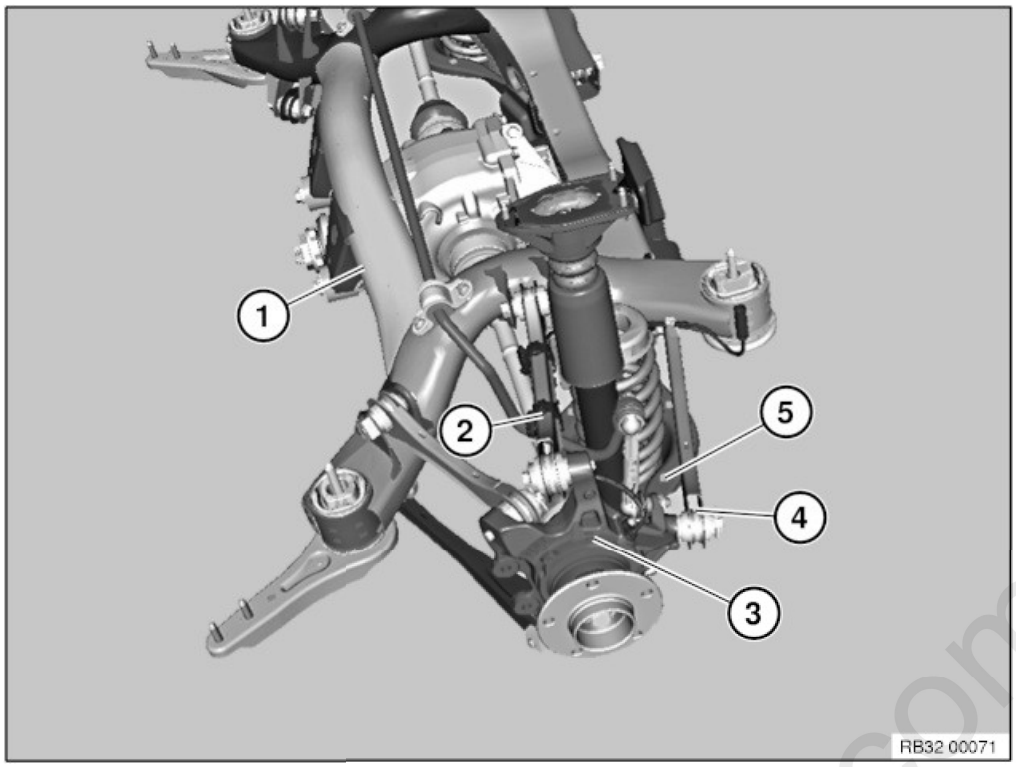
Necessary preliminary tasks:

- Check compliance with test conditions, repair vehicle if necessary.

- F01/F02/F04/F11/F15/F16/F85/F86: with air spring system: Carry out ride height adjustment
- Check vehicle interior and luggage compartment (including spare wheel well) for load status, if applicable, unload motor vehicle
- Introduce DIN load (refer to Technical Data) into vehicle

cardiagn.com

33 00 ... Rear axle: wheel/chassis alignment check must be carried out after the following work



A wheel alignment check must be carried out after the following work:

- Release the following screw connection:
  - Wishbone to rear axle support (2)
  - Toe arm on rear axle support (4)
  - Toe arm to wheel carrier (4)
  - Camber arm on rear axle support (5)
  - Camber arm to wheel carrier (5)

- Replacement of following parts:
  - Rear axle support (1)
  - Wishbone (2)
  - Wheel carrier (3)
  - Toe arm (4)
  - Toe arm (5)
  - Ball joint in wheel carrier
  - Rubber mount in wheel carrier

cardiagn.com

00 Safety information for working on vehicles with automatic engine start-stop function (MSA)



Warning!

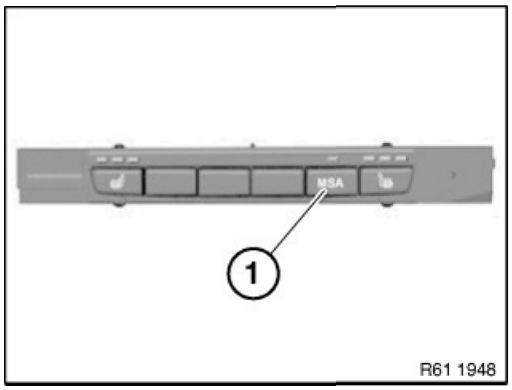
If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

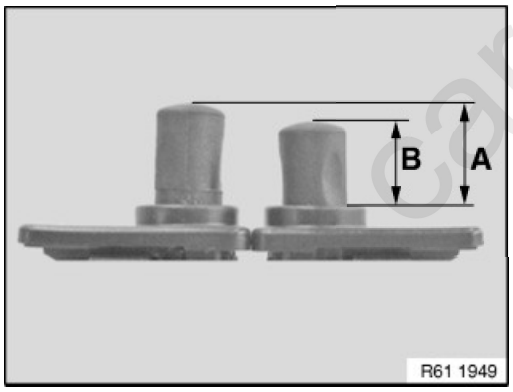
Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by:



- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
  - Workshop mode

    A = 10 mm
  - Basic setting (engine hood/bonnet open)

    B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.



When working with diagnosis tools:

- Observe instructions in diagnosis tool

cardiagn.com

Note:
For further information on automatic engine start-stop function (MSA):

- Refer to the Service Information (bulletin) (for manual transmissions) Service Information (bulletin) 61 01 07 335
- Refer to the Service Information (bulletin) (for automatic transmissions or twin-clutch gearboxes) Service Information (bulletin) 61 01 10 629

cardiagn.com

00 Safety instructions for handling oil



Warning!

Danger of poisoning if oil is ingested/absorbed through the skin!

Risk of injury if oil comes into contact with eyes and skin!



Recycling:

Observe country-specific waste disposal regulations.



Measures if oil is unintentionally released:

- Personal precautionary measures: Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- Environmental protection measures: Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- Limiting spread: Use oil blocks to prevent the surface spread of oil.
- Cleaning procedure: Bind and dispose of escaped oil with nonflammable absorbents.

  Note: Do not flush oil away with water or aqueous cleaning agents.

cardiagn.com

34 52 .. Start-up of ICM control unit



Note:
Start-up of ICM control unit must be carried out:

- After replacement or removal and installation of ICM control unit



Connect vehicle to BMW diagnosis system.

Select and carry out start-up of ICM control unit under Service functions.

cardiagn.com

32 00 ... Test conditions for chassis/wheel alignment check

Observe the following test conditions prior to the chassis/wheel alignment check:

1. Only BMW approved wheel and tyre combinations may be installed on the vehicle
2. Correct tread depth. The tread depth for each axle may differ from left to right by max. 1-2 mm.
3. Correct tyre pressure (see label on vehicle).
4. All chassis and suspension components must be technically OK.
5. Condition of suspension and shock absorbers OK: Visually inspect for breakage, etc.
6. Vehicles with self-levelling suspension: Pull fuse of air supply system so that there is no controlling down or up.

cardiagn.com

32 00 ... Instructions and specifications for replacement of steering gear/steering column/steering shaft following accident damage

Steering gear facts:

In the event of accidents or driving conditions similar to accidents, shock-like loads can cause different types of damage to front axles and steering gears. When a steering box is externally undamaged, it is sometimes only possible to identify damage with great difficulty and with great effort. However, damage of this nature poses an unacceptable risk to the vehicle because this can result in failure of the steering system.

Because of the disproportionate amount of effort involved, it is generally not sensible to check thoroughly all the individual components of the steering box and as an alternative it is necessary to take into account other components which can be checked more easily.

Steering gear procedure:

The steering box must be replaced if one or more of the following points apply:

A. Visible or noticeable damage to the steering box
   - Version with electric steering box (EPS): Examine in particular the control unit with all plug connections for damage and hairline cracks.

B. Unacceptable torque increase and jamming when the steering gear is turned from lock to lock (without hydraulic/electrical assistance).

C. Fire damage

D. Damage, permanent deformation or fractures to:
   - Wheel rims in the event of a negative result from the wheel alignment check
   - Spring struts, steering stubs, swivel bearings
     If the damage found is due only to the damper pipe sliding in the swivel bearing, then it is **not necessary** to replace the steering gear under the following conditions:
     1. There is no further damage to the chassis and suspension components, body parts, wheels etc., that can be attributed to violent effects similar to that caused by an accident.
        Note: If the spring cup abuts the tyre or if the lower end of the damper touches the output shaft, this is to be taken as subsequent damage of the damper pipe's sliding and does not necessarily result in damage to the steering gear.
     2. After the repair (swivel bearing and spring strut), no noticeable noises and no noticeable breaks or stiff positions can be observed when turning of the steering wheel slow and fast in both directions from one limit position to the other.
   - Wishbones
   - Struts or trailing links or anti-roll bar with this function
   - Body-side screwing/attachment points for wheel guide/control components
   - Front axle support
   - Track rods
   - Steering box fixtures
   - Steering column

   A lopsided steering wheel, significant deviations of camber/track values and noises when cranking the steering can be additional indications for the damage/deformations listed here.

Note:

If the steering box replacement work which is required for safety reasons is refused by the customer or an insurance company for cost reasons, a memorandum to that effect must be drawn up and countersigned by the party bearing the costs of the accident repair.

For corresponding specimen of memorandum, refer to Service Information (bulletin) 320188(828) Appendix 1

Actual situation of the steering column and steering shaft:

In the event of accidents or driving conditions similar to accidents, shock-like loads can cause different types of damage to the steering shaft and steering column. In case no external damaged of the steering column and the steering shaft can be noticed, it is sometimes only possible to identify damage with great difficulty and with great effort.

Proceedure for steering column and steering shaft:

The steering column and steering shaft must be replaced if one or more of the following points apply:

- Visible or noticeable damage, deformation or breakage of the steering column or steering shaft
- Damage, permanent deformation or breakage of the track rod
- Unacceptable torque increase and jamming when the steering column is cranked from limit position to limit position (without hydraulic/electrical assistance)
- If, after all damaged axle components are exchanged, the axle measurement target data during wheel alignment cannot be reached (exceeding of the permitted axle measurement tolerances). If required, enclose the measurement protocol of the invoice/certificate.
- Positive check for activated crash system of the steering column:
- If no damage is visible on the steering column, the mechanical steering column must be checked for an activated crash system:
    1. Open steering column lock
    2. Pull steering wheel out towards the driver (towards the body) until the physical limit position is reached, but do not use excessive force
    3. Push steering wheel towards engine compartment (approx. 20-30 mm away from body) into the comfort position and lock

       If no end stop is present when pulling out the steering column or the gaiter of the steering column shroud has tension, the crash system has activated and the steering column is to be renewed.

Note:

If the steering column/steering shaft replacement work which is required for safety reasons is rejected by the customer or an insurance company for cost reasons, a memorandum to that effect must be drawn up and countersigned by the party bearing the costs of the accident repair.

For corresponding specimen of the memorandum, refer to Service Information 320188(828) Appendix 1

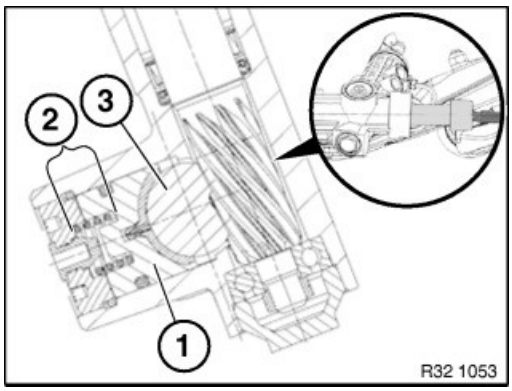
Attention!

The vehicle's operating licence will be invalidated whenever the function of any of its safety components is compromised!

This guideline is binding for all accident repairs to all BMW F3x vehicles.

cardiagn.com

32 11 ... Notes on checking steering backlash on vehicles with rack-and-pinion steering



Note:
The evaluation "steering backlash" is made usually when the front axle is raised, where the track rod is angled.

The force introduced via the track rod is divided into a horizontal force and a vertical force relieving the thrust member (1) against the spring (2).

The steering box is depressurised on account of no hydraulic assistance due to engine standstill and is thus not preloaded!

The play created in this way is incorrectly referred to as steering backlash.

3 = Rack

Solution:

1. Check the tie rod backlash only in loaded condition or in the design position.
2. Checking with front axle raised:
   - To evaluate the play of the steering gear, it is necessary to pressurise the steering gear via its servo system!
   - The combustion engine must be running during hydraulically or electrically assisted steering for this purpose

Desired state:

The steering must be backlash-free in all components!

cardiagn.com

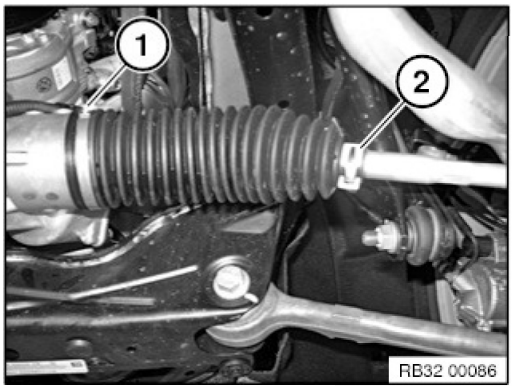
32 11 100 Replacing gaiter for steering box on left or right

Attention!

The hydraulic steering gear must be replaced if the polished surface of the rack is damaged (e.g. by corrosion)!

Necessary preliminary work:

- Remove underbody protection
- Remove cover of front steering assemblies (diesel-engine cars with rear-wheel drive only)
- Remove track rod end



Clean track rod.

Release ear clamp (1) and band clamp (2).

Detach gaiter from track rod.

Installation note:
Clean rack and check surface for damage (e.g. by corrosion).

Clean track rod and apply grease to taper.

Note:
This ensures that the gaiter is not rotated when the track rod is rotated.

After installation:

- Perform chassis / wheel alignment check

cardiagn.com

32 00 ... Instructions and specifications for replacement of steering gear/steering column/steering shaft following accident damage

Steering gear facts:

In the event of accidents or driving conditions similar to accidents, shock-like loads can cause different types of damage to front axles and steering gears. When a steering box is externally undamaged, it is sometimes only possible to identify damage with great difficulty and with great effort. However, damage of this nature poses an unacceptable risk to the vehicle because this can result in failure of the steering system.

Because of the disproportionate amount of effort involved, it is generally not sensible to check thoroughly all the individual components of the steering box and as an alternative it is necessary to take into account other components which can be checked more easily.

Steering gear procedure:

The steering box must be replaced if one or more of the following points apply:

A. Visible or noticeable damage to the steering box
   - Version with electric steering box (EPS): Examine in particular the control unit with all plug connections for damage and hairline cracks.

B. Unacceptable torque increase and jamming when the steering gear is turned from lock to lock (without hydraulic/electrical assistance).

C. Fire damage

D. Damage, permanent deformation or fractures to:
   - Wheel rims in the event of a negative result from the wheel alignment check
   - Spring struts, steering stubs, swivel bearings
     If the damage found is due only to the damper pipe sliding in the swivel bearing, then it is **not necessary** to replace the steering gear under the following conditions:
     1. There is no further damage to the chassis and suspension components, body parts, wheels etc., that can be attributed to violent effects similar to that caused by an accident.
        Note: If the spring cup abuts the tyre or if the lower end of the damper touches the output shaft, this is to be taken as subsequent damage of the damper pipe's sliding and does not necessarily result in damage to the steering gear.
     2. After the repair (swivel bearing and spring strut), no noticeable noises and no noticeable breaks or stiff positions can be observed when turning of the steering wheel slow and fast in both directions from one limit position to the other.
   - Wishbones
   - Struts or trailing links or anti-roll bar with this function
   - Body-side screwing/attachment points for wheel guide/control components
   - Front axle support
   - Track rods
   - Steering box fixtures
   - Steering column

   A lopsided steering wheel, significant deviations of camber/track values and noises when cranking the steering can be additional indications for the damage/deformations listed here.

Note:

If the steering box replacement work which is required for safety reasons is refused by the customer or an insurance company for cost reasons, a memorandum to that effect must be drawn up and countersigned by the party bearing the costs of the accident repair.

For corresponding specimen of memorandum, refer to Service Information (bulletin) 320188(828) Appendix 1

Actual situation of the steering column and steering shaft:

In the event of accidents or driving conditions similar to accidents, shock-like loads can cause different types of damage to the steering shaft and steering column. In case no external damaged of the steering column and the steering shaft can be noticed, it is sometimes only possible to identify damage with great difficulty and with great effort.

Proceedure for steering column and steering shaft:

The steering column and steering shaft must be replaced if one or more of the following points apply:

- Visible or noticeable damage, deformation or breakage of the steering column or steering shaft
- Damage, permanent deformation or breakage of the track rod
- Unacceptable torque increase and jamming when the steering column is cranked from limit position to limit position (without hydraulic/electrical assistance)
- If, after all damaged axle components are exchanged, the axle measurement target data during wheel alignment cannot be reached (exceeding of the permitted axle measurement tolerances). If required, enclose the measurement protocol of the invoice/certificate.
- Positive check for activated crash system of the steering column:
- If no damage is visible on the steering column, the mechanical steering column must be checked for an activated crash system:
    1. Open steering column lock
    2. Pull steering wheel out towards the driver (towards the body) until the physical limit position is reached, but do not use excessive force
    3. Push steering wheel towards engine compartment (approx. 20-30 mm away from body) into the comfort position and lock

       If no end stop is present when pulling out the steering column or the gaiter of the steering column shroud has tension, the crash system has activated and the steering column is to be renewed.

Note:

If the steering column/steering shaft replacement work which is required for safety reasons is rejected by the customer or an insurance company for cost reasons, a memorandum to that effect must be drawn up and countersigned by the party bearing the costs of the accident repair.

For corresponding specimen of the memorandum, refer to Service Information 320188(828) Appendix 1

Attention!

The vehicle's operating licence will be invalidated whenever the function of any of its safety components is compromised!

This guideline is binding for all accident repairs to all BMW F3x vehicles.

cardiagn.com

32 13 572 Replace electrical steering box (EPS)

Important!

Connecting line:

In the event of moisture/corrosion inside the two plug connections, check the insulation of the connecting line. If the insulation reveals any noticeable/striking features, partial replacement will be necessary. Otherwise it will be sufficient to replace the contacts or connector housing.

Note:
In a warranty case you must always provide a fault memory printout, even where there is no fault entry, with the defective part.

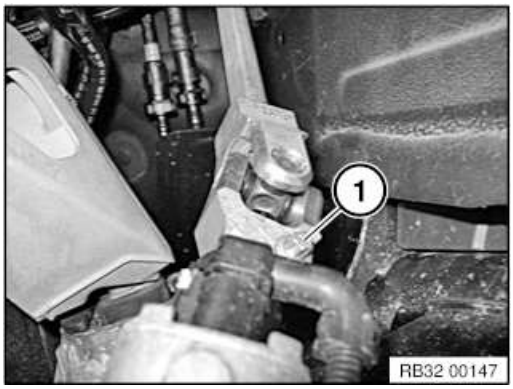
Important!

Do not turn the steering wheel once the steering shaft has been detached from the steering box/steering column! If the lower section of the steering shaft is separated from the steering box/steering column, the steering column switch cluster may be damaged when the steering wheel is turned.

Necessary preliminary tasks:

- Disconnect battery earth lead

  Note: High-current-carrying wiring laid with permanent positive connection (80 A fuse).
- Remove front wheel on the left and right.
- Remove front underbody protection
- F23/F33: remove stiffening plate.
- Remove underride protection for steering (motor vehicles with sports suspension settings only)
- Remove cover of steering assembly (diesel-engine cars only)
- Release left and right track rod end at swivel bearing

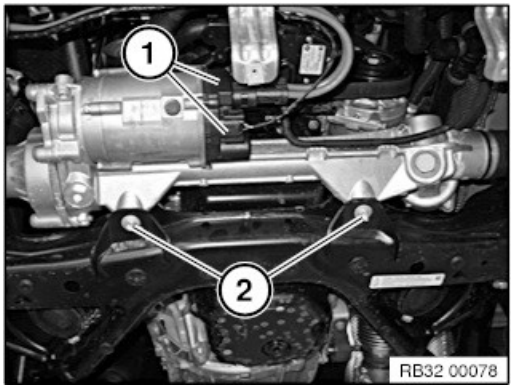


Release clamping bolt (1) of steering shaft from steering gear and pull off.*Installation note:*
Clean screw threads to remove all remnants of screw locking adhesive.

Replace clamping bolt

Tightening torque 32 31 2AZ.

cardiagn.com



Unlock plug connections (1) and disconnect.

Unfasten screws (2).

Tightening torque, 32 00 1AZ.

Installation note:
Replace the screws (2) and nuts.

Important!

Risk of damage!

Pay attention to connector housing on steering box while removing steering box!

Remove steering gear towards the front.

Installation note:
Remount track rod end on left and right.

Or check and replace if necessary!

After installation:

- Turn steering wheel in both directions to the limit position. The airbag indicator light must not light up in the process.
- Carry out programming/encoding
- Teach in end stop software
- Perform chassis / wheel alignment check

cardiagn.com

32 13 572 Replacing the electrical steering gear (EPS) (AW-specification without wheel alignment) (after vehicle diagnosis) (AW-specification without programming/encoding, see 61 00...)

TECHNICAL INFORMATION

After installation, the end stops must be taught in.

TECHNICAL INFORMATION

Perform wheel alignment after installation.

PRELIMINARY WORK

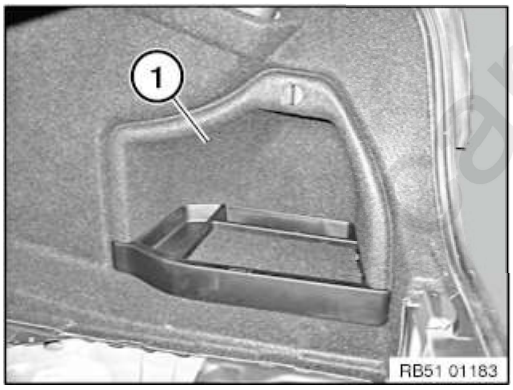
1 – Prepare fault memory printout

TECHNICAL INFORMATION

In a warranty case, you must always provide a fault memory printout with the defective part, even if the fault memory does not contain an entry.

- Prepare fault memory printout.
- Attach the fault memory printout to the damaged part.

2 – Remove right luggage compartment trim panel



- Remove right luggage compartment trim panel (1).

3 – Disconnecting the battery earth lead

Prerequisite

Ignition is switched off.

TECHNICAL INFORMATION

For additional information see:
61 00 ... Safety information on handling the vehicle battery
61 00 / 12 00 ... Notes on disconnecting and connecting the vehicle battery
61 12 ... Notes on the intelligent battery sensor (IBS)

ardiagn.com



RISK OF DAMAGE

Damage to battery terminal, the safety battery terminal or the intelligent battery sensor (IBS).

Damaged battery terminals can lead to malfunctions or vehicle electrical system faults.

- Pull off battery terminal from battery pole by carefully moving to and fro. Do not pry off using a tool.

- Slacken nut (1).
- Pull off the battery earth lead including intelligent battery sensor (IBS) (2) upwards, put to one side and secure the components.

4 – Remove the front left and right wheels

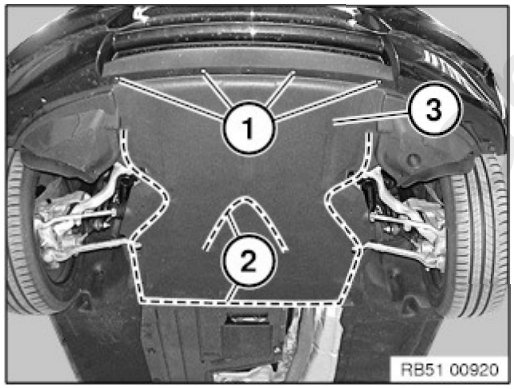
▶ **Removing the wheel**



- If several wheels are removed simultaneously: Use a piece of chalk to mark on each tyre the axle and side on which the corresponding wheel is fitted.
- Unscrew the wheel bolts and remove the wheel.

  Use the matching adapter from tool set 0 492 518 (36 1 300) (wheel bolt adapter set) to loosen and tighten down the wheel bolt with security code.

5 – Removing the front underbody protection



NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

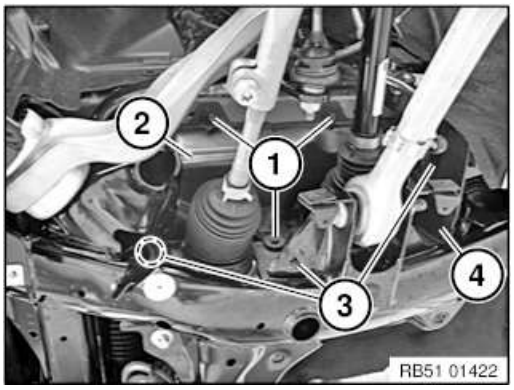
- Loosen screws (1).
- Release screws along line (2).
- Remove the front underbody protection (3).

6 – Removing cover of the steering assembly

NOTICE

Description is for left component only. Procedure on the right side is identical.

mydiagn.com



- Loosen the screws (1) and remove the cover (2).
- Loosen the expanding rivet(3) and remove the cover (4).

7 – Removing the left and right track rod end

▶ Removing the track rod end

RISK OF DAMAGE

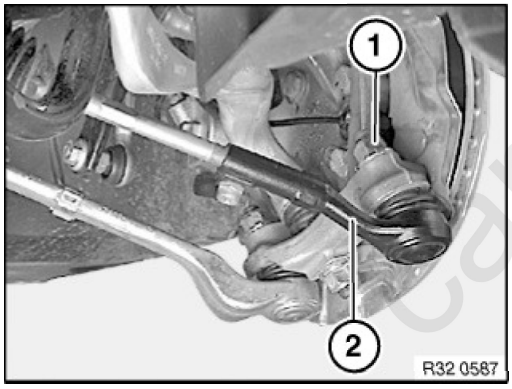
Component damage caused by striking tools.

Brute force can result in component damage.

- Only use those tools intended for the work.

NOTICE

Description is for left component only. Procedure on the right side is identical.



- Loosen the nut (1), if necessary, counter-hold the Torx socket.
- Remove the track rod end (2) from the swivel bearing.

8 – Releasing the steering shaft on the electromechanical steering gear

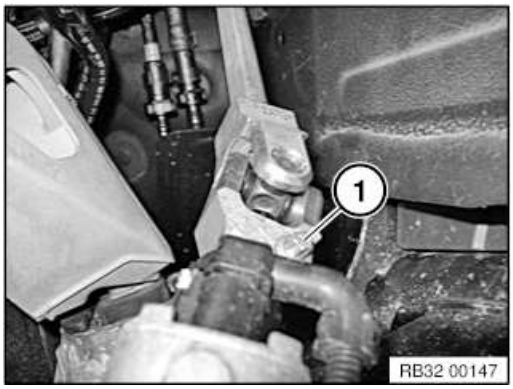
RISK OF DAMAGE

Damage to steering column switch cluster (SZL).

The steering column switch cluster (SZL) or the coil spring cassette may be damaged by twisting of the steering wheel if the lower steering shaft (or the universal joint) is separated from the steering gear or from the steering column.

- Secure steering wheel from twisting.

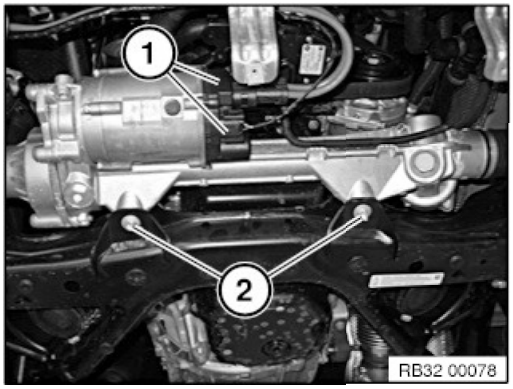
cardiagn.com



- Release the clamping bolt (1) of the steering shaft at the electromechanical steering gear.

MAIN WORK

9 – Remove the electromechanical steering gear



- Unlock and disconnect plug connections (1).
- Loosen and remove the screws (2).
- Carefully remove the electromechanical steering gear towards the front.

Check

- Check plug connection for moisture and corrosion.
- Check the access line for damage.

Result

» Plug connection is moist or corroded.

» The insulation of the line is damaged.

Measure

- If the insulation of the access line is damaged: Partially replace the access line.

  If the insulation of the access line is not damaged: Renew the contacts or the connector housing.

10 – Remounting the track rod end on left and right

▸ **Remounting the track rod end**

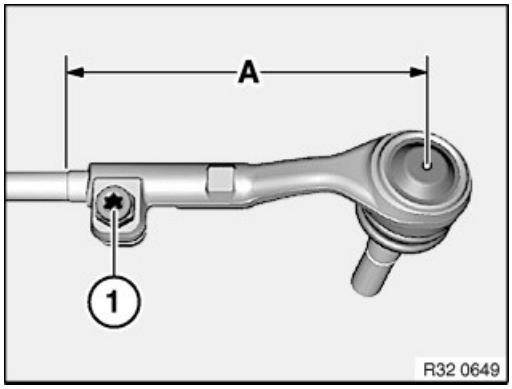
TECHNICAL INFORMATION

Perform wheel alignment after installation.

NOTICE

Description is for left component only. Procedure on the right side is identical.

cardiagn.com

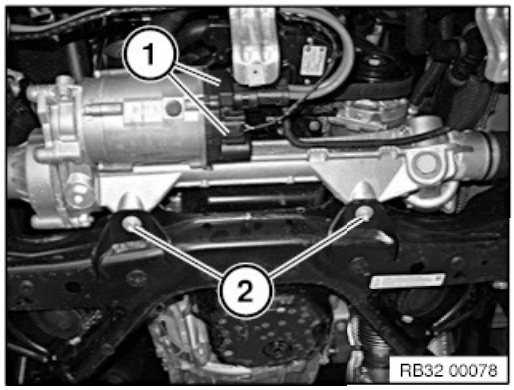


- Determine dimension (A) to simplify subsequent setting of front axle.
- Slacken screw (1).
- Unscrew the track rod end, if applicable, counter support the track rod with the open-end spanner.
- Screw on the track rod end to this dimension (A).
- Tighten down screw (1).

Track rod end to track rod

			32 Nm

11 – Install the electromechanical steering gear



- Insert the electromechanical steering gear into the front axle support.
- Renew the screws (2) and nuts.

  Parts: Bolts, nuts
- Tighten the bolts (2) and nuts .

Electromechanical steering gear to front axle support

M10	Renew screws and nuts.		56 Nm

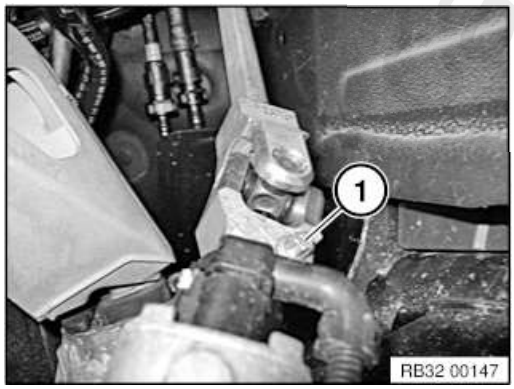
- Connect connectors (1) and lock.

POSTPROCESSES

12 – Securing the steering shaft on the electromechanical steering gear

TECHNICAL INFORMATION

Microencapsulated screws must be replaced and may not be reused.
The screw fitting must be completed within 10 minutes, as the hardening begins after this time period.
Microencapsulated screws must not be retightened.



- Clean the screw threads to remove all remnants of screw locking adhesive.
- Place the steering shaft universal joint on the electromechanical steering gear.
- Renew the screw (1).

  Parts: Screw
- Tighten down screw (1).

Bottom steering shaft on the electrical steering gear (EPS)

M8	Recut thread. Renew clamping bolt. Retorquing not permitted.		24 Nm

13 – Installing the left and right track rod end

▸ **Installing track rod end**

NOTICE

Description is for left component only. Procedure on the right side is identical.

Check

- Check the gaiter and the spring circlip for damage.

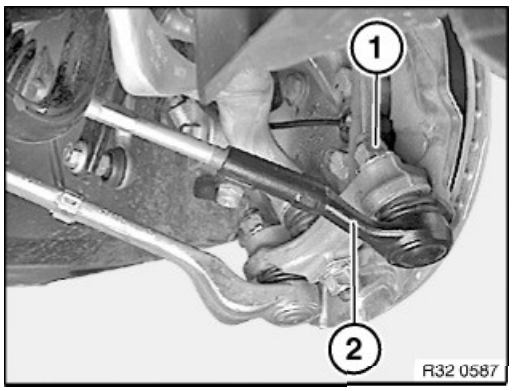
Result

» Component is cracked or porous.

Measure

- Replace component.

  Parts: Component



TECHNICAL INFORMATION

Keep the connection of the track rod end to the swivel bearing clean and free from oil and grease.

- Insert track rod end (2) into the swivel bearing.

TECHNICAL INFORMATION

Self-locking nuts must be renewed and must not be reused.

- Renew nut (1).

  Parts: Nut

- Tighten the nut (1), if necessary, counter support the Torx socket.

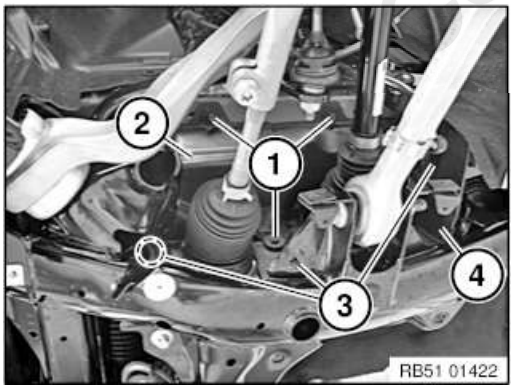
Track rod end to swivel bearing

M14	Replace self-locking nut.		175 Nm

14 – Installing the steering assembly cover

NOTICE

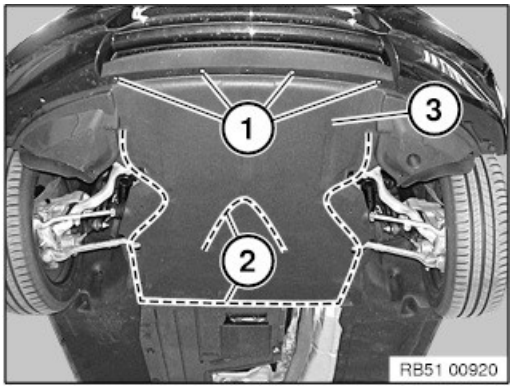
Description is for left component only. Procedure on the right side is identical.



- Insert the cover (2) and secure using the screws (1).
- Insert the cover (4) and secure with the expanding rivets (3).

15 – Installing the front underbody protection

carsdiagn.com



NOTICE

Schematic diagram is for example purposes. Some parts may differ in certain details.

- Position the front underbody protection (3).
- Tighten the bolts along the line (2).
- Tighten the screws (1).

Underbody protection front

Screw not metric thread			3 Nm
Screw M6			8,8 Nm
Nut			2,5 Nm

16 – Mount the front left and right wheels

▸ **Mounting the wheel**

▹ **Clean the contact surfaces between the brake disc and the wheel rim**



TECHNICAL INFORMATION

The contact surface between the brake disc and the wheel rim must be clean and free from oil and grease. There is otherwise a risk of the wheel becoming loose at a later time.

- Remove dirt, grease residues and corrosion from the contact surface with a drill and the special tool 2 344 011.

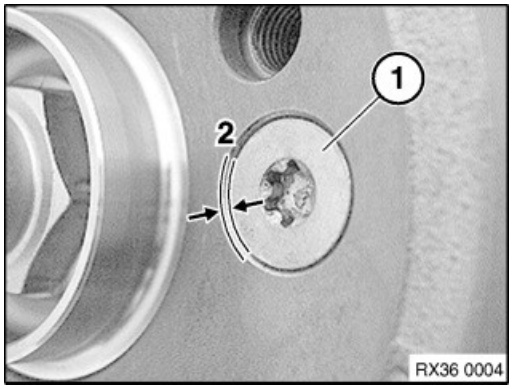
  Do not operate special tool 2 344 011 with an impact screwdriver.
- Degrease the contact surfaces with the universal cleaner (see BMW Group Parts).
- In the event of grease residue around the wheel bolt holes: remove and clean the brake disc.



- Remove dirt, grease residues and corrosion from the contact surface with a drill and the special tool 2 344 011.

  Do not operate special tool 2 344 011 with an impact screwdriver.
- Degrease the contact surfaces with the universal cleaner (see BMW Group Parts).

cardiagn.com



- Check the mounting bolt for the brake disc (1) for secure fit.

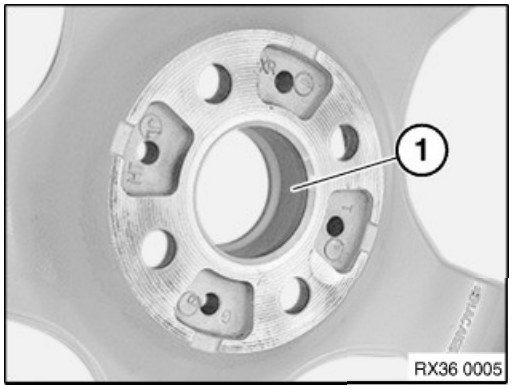
  The mounting bolt for the brake disc (1) must not protrude under any circumstances on the contact surface (2) between the brake disc and the wheel rim.

Brake disc to front wheel hub

M8	Renew screw.		16 Nm

Brake disc to rear wheel hub

M8	Renew screw.		16 Nm



- Lightly grease the wheel centring (1) in the wheel rim; refer to additional information for grease for the wheel centring.

◁



TECHNICAL INFORMATION

Never use impact screwdrivers or electric screwdrivers to screw in and tighten the wheel bolts.

The wheel rim must rest uniformly against the brake disc.

In the case of non-original BMW wheel bolts/wheel rims, it may be necessary to retighten the wheel bolts on account of setting properties (refer to the documentation from the manufacturer).

Do not apply oil to new wheel bolts.

- Renew corroded wheel bolts.

  Parts: Wheel bolts

- Clean the wheel bolts.
- Check wheel bolts (arrows) and threads for damage, renew the wheel bolts if necessary.
- Mount wheel bolts and tighten.

Wheel bolts

M14/AF 17	Screw in wheel bolts and evenly tighten crosswise by hand in order to centre the wheel rim. Tighten wheel bolts to the prescribed tightening torque with a calibrated torque wrench in a crosswise sequence. Check all the wheel bolts in the same order or retighten to the prescribed tightening torque again.	Tightening torque Check	140 Nm 140 Nm

carmanuals.com

17 – Connecting the battery earth lead

TECHNICAL INFORMATION

For additional information see:
61 00 ... Safety information on handling the vehicle battery
61 00 / 12 00 ... Notes on disconnecting and connecting the vehicle battery
61 12 ... Notes on the intelligent battery sensor (IBS)

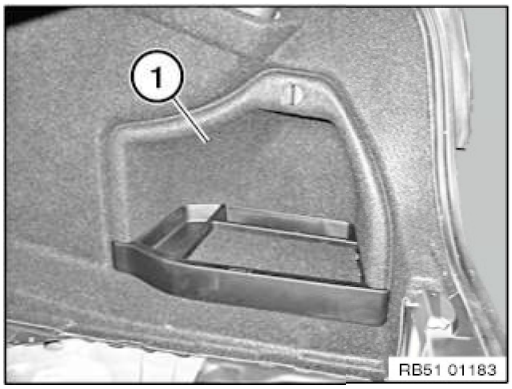


- Connect battery earth lead with intelligent battery sensor (IBS) (2) to negative battery terminal.
- Tighten nut (1).

Battery cable on the battery

M6			5 Nm

18 – Install right luggage compartment trim panel



- Insert right luggage compartment trim panel (1).

19 – Encode/program control unit(s)

Prerequisite

Replacement of the control unit.

TECHNICAL INFORMATION

Use the most recent software version to prevent faults during programming/encoding.
The battery voltage must not fall below 13.0 V during programming.
Use only chargers for a low volt-vehicle electrical system that are recommended by BMW.

TECHNICAL INFORMATION

No high-voltage switch off is required in electric vehicles or hybrid vehicles for programming/encoding.
The high-voltage system will be automatically switched off by the programming system.
Exception:
BMW I01: Note Product and Measures Management Aftersales measure 55176388.

cardiagn.com

- Connect the battery charger to the vehicle.
- Connect the programming system with the vehicle.
- Determine the action plan.
- Accept and fully process the measures plan.
- If applicable, connect the workshop system to the vehicle, depending on the reworking list.
- Carry out vehicle test.
- Delete the fault memory.
- The information about programming the workshop system and the corresponding notes in the user documentation must be observed.
- Wait until programming/encoding has been completed.
- Disconnect the programming system from the vehicle.
- Disconnect the battery charger from the vehicle.

Additional Information

Overview of Tightening Torques

Track rod end to track rod			Used in step 10
			32 Nm

Electromechanical steering gear to front axle support			Used in step 11
M10	Renew screws and nuts.		56 Nm

Bottom steering shaft on the electrical steering gear (EPS)			Used in step 12
M8	Recut thread. Renew clamping bolt. Retorquing not permitted.		24 Nm

Track rod end to swivel bearing			Used in step 13
M14	Replace self-locking nut.		175 Nm

Underbody protection front			Used in step 15
Screw not metric thread			3 Nm
Screw M6			8,8 Nm
Nut			2,5 Nm

Brake disc to front wheel hub			Used in step 16
M8	Renew screw.		16 Nm

Brake disc to rear wheel hub			Used in step 16
M8	Renew screw.		16 Nm

cardiagn.com

Wheel bolts Used in step 16

M14/AF 17	Screw in wheel bolts and evenly tighten crosswise by hand in order to centre the wheel rim. Tighten wheel bolts to the prescribed tightening torque with a calibrated torque wrench in a crosswise sequence. Check all the wheel bolts in the same order or retighten to the prescribed tightening torque again.	Tightening torque Check	140 Nm 140 Nm

Battery cable on the battery Used in step 17

M6			5 Nm

Overview of Special Tools

0 492 518 (36 1 300) Adapter



Common Used in step 4

Usage	(Wheel bolt adapter kit) For releasing and tightening wheel bolts. Individual parts are available via the EPC, see also comments texts for the individual adapters.
Included in the tool or work	
Storage location	Individual
Replaced by	
In connection with	
SI-Number	01 27 04 (167)

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
6	0 495 221 (36 1 323)		**Wheel stud** (Code 30) Code 39 available separately, (see EPC) under 36 13 1 181 259	
6	0 495 222 (36 1 324)		**Wheel stud** (Code 31) With centring bore available separately, (see EPC) under 36 13 6 765 544	
6	0 495 223 (36 1 325)		**Wheel stud** (Code 32) With centring bore available separately, (see EPC) under 36 13 6 765 545	
6	0 495 224 (36 1 326)		**Wheel stud** (Code 33) With centring bore available separately, (see EPC) under 36 13 6 765 546	
6	0 495 225 (36 1 327)		**Wheel stud** (Code 34) With centring bore available separately (see EPC) under 36 13 6 765 547	

cardiagn.com

6	0 495 226 (36 1 328)		**Wheel stud** (Code 35) With centring bore available separately, (see EPC) under 36 13 6 762 340	
6	0 495 227 (36 1 329)		**Wheel stud** (Code 36) With centring bore available separately (see EPC) under 36 13 6 762 341	
6	0 495 228 (36 1 331)		**Wheel stud** (Code 37) With centring bore available separately (see EPC) under 36 13 6 762 342	
6	0 495 229 (36 1 332)		**Wheel stud** (Code 38) With centring bore available separately (see EPC) under 36 13 6 762 343	
6	0 495 230 (36 1 333)		**Wheel stud** (Code 40) With centring bore available separately (see EPC) under 36 13 6 762 344	
6	0 495 231 (36 1 335)		**Supplement** Not available separately. Can only be ordered as part of the complete special tools (SWZ) set 83 30 0 492 518 (SWZ number 36 1 300) or via the Electronic Parts Catalogue (supplementary set for wheel bolt adapter kit 36 1 300). Consists of: 36 1 323 Code 30 36 1 324 Code 31 36 1 325 Code 32 36 1 326 Code 33 36 1 327 Code 34 36 1 328 Code 35 36 1 329 Code 36 36 1 331 Code 37 36 1 332 Code 38 36 1 333 Code 40 36 1 336 Connection diagram label	
6	0 495 232 (36 1 336)		**Labels** (Label) Connection diagram not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.	
6	0 495 233 (36 1 339)		**Case** s (Case) incl. connection diagram label. Not available individually.	

cardiagn.com

2	0 492 519 (36 1 301)		**Wheel stud** (Code 11) Can be ordered separately via EPC under part number 36 13 1 181 241.	
2	0 492 520 (36 1 302)		**Wheel stud** (Code 12) available separately (see EPC) under 36 13 1 181 242	
2	0 492 521 (36 1 303)		**Wheel stud** (Code 13) available separately (see EPC) under 36 13 1 181 243	
2	0 492 522 (36 1 304)		**Wheel stud** (Code 14) available separately, (see EPC) under 36 13 1 181 244	
2	0 492 523 (36 1 306)		**Wheel stud** (Code 16) available separately (see EPC) under 36 13 1 181 246	
2	0 492 524 (36 1 307)		**Wheel stud** (Code 17) available separately (see EPC) under 36 13 1 181 247	
2	0 492 525 (36 1 308)		**Wheel stud** (Code 18) available separately (see EPC) under 36 13 1 181 248	
2	0 492 526 (36 1 309)		**Wheel stud** (Code 19) available separately (see EPC) under 36 13 1 181 249	
2	0 492 527 (36 1 311)		**Wheel stud** (Code 20) available separately (see EPC) under 36 13 1 181 250	
2	0 492 528 (36 1 312)		**Wheel stud** (Code 31) 12/2004 available separately, (see EPC) under 36 13 6 765 544	
2	0 492 529 (36 1 313)		**Wheel stud** (Code 32), 12/2004 available separately (see EPC) under 36 13 6 765 545	
2	0 492 530 (36 1 314)	0 495 224	**Wheel stud** (Code 33) 12/2004 Replaced by 36 1 326.(0 495 224) Not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.	

cardiagn.com

2	0 492 531 (36 1 315)	0 495 225	**Wheel stud** (Code 34) 12/2004 Replaced by 36 1 327.(0 495 225) Not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.	
2	0 492 532 (36 1 316)	0 495 226	**Wheel stud** (Code 35) 12/2004 Replaced by 36 1 328.(0 495 226) Not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.	
2	0 492 533 (36 1 317)	0 495 227	**Wheel stud** (Code 36) 12/2004 Replaced by 36 1 329.(0 495 227) Not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.	
2	0 492 534 (36 1 318)	0 495 228	**Wheel stud** (Code 37) 12/2004 Replaced by 36 1 331.(0 495 228) Not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.	
2	0 492 535 (36 1 319)	0 495 229	**Wheel stud** (Code 38) 12/2004 Replaced by 36 1 332.(0 495 229) Not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.	

cardiagn.com

2	0 492 536 (36 1 321)	0 495 221	**Wheel stud** (Code 39) Code 30, 12/2004 Replaced by 36 1 323.(0 495 221) Not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.	
2	0 492 537 (36 1 322)	0 495 230	**Wheel stud** (Code 40) 12/2004 Replaced by 36 1 333.(0 495 230) Not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.	
10	0 493 534 (36 1 305)		**Wheel stud** (Code 15) available separately (see EPC) under 36 13 1 181 245	

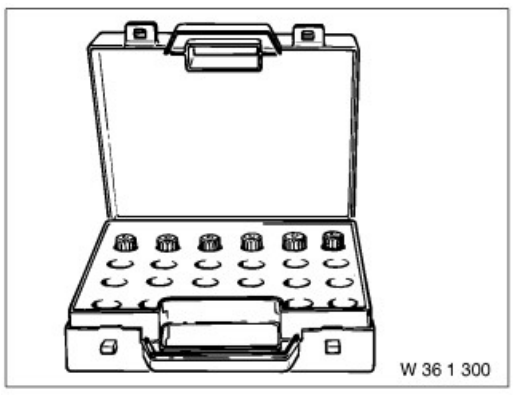
2 344 011 Tool



Common	Used in step 16
Usage	Tool (wheel hub grinder) for cleaning the connection of the wheel rim (wheel contact face) to the wheel hub.
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	08 08 12 (872)

Replacement tools:

0 495 221 (36 1 323) Wheel stud



Common	Used in step 4
Usage	(Code 30) Code 39 available separately, (see EPC) under 36 13 1 181 259
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

carflagn.com

0 495 224 (36 1 326) Wheel stud



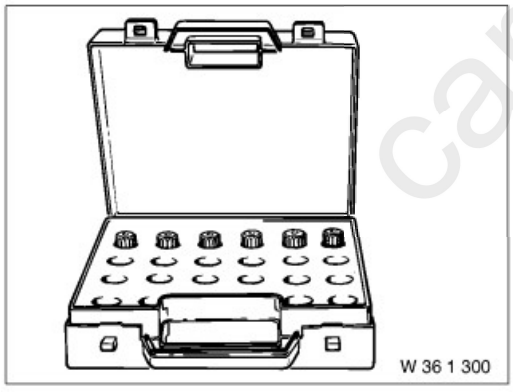
Common	Used in step 4
Usage	(Code 33) With centring bore available separately, (see EPC) under 36 13 6 765 546
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 225 (36 1 327) Wheel stud



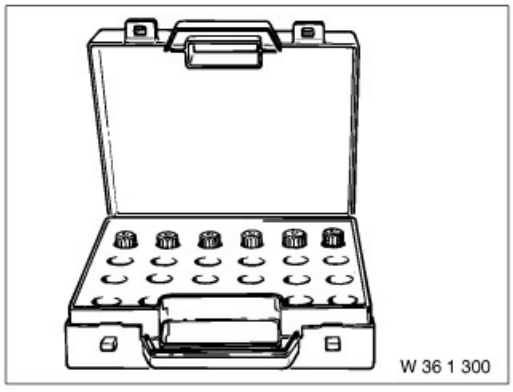
Common	Used in step 4
Usage	(Code 34) With centring bore available separately (see EPC) under 36 13 6 765 547
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 226 (36 1 328) Wheel stud



Common	Used in step 4
Usage	(Code 35) With centring bore available separately, (see EPC) under 36 13 6 762 340
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 227 (36 1 329) Wheel stud



Common	Used in step 4
Usage	(Code 36) With centring bore available separately (see EPC) under 36 13 6 762 341
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

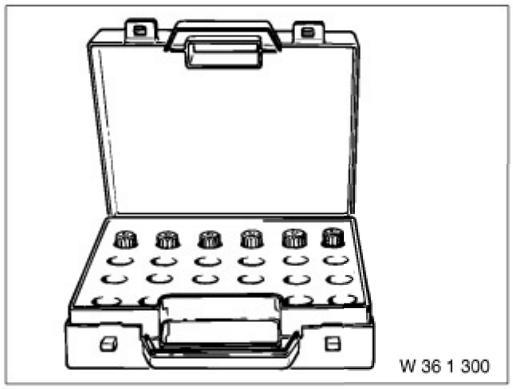
cardiagn.com

0 495 228 (36 1 331) Wheel stud



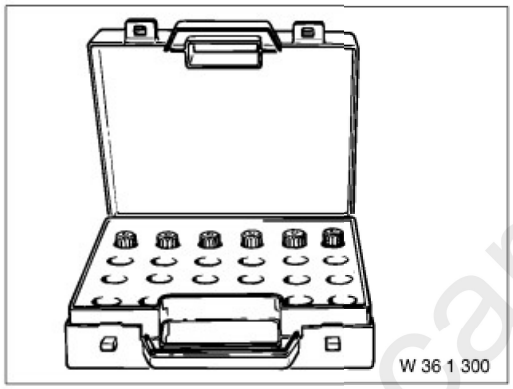
Common	Used in step 4
Usage	(Code 37) With centring bore available separately (see EPC) under 36 13 6 762 342
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 229 (36 1 332) Wheel stud



Common	Used in step 4
Usage	(Code 38) With centring bore available separately (see EPC) under 36 13 6 762 343
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 230 (36 1 333) Wheel stud



Common	Used in step 4
Usage	(Code 40) With centring bore available separately (see EPC) under 36 13 6 762 344
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

cardiagn.com

Links

General repair instructions	Used in step
61 20 ... Notes on AGM battery	317
61 12 ... Notes on intelligent battery sensor (IBS)	317
61 00 ... Notes for disconnecting and connecting battery	317

Repair instructions	Used in step
32 00 150 KDS chassis/wheel alignment check with vehicle load up to design position	
32 00 155 KDS wheel alignment check with ride height measurement without vehicle load	
32 10 ... Teaching in end stop software for electric steering gear (EPS)	

Operating materials	Used in step
2.0 Grease for wheel centring	16

Parts

Parts required

Designation	Used in step
Universal cleaner	16

cardiagn.com

32 13 580 Replacing the EPS steering thrust piece (ThyssenKrupp)



Special tools required:

- 2 458 076



Note:
Follow the training video.



Note:
Check that the repair kit is complete.

- Slide inserts available and not damaged
- O-rings available and not damaged (no damage to the thrust piece surface)



Caution!

Risk of damage:

Ensure utmost cleanliness when carrying out all work! Non-observance may lead to malfunctions and damage to the steering gear!



Caution!

Installation gloves (personal protective equipment, BMW part number 83 19 0 441 882) **must** be worn for all work!

The described components or surfaces may **only** be cleaned using a disposable cloth (lint-free cloth)!



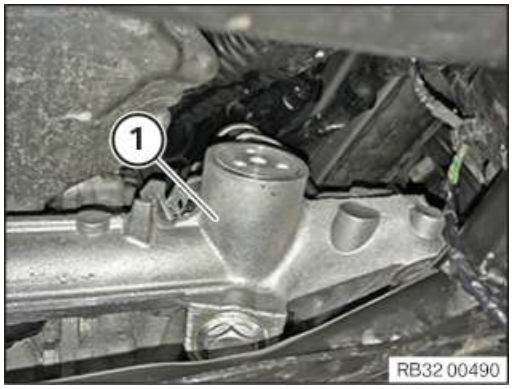
Necessary preliminary work:

- Disconnect battery negative cable
- Remove underbody protection
- Move steering to straight-ahead position



Replace thrust piece:

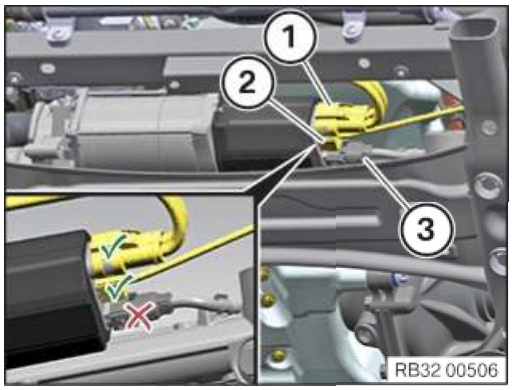
cardiagn.com



Caution!

Ingress of dirt in the steering gear must be prevented!

Before starting work, thoroughly clean the steering gear in area (1) and the adjacent installation space!



Unlock, disconnect and place the EPS steering gear plug connection (1) and (2) to one side.**Caution!**

Plug connection (3) must not be disconnected!



Release adjusting screw (1) using special tool 2 458 076 (4) (socket) and 1/2" reversible ratchet.**Caution!**

Danger of injury - adjusting screw has sharp edges.



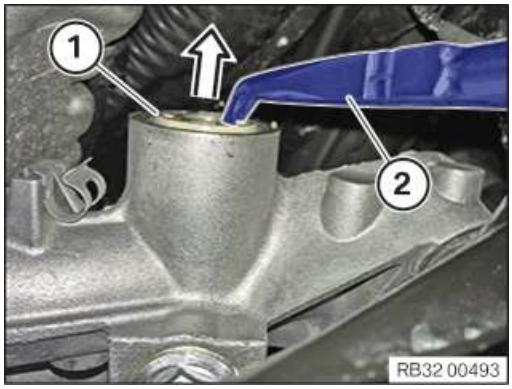
Remove compression spring (1) with offset long-nose pliers.

Carefully clean seal residues on the thread (2) using a disposable cloth (lint-free cloth), and remove any seal residues.

Note:

Cleaning using compressed air and/or a chemical cleaning agent is not permitted!

cardiagn.com

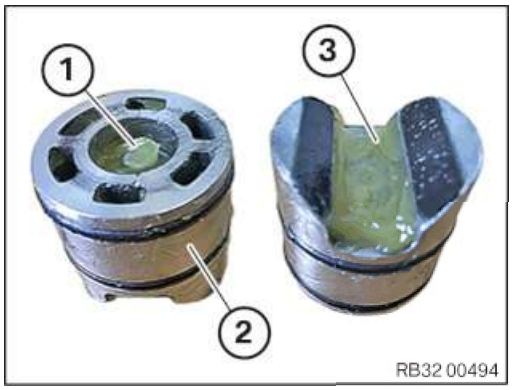


Remove thrust piece (1) upwards using offset long-nose pliers (2).

To facilitate disassembly and to slightly slacken the thrust piece, if necessary, rotate on the steering shaft approx. 1/4 turn anti-clockwise and clockwise alternating!

Dispose of adjusting screw, compression spring and thrust piece.

Perform a visual inspection using a mirror (no particles on the rack, no particles on the thrust piece bore hole, no damage to the thrust piece bore hole or thread).



Grease new thrust piece in pressure spring seat (1) and on thrust piece outer wall (2) **completely** with BMW FB-1 grease.

Grease guide surfaces on bottom of thrust piece **completely**. Fill guide surface (3) with plenty of BMW FB-1 grease.

Grease: FB-1, BMW part number 83 23 2 208 093



Carefully insert greased thrust piece (1) into special tool 2 458 076 (3) (sleeve) from above (screw thread side = bottom).

Press the thrust piece (1) so far in until it is seated approx. 5 mm deep (to the upper edge of the special tool) in the special tool 2 458 076 (3) (sleeve).

Note: The O-rings of the thrust piece may not protrude over the thread-side edge of the insertion sleeve.

Observe the following animation!

Your browser doesn't support HTML5 video.

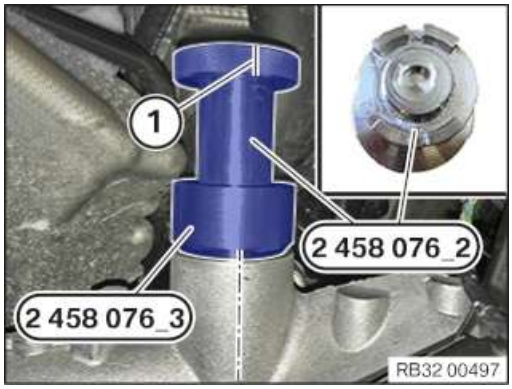
"Grease thrust piece and insert in special tool" animation



Screw special tool 2 458 076 (3) (sleeve) with thrust piece engaged into steering gear up to limit position.

Then, release special tool 2 458 076 (3) (sleeve) once again by 45°- 90°.

cardiagn.com



Caution!

Observe correct mounting orientation! Align thrust piece with rack !

Special tool 2 458 076 (2) (assembly tool) is encoded.

Position and twist assembly tool on the thrust piece until the assembly tool journal fits in the thrust piece recess.

Turn the assembly tool or the thrust piece such that (note: hold sleeve 2 458 076 (3) in position while doing so) mark (1) on the assembly tool points downwards.

Observe the following animation!

Your browser doesn't support HTML5 video.

"Install thrust piece in steering gear" animation



Press thrust piece with special tool 2 458 076 (2) (assembly tool) into the steering gear by hand.

Caution!

The thrust piece may only be inserted by hand in the thrust piece bore hole and not by means of other tools (aside from the assembly tool).

Remove special tools.



Grease compression spring (1) with BMW FB-1 grease, BMW part number 83 23 2 208 093 and insert into thrust piece using long-nose pliers.

cardiagn.com



Caution!

Compliance with the tightening torque is absolutely mandatory!

Danger of injury - adjusting screw has sharp edges.

Installation note:

- Renew adjusting screw (1)
- Place adjusting screw (1) from the rep. kit onto special tool 2 458 076 (4) (socket), grease it at the spring seat and thread and tighten by hand
- Tighten adjusting screw (1) with special tool 2 458 076 (4) (socket) to **70 Nm**
- **Then turn the steering wheel in both directions four times up to the limit position**.

After turning the steering wheel to the limit position, adjust the thrust piece play (between rack and thrust piece). Refer to the following steps.

Check/adjust the thrust piece play (between the rack and thrust piece):

Caution!

In order to achieve the correct measuring result, the following work must be performed before adjusting the thrust piece!

- Remove the gaiter for the left and right steering gear
- Remove the left and right track rod on the steering gear
- Move steering wheel to centre position (straight-ahead driving)



Loosen adjusting screw (1) with special tool 2 458 076 (4) (socket) by **approx. 60°**.

ardiag.com



Check thrust piece play:

Position special tool 2 458 076 (1) (calliper) on the steering gear housing and tighten by hand using the knurled screws.

Caution!

Ensure correct mounting orientation of special tool 2 458 076 (1)!

Journal and calliper (1) on special tool must fit in recesses (2) of the adjusting screw.

Special tool must be flush with steering gear housing!



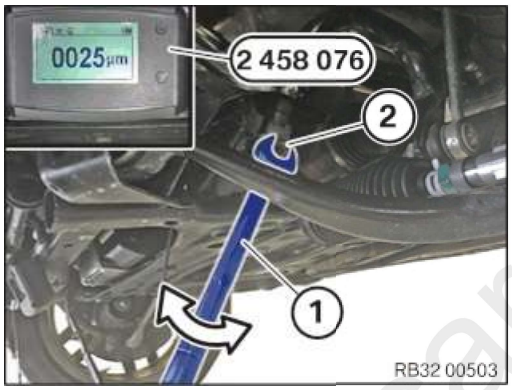
Rack shaking free:

Lightly shake the mounting flats of the rack with the torque wrench with open-end spanner attachment of AF 24. **This must be repeated prior to each calibration (set to zero value) of the measuring device.**

Attach special tool 2 458 076 (measuring device) and secure on front axle support (measuring device is equipped with a magnet).

Switch on and calibrate measuring device (set to zero value).

- The exact procedure can be found in the measuring device's Owner's Handbook, and must be complied with



Caution!

A torque of 20 Nm must be complied with for the thrust piece play!

While measuring the play of the thrust piece, the torque wrench must not touch the front axle support (if necessary, hold the torque wrench in an inclined position).

Non-observance may cause damage to the steering gear or incorrect measurement!

Set torque wrench (1) to 20 Nm.

Position the torque wrench (1) with an open-end spanner attachment (2) AF 24 on the mounting flats of the rack.

Twist and hold rack using a torque wrench (1) (20 Nm).

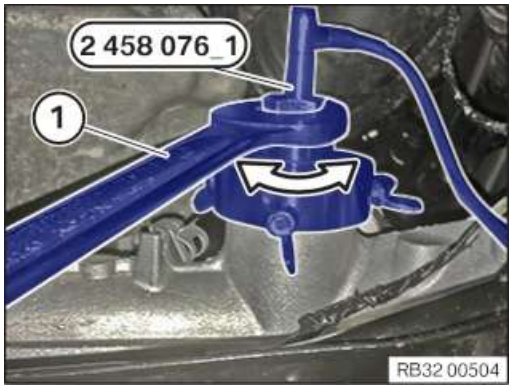
Read off the measured value on the measuring device at the same time (maximum thrust piece play measured value at exactly 20 Nm)!

Perform procedure once in direction of travel and once in opposite direction.

Permissible setpoint value 25 +/-5 µm (in both directions of rotation)!

If the permissible setpoint value is not reached→adjust thrust piece play. (Refer to following step)

cardiagn.com



Adjust thrust piece play:

Position open-end spanner AF 24 (1) on special tool 2 458 076 (1) (calliper) and twist in the respective direction (adjusting screw of thrust piece is thus screwed in or out).

Increase thrust piece play → turn special tool anticlockwise (loosen adjusting screw anticlockwise)

Reduce thrust piece play → turn special tool clockwise (screw in adjusting screw clockwise)

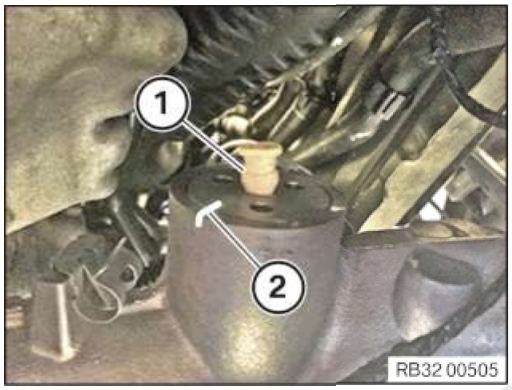
After adjusting thrust piece play (value 1), perform thrust piece play measurement again at 100° +/- 5° steering wheel angle (deflection to the left) (value 2):

If the thrust piece play is less than 5 µm, repeat the thrust piece play adjustment at 100° steering wheel angle and set to 5 µm to 10 µm (value 3).

Then measure thrust piece play in centre position (value 4).

The thrust piece play (value 4) may be more than **25 +5µm** during this!

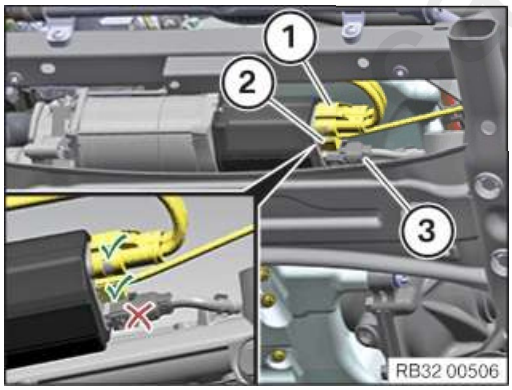
The measured values for the thrust piece play in the centre position (values 1 and 4) and at a 100° steering angle (values 2 and 3) must be noted in the non-electrical diagnosis.



After correctly adjusting the thrust piece play, remove special tool and install sealing plug (1)!

Join sealing plug to, for example, a hexagon socket wrench (4 mm) in the adjusting screw up to limit position.

Apply colour coding (protective paint) (2) with paint pen!



Connect and lock connector (1) and (2) on EPS steering gear.

cardiagn.com

After installation:

- Install the left and right track rods on the steering gear
- Install left and right gaiter
- Fit underbody protection
- Connect negative battery terminal.
- With the vehicle on the vehicle lift, move steering wheel twice in both directions up to the limit position and check for friction
- Set vehicle down on its wheels. Start the engine, move the steering wheel twice in both directions up to the limit position and check for friction
- While driving, check for increased friction and rattling noises

cardiagn.com

32 10 ... Teaching in end stop software for electric steering gear (EPS)

Note:
The end stop software must be taught in:

- after the steering gear is replaced
- after programming/coding

Connect vehicle to BMW diagnosis system.

Select and perform end stop under Service functions.

cardiagn.com

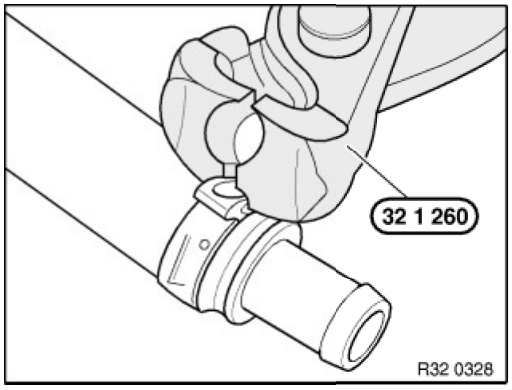
32 41 ... Instructions for removing and installing ear clips

Special tools required:

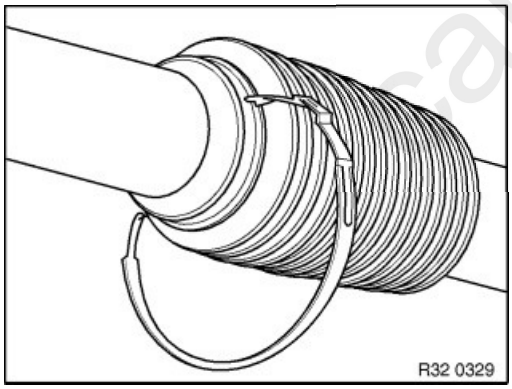
- 32 1 260

Note:
The work steps are show on assorted components.

Ear clip must always be replaced.

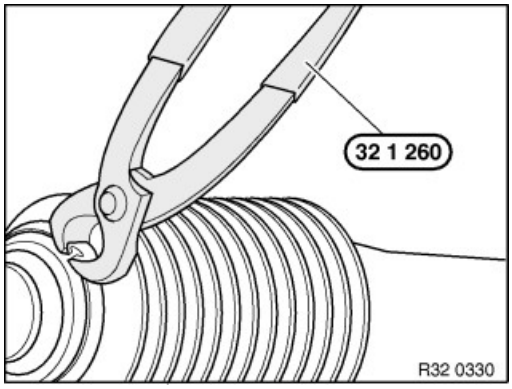


To remove an ear clip, place special tool 32 1 260 at right angles to ear and cut ear open.

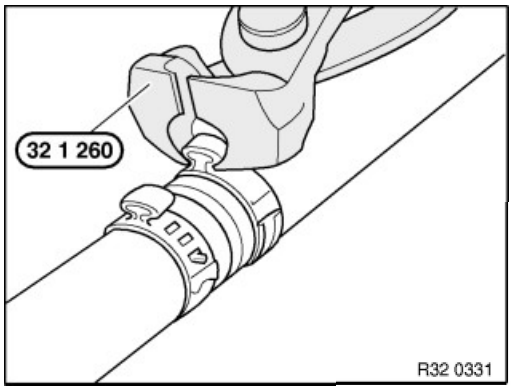


The ear clip can be fitted not only axially but also radially after the hook fastener has been opened.

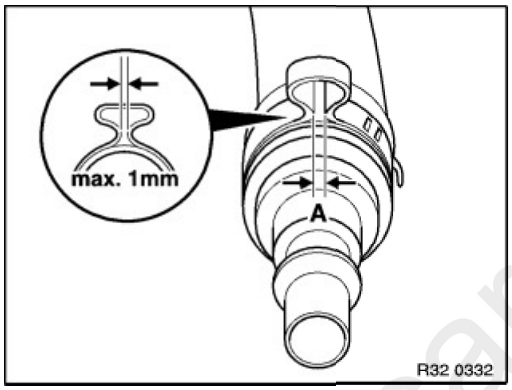
cardiagn.com



Attach hook fastener and press ear together with special tool 32 1 260 .



The diagonal cutting pliers of special tool 32 1 260 can be used in areas which are difficult to access.



Important!

Gap (A) max. 1 mm!

cardiagn.com

32 21 231 Replacing (removing and installing) left or right track rod

Special tools required:

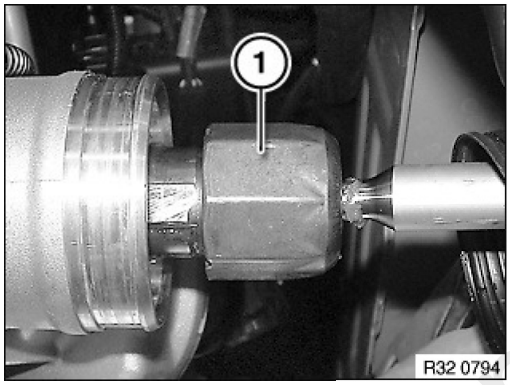
- 32 3 160

Important!

The steering box must be replaced if the polished surface of the rack is damaged (e.g. by corrosion)!

Necessary preliminary tasks:

- Remove cover of steering assemblies front left/right (only diesel-engine cars with rear-wheel drive)
- Remove track rod end from swivel bearing
- Remove gaiter from steering box and slide back



Important!

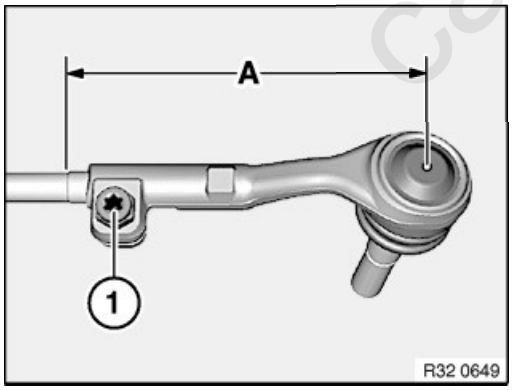
To avoid damage to rack and to suspension mounting, move rack in as far as possible.

Undo the joint (1) using special tools 32 3 160 at the steering box rack.

Tightening torque 32 21 1AZ.

Installation note:
Clean rack.

Check surface of rack for damage (e.g. corrosion).



On replacement, assemble new part with gaiter:

Determine dimension (A) to simplify following adjustment of front axle.

Slacken clamping bolt (1) and screw off track rod end.

Slide gaiter with ear clip and band clamp on track rod.

Screw in track rod end to dimension (A).

Tightening torque 32 21 2AZ

After installation:

- Only if replacing/removing track rod end: Perform chassis / wheel alignment check

cardiagn.com

32 21 151 Replacing left or right track rod end

Note:
If the track rod end to track rod screw connection is released, it is necessary after reinstallation to carry out a wheel alignment check.

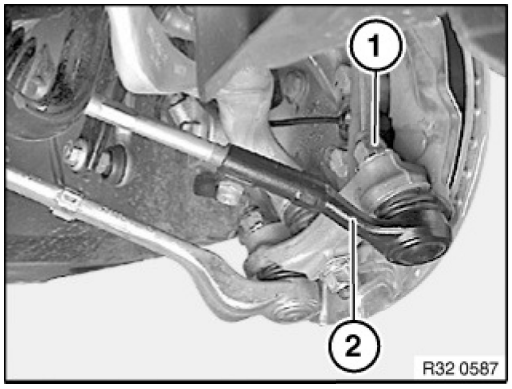
Necessary preliminary work:

- Remove front wheel

Important!

Do not release track rod end from swivel bearing with impact tool.

Rubber boot of track rod end must not be damaged!



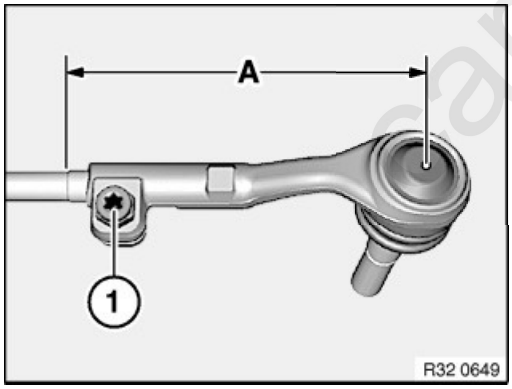
Release nut (1), if necessary, grip at inner Torx socket.

Remove track rod end (2) from swivel bearing.

Installation note:
Keep track rod end to swivel bearing connection clean and free from oil and grease.

Replace self-locking nut.

Tightening torque 32 21 3AZ.



Determine dimension (A) to simplify following adjustment of front axle.

Slacken bolt (1).

Screw off track rod end; if necessary, grip track rod with open-end spanner.

Installation note:
Check gaiter for damage, replace if necessary.

Screw track rod end onto track rod to dimension (A).

Tightening torque 32 21 2AZ.

After installation:

- Perform wheel alignment

cardiagn.com

32 21 151 Replacing left or right track rod end \PREMIUM

TECHNICAL INFORMATION

Perform wheel alignment after installation.

PRELIMINARY WORK

1 – Removing the wheel



- If several wheels are removed simultaneously: Use a piece of chalk to mark on each tyre the axle and side on which the corresponding wheel is fitted.
- Unscrew the wheel bolts and remove the wheel.

  Use the matching adapter from tool set 0 492 518 (36 1 300) (wheel bolt adapter set) to loosen and tighten down the wheel bolt with security code.

MAIN WORK

2 – Removing the track rod end

RISK OF DAMAGE

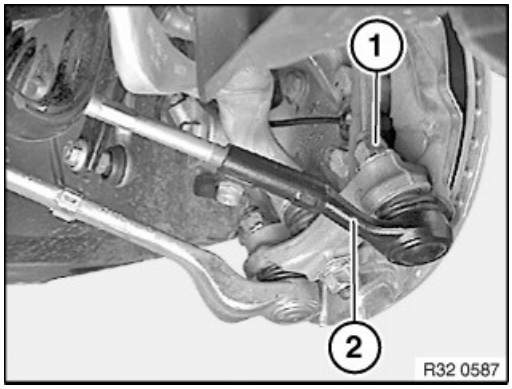
Component damage caused by striking tools.

Brute force can result in component damage.

- Only use those tools intended for the work.

NOTICE

Description is for left component only. Procedure on the right side is identical.



- Loosen the nut (1), if necessary, counter-hold the Torx socket.
- Remove the track rod end (2) from the swivel bearing.

3 – Remounting the track rod end

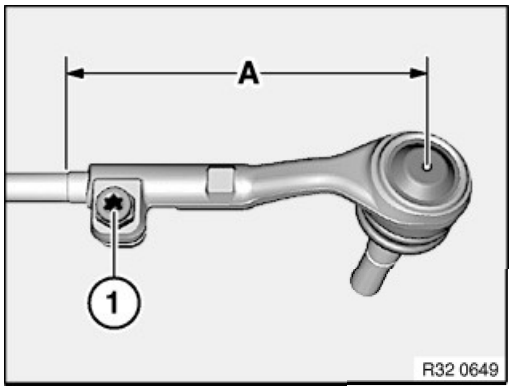
cardiagn.com

TECHNICAL INFORMATION

Perform wheel alignment after installation.

NOTICE

Description is for left component only. Procedure on the right side is identical.



- Determine dimension (A) to simplify subsequent setting of front axle.
- Slacken screw (1).
- Unscrew the track rod end, if applicable, counter support the track rod with the open-end spanner.
- Screw on the track rod end to this dimension (A).
- Tighten down screw (1).

Track rod end to track rod

			32 Nm

4 – Installing track rod end

NOTICE

Description is for left component only. Procedure on the right side is identical.

Check

- Check the gaiter and the spring circlip for damage.

Result

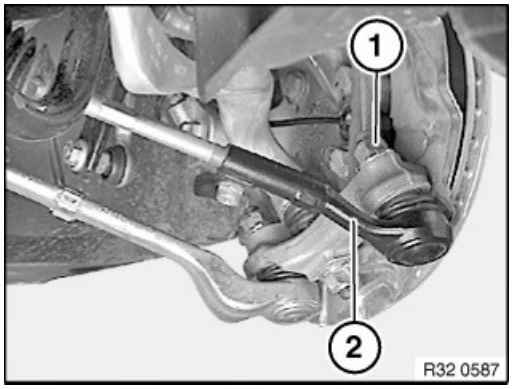
» Component is cracked or porous.

Measure

- Replace component.

  Parts: Component

cardiagn.com



TECHNICAL INFORMATION

Keep the connection of the track rod end to the swivel bearing clean and free from oil and grease.

- Insert track rod end (2) into the swivel bearing.

TECHNICAL INFORMATION

Self-locking nuts must be renewed and must not be reused.

- Renew nut (1).

  Parts: Nut

- Tighten the nut (1), if necessary, counter support the Torx socket.

Track rod end to swivel bearing

M14	Replace self-locking nut.		175 Nm

POSTPROCESSES

5 – Mounting the wheel

▸ **Clean the contact surfaces between the brake disc and the wheel rim**



TECHNICAL INFORMATION

The contact surface between the brake disc and the wheel rim must be clean and free from oil and grease. There is otherwise a risk of the wheel becoming loose at a later time.

- Remove dirt, grease residues and corrosion from the contact surface with a drill and the special tool 2 344 011.

  Do not operate special tool 2 344 011 with an impact screwdriver.

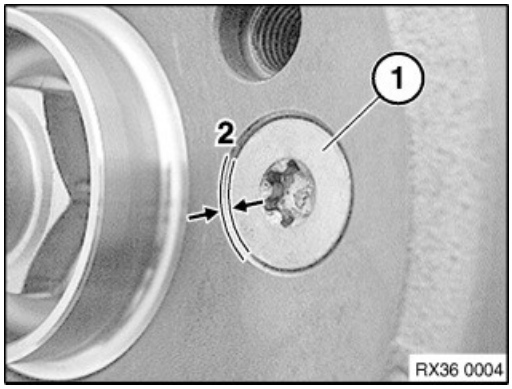
- Degrease the contact surfaces with the universal cleaner (see BMW Group Parts).
- In the event of grease residue around the wheel bolt holes: remove and clean the brake disc.



- Remove dirt, grease residues and corrosion from the contact surface with a drill and the special tool 2 344 011.

  Do not operate special tool 2 344 011 with an impact screwdriver.

- Degrease the contact surfaces with the universal cleaner (see BMW Group Parts).



- Check the mounting bolt for the brake disc (1) for secure fit.

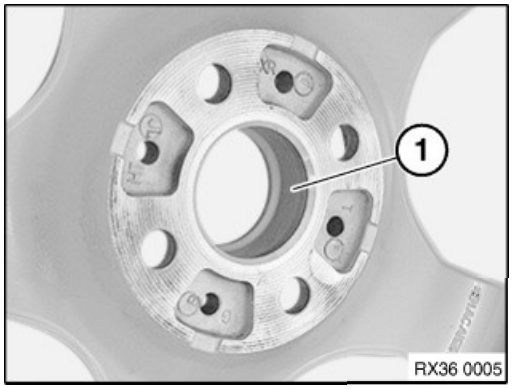
  The mounting bolt for the brake disc (1) must not protrude under any circumstances on the contact surface (2) between the brake disc and the wheel rim.

Brake disc to front wheel hub

M8	Renew screw.		16 Nm

Brake disc to rear wheel hub

M8	Renew screw.		16 Nm



- Lightly grease the wheel centring (1) in the wheel rim; refer to additional information for grease for the wheel centring.



TECHNICAL INFORMATION

Never use impact screwdrivers or electric screwdrivers to screw in and tighten the wheel bolts.

The wheel rim must rest uniformly against the brake disc.

In the case of non-original BMW wheel bolts/wheel rims, it may be necessary to retighten the wheel bolts on account of setting properties (refer to the documentation from the manufacturer).

Do not apply oil to new wheel bolts.

- Renew corroded wheel bolts.

  Parts: Wheel bolts

- Clean the wheel bolts.
- Check wheel bolts (arrows) and threads for damage, renew the wheel bolts if necessary.
- Mount wheel bolts and tighten.

Wheel bolts

M14/AF 17	Screw in wheel bolts and evenly tighten crosswise by hand in order to centre the wheel rim.	Tightening torque	140 Nm
	Tighten wheel bolts to the prescribed tightening torque with a calibrated torque wrench in a crosswise sequence.	Check	140 Nm
	Check all the wheel bolts in the same order or retighten to the prescribed tightening torque again.		

Additional Information

cardiag.com

Overview of Tightening Torques

Track rod end to track rod			Used in step 3
			32 Nm

Track rod end to swivel bearing			Used in step 4
M14	Replace self-locking nut.		175 Nm

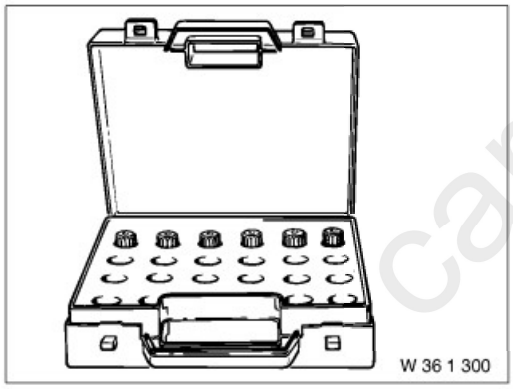
Brake disc to front wheel hub			Used in step 5
M8	Renew screw.		16 Nm

Brake disc to rear wheel hub			Used in step 5
M8	Renew screw.		16 Nm

Wheel bolts			Used in step 5
M14/AF 17	Screw in wheel bolts and evenly tighten crosswise by hand in order to centre the wheel rim. Tighten wheel bolts to the prescribed tightening torque with a calibrated torque wrench in a crosswise sequence. Check all the wheel bolts in the same order or retighten to the prescribed tightening torque again.	Tightening torque Check	140 Nm 140 Nm

Overview of Special Tools

0 492 518 (36 1 300) Adapter



Common		Used in step 1
Usage	(Wheel bolt adapter kit) For releasing and tightening wheel bolts. Individual parts are available via the EPC, see also comments texts for the individual adapters.	
Included in the tool or work		
Storage location	Individual	
Replaced by		
In connection with		
SI-Number	01 27 04 (167)	

Consisting of

Pos	BMW Order number	Replaced by	Designation	In Connection with
6	0 495 221 (36 1 323)		**Wheel stud** (Code 30) Code 39 available separately, (see EPC) under 36 13 1 181 259	
6	0 495 222 (36 1 324)		**Wheel stud** (Code 31) With centring bore available separately, (see EPC) under 36 13 6 765 544	

cardiagn.com

6	0 495 223 (36 1 325)		**Wheel stud** (Code 32) With centring bore available separately, (see EPC) under 36 13 6 765 545	
6	0 495 224 (36 1 326)		**Wheel stud** (Code 33) With centring bore available separately, (see EPC) under 36 13 6 765 546	
6	0 495 225 (36 1 327)		**Wheel stud** (Code 34) With centring bore available separately (see EPC) under 36 13 6 765 547	
6	0 495 226 (36 1 328)		**Wheel stud** (Code 35) With centring bore available separately, (see EPC) under 36 13 6 762 340	
6	0 495 227 (36 1 329)		**Wheel stud** (Code 36) With centring bore available separately (see EPC) under 36 13 6 762 341	
6	0 495 228 (36 1 331)		**Wheel stud** (Code 37) With centring bore available separately (see EPC) under 36 13 6 762 342	
6	0 495 229 (36 1 332)		**Wheel stud** (Code 38) With centring bore available separately (see EPC) under 36 13 6 762 343	
6	0 495 230 (36 1 333)		**Wheel stud** (Code 40) With centring bore available separately (see EPC) under 36 13 6 762 344	
6	0 495 231 (36 1 335)		**Supplement** Not available separately. Can only be ordered as part of the complete special tools (SWZ) set 83 30 0 492 518 (SWZ number 36 1 300) or via the Electronic Parts Catalogue (supplementary set for wheel bolt adapter kit 36 1 300). Consists of: 36 1 323 Code 30 36 1 324 Code 31 36 1 325 Code 32 36 1 326 Code 33 36 1 327 Code 34 36 1 328 Code 35 36 1 329 Code 36 36 1 331 Code 37 36 1 332 Code 38 36 1 333 Code 40 36 1 336 Connection diagram label	

cardiagn.com

6	0 495 232 (36 1 336)		**Labels** (Label) Connection diagram not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.	
6	0 495 233 (36 1 339)		**Case** s (Case) incl. connection diagram label. Not available individually.	
2	0 492 519 (36 1 301)		**Wheel stud** (Code 11) Can be ordered separately via EPC under part number 36 13 1 181 241.	
2	0 492 520 (36 1 302)		**Wheel stud** (Code 12) available separately (see EPC) under 36 13 1 181 242	
2	0 492 521 (36 1 303)		**Wheel stud** (Code 13) available separately (see EPC) under 36 13 1 181 243	
2	0 492 522 (36 1 304)		**Wheel stud** (Code 14) available separately, (see EPC) under 36 13 1 181 244	
2	0 492 523 (36 1 306)		**Wheel stud** (Code 16) available separately (see EPC) under 36 13 1 181 246	
2	0 492 524 (36 1 307)		**Wheel stud** (Code 17) available separately (see EPC) under 36 13 1 181 247	
2	0 492 525 (36 1 308)		**Wheel stud** (Code 18) available separately (see EPC) under 36 13 1 181 248	
2	0 492 526 (36 1 309)		**Wheel stud** (Code 19) available separately (see EPC) under 36 13 1 181 249	
2	0 492 527 (36 1 311)		**Wheel stud** (Code 20) available separately (see EPC) under 36 13 1 181 250	
2	0 492 528 (36 1 312)		**Wheel stud** (Code 31) 12/2004 available separately, (see EPC) under 36 13 6 765 544	

cardiagn.com

2	0 492 529 (36 1 313)		**Wheel stud** (Code 32), 12/2004 available separately (see EPC) under 36 13 6 765 545	
2	0 492 530 (36 1 314)	0 495 224	**Wheel stud** (Code 33) 12/2004 Replaced by 36 1 326.(0 495 224) Not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.	
2	0 492 531 (36 1 315)	0 495 225	**Wheel stud** (Code 34) 12/2004 Replaced by 36 1 327.(0 495 225) Not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.	
2	0 492 532 (36 1 316)	0 495 226	**Wheel stud** (Code 35) 12/2004 Replaced by 36 1 328.(0 495 226) Not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.	
2	0 492 533 (36 1 317)	0 495 227	**Wheel stud** (Code 36) 12/2004 Replaced by 36 1 329.(0 495 227) Not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.	
2	0 492 534 (36 1 318)	0 495 228	**Wheel stud** (Code 37) 12/2004 Replaced by 36 1 331.(0 495 228) Not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.	

cardiagn.com

2	0 492 535 (36 1 319)	0 495 229	**Wheel stud** (Code 38) 12/2004 Replaced by 36 1 332.(0 495 229) Not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.	
2	0 492 536 (36 1 321)	0 495 221	**Wheel stud** (Code 39) Code 30, 12/2004 Replaced by 36 1 323.(0 495 221) Not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.	
2	0 492 537 (36 1 322)	0 495 230	**Wheel stud** (Code 40) 12/2004 Replaced by 36 1 333.(0 495 230) Not available individually. Can only be ordered as part of the complete special tool set 83 30 0 492 518 (special tool number 36 1 300) or via the Electronic Parts Catalogue.	
10	0 493 534 (36 1 305)		**Wheel stud** (Code 15) available separately (see EPC) under 36 13 1 181 245	

2 344 011 Tool



Common Used in step 5

Usage	Tool (wheel hub grinder) for cleaning the connection of the wheel rim (wheel contact face) to the wheel hub.
Included in the tool or work	
Storage location	
Replaced by	
In connection with	
SI-Number	08 08 12 (872)

Replacement tools:

cardiagn.com

0 495 221 (36 1 323) Wheel stud



Common	Used in step 1
Usage	(Code 30) Code 39 available separately, (see EPC) under 36 13 1 181 259
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 224 (36 1 326) Wheel stud



Common	Used in step 1
Usage	(Code 33) With centring bore available separately, (see EPC) under 36 13 6 765 546
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 225 (36 1 327) Wheel stud



Common	Used in step 1
Usage	(Code 34) With centring bore available separately (see EPC) under 36 13 6 765 547
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

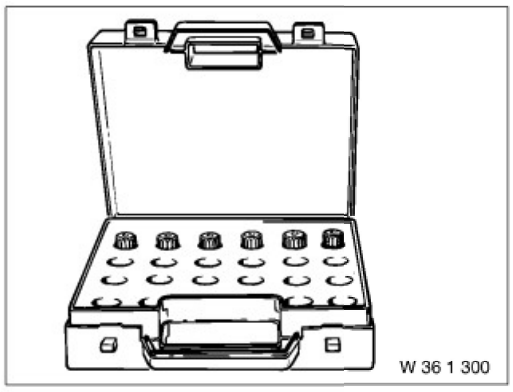
cardiagn.com

0 495 226 (36 1 328) Wheel stud



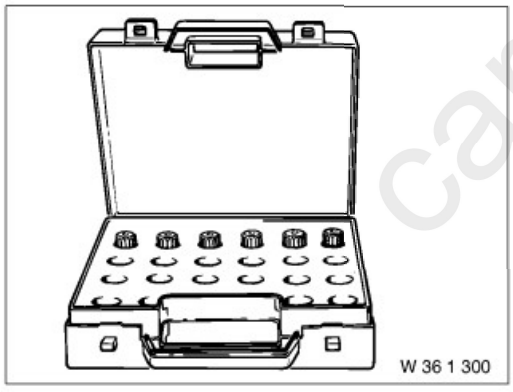
Common	Used in step 1
Usage	(Code 35) With centring bore available separately, (see EPC) under 36 13 6 762 340
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 227 (36 1 329) Wheel stud



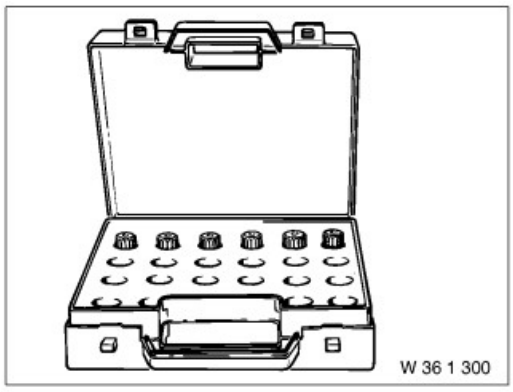
Common	Used in step 1
Usage	(Code 36) With centring bore available separately (see EPC) under 36 13 6 762 341
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 228 (36 1 331) Wheel stud



Common	Used in step 1
Usage	(Code 37) With centring bore available separately (see EPC) under 36 13 6 762 342
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

0 495 229 (36 1 332) Wheel stud



Common	Used in step 1
Usage	(Code 38) With centring bore available separately (see EPC) under 36 13 6 762 343
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

cardiagn.com

0 495 230 (36 1 333) Wheel stud



Common	Used in step 1
Usage	(Code 40) With centring bore available separately (see EPC) under 36 13 6 762 344
Included in the tool or work	0 492 518
Storage location	
Replaced by	
In connection with	
SI-Number	

Links

Repair instructions	Used in step
32 00 150 KDS chassis/wheel alignment check with vehicle load up to design position	
32 00 155 KDS wheel alignment check with ride height measurement without vehicle load	

Operating materials	Used in step
2.0 Grease for wheel centring	5

Parts

Parts required

Designation	Used in step
Universal cleaner	5

cardiagn.com

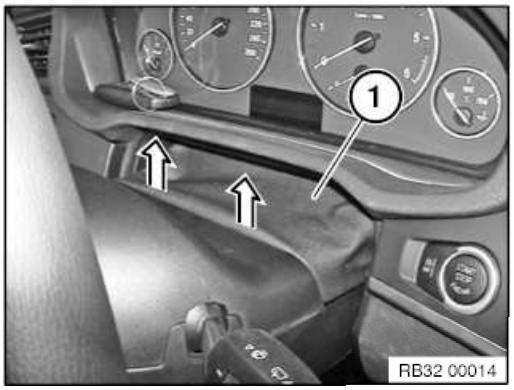
32 31 020 Remove and install / replace the steering column shroud lower section \PREMIUM

PRELIMINARY WORK

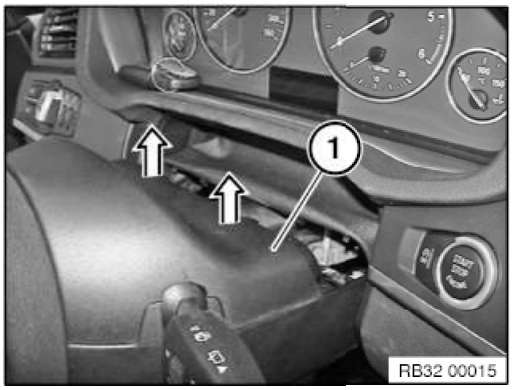
1 – Removing steering column shroud upper section

Prerequisite

Steering column in bottom and raised position.



- Carefully pull the gap cover for the steering column (1) upwards and unclip.



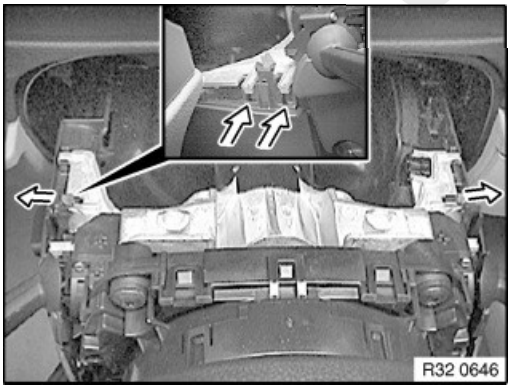
- Carefully pull the steering column shroud upper section (1) upwards at the rear, unclip and remove.

MAIN WORK

2 – Removing steering column shroud lower section

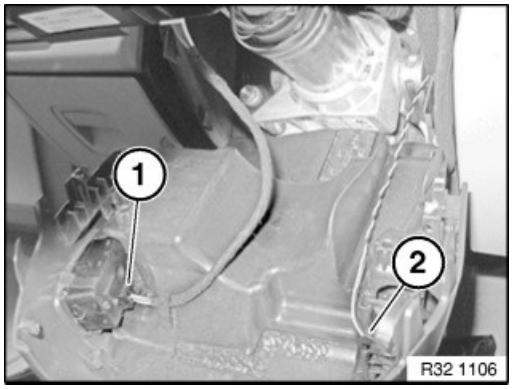
Prerequisite

Steering column in top and raised position.



- Press retaining lugs outwards gently and unclip steering column shroud lower section downwards.

cardiagn.com

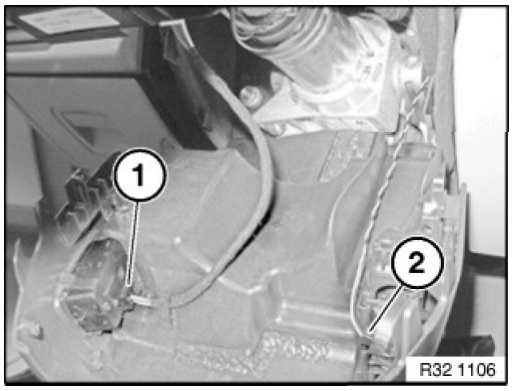


- Tilt steering column shroud lower section in downward direction.
- If necessary disconnect plug connection (1) of the steering column adjustment and the plug connection (2) of the ring aerial.
- Remove steering column shroud lower section.

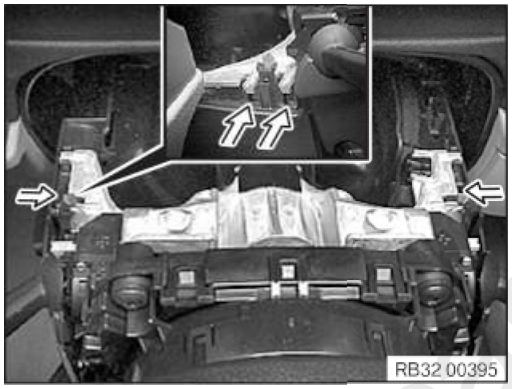
3 – Install steering column shroud lower section

Prerequisite

Steering column in top and raised position.



- Connect the connector (2) of the ring aerial and if applicable the connector (1) of the steering column adjustment.
- Tilt the steering column shroud lower section upwards towards the steering column.



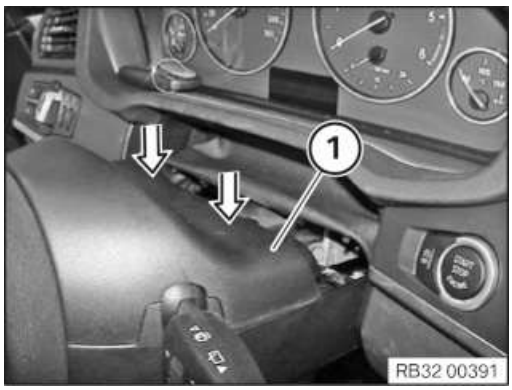
- Align the steering column shroud lower section with the steering column using the retaining lugs and press upwards up to the limit position.
- Slightly press the steering column shroud lower section together on both sides and then completely press it upwards until the retaining lugs engage.

cardiagn.com

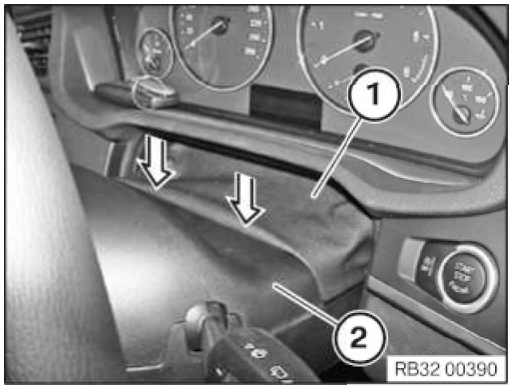
4 – Fit steering column shroud upper section

Prerequisite

Steering column in bottom and raised position.



- Insert the steering column shroud upper section (1) and clip in the direction of the arrow.



- Position and clip in the gap cover (1) for the steering column onto the steering column shroud upper section (2) in the direction of the arrow.

cardiagn.com

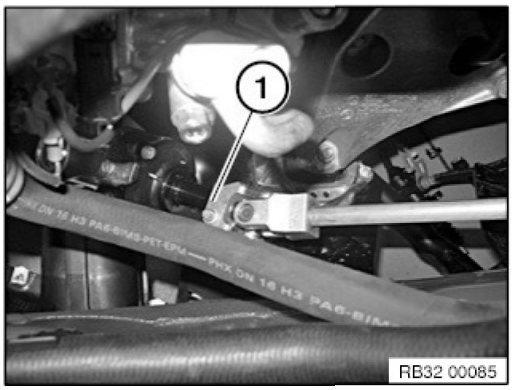
32 31 070 Removing and installing / replacing lower section of steering shaft

Attention!

Do not turn the steering wheel once the steering shaft has been detached from the steering box/steering column! If the lower section of the steering shaft is separated from the steering gear/steering column, the steering column switch cluster may be damaged when the steering wheel is turned!

Necessary preliminary work:

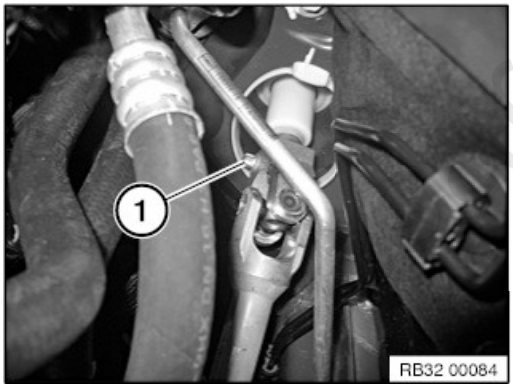
- Remove electronics box (only N47/B47/B37/B38/B48)
- Remove trim panel for pedal mechanism
- Move steering column in "top" and "retracted" position.



Release and detach clamping bolts (1) of steering shaft on steering gear (in engine compartment).*Installation note:*
Clean screw threads to remove all remnants of screw locking adhesive.

Replace clamping bolts.

Tightening torque 32 31 2AZ.



Pull down steering shaft until clamping bolt (1) is accessible with tool (2).

Release clamping bolt (1) and remove steering shaft.

Installation note:
Clean screw threads to remove all remnants of screw locking adhesive.

Replace clamping bolts.

Counter-hold the steering shaft in the passenger compartment on the steering column when sliding the universal joint onto the steering column!

Connect steering spindle first to steering column and then to steering gear.

Clamping bolt must rest in groove of steering box or steering column.

No retorquing permitted!

Tightening torque 32 31 3AZ.

After installation:

- Turn steering wheel in both directions to the limit position. The airbag indicator light must not light up in the process.

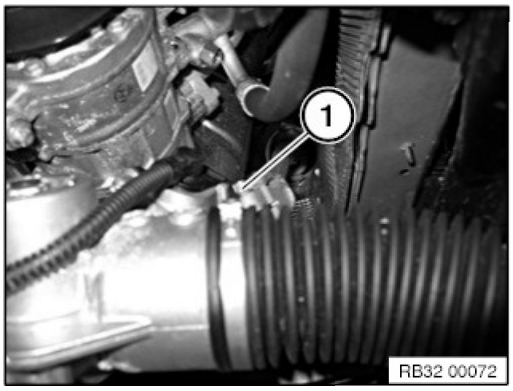
32 31 070 Removing and installing / replacing lower section of steering shaft

Important!

If the lower section of the steering shaft is separated from the steering box/steering column, the steering column switch cluster may be damaged when the steering wheel is turned.

Necessary preliminary tasks:

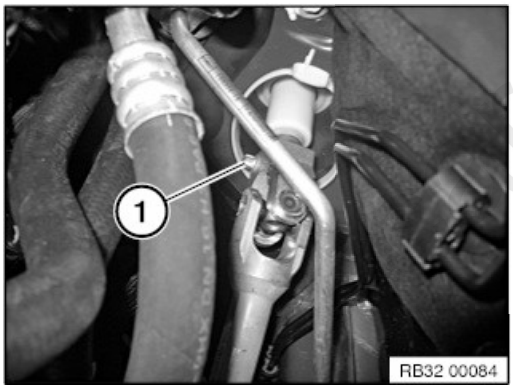
- Remove front underbody protection
- Remove sump guard for steering (sports chassis only)
- Remove trim panel for pedal mechanism
- Move steering column in "top" and "retracted" position.



Release clamping bolts (1) of steering shaft from steering box from below and detach steering shaft from steering box.*Installation note:*
Clean screw threads to remove all remnants of screw locking adhesive.

Replace clamping bolts.

Tightening torque 32 31 2AZ.



Pull down steering shaft until clamping bolt (1) is accessible with tool (reversible ratchet and extension).

Release clamping bolt (1) and remove steering shaft in downward direction.

Installation note:
Clean screw threads to remove all remnants of screw locking adhesive.

Replace clamping bolts.

Counter-hold the steering shaft in the passenger compartment on the steering column when sliding the universal joint onto the steering column!

Connect steering spindle first to steering column and then to steering gear.

Clamping bolt must rest in groove of steering box or steering column.

No subsequent retorquing permitted!

Tightening torque 32 31 3AZ.

After installation:

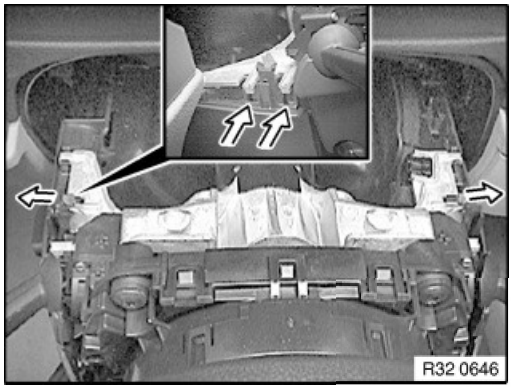
- Turn steering wheel in both directions to the limit position. The airbag indicator light must not light up in the process.

diagn.com

32 31 020 Removing and installing/replacing lower section of steering column shroud

Necessary preliminary work:

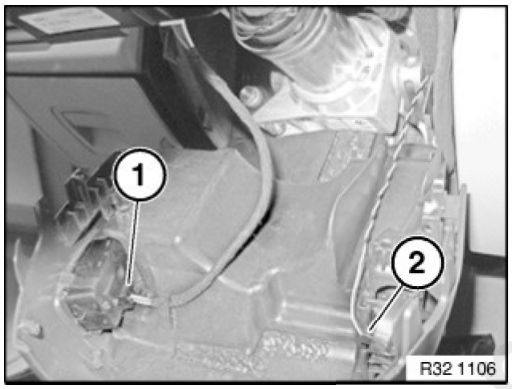
- Remove top section of steering column casing.
- Move steering column in "top" and "extended" position.



Press retaining lugs outwards a little and unclip steering column shroud downwards.*Installation note:*
Align steering column shroud by means of retaining lugs to steering column and press up as far as it will go.

Press steering column shroud on both sides together a little and then press upwards completely until retaining lugs snap into place.

Check installation position, correct if necessary.



Tilt steering column shroud in downward direction.

If necessary, unlock plug connection (1) on steering column adjustment switch and (2) emergency starting aerial and disconnect.

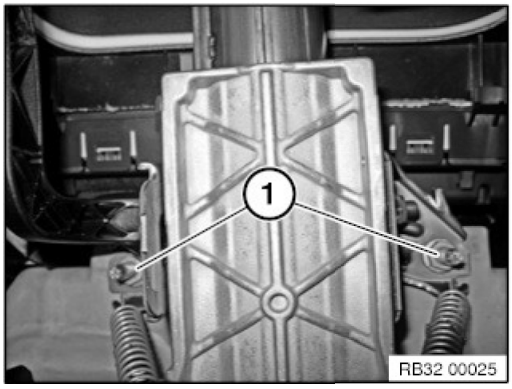
Remove steering column shroud lower section.

cardiagn.com

32 31 090 Removing and installing/replacing steering column

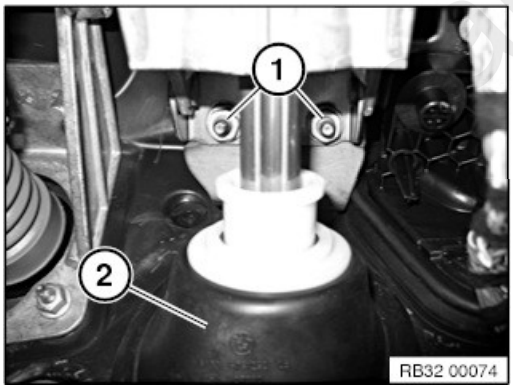
Necessary preliminary tasks:

- Move steering column into "extended" position.
- Disconnect battery negative lead.
- Remove airbag
- Remove steering wheel.
- Remove trim panel for pedal mechanism.
- US vehicles only: Remove airbag module for driver's knee protection.
- Remove upper and lower steering column shroud.
- Remove steering column switch cluster.
- Unclip wiring harness and place to one side.
- Release electronics box at the spring strut dome and only lay to the side (only N47).
- Release steering shaft from steering column in engine compartment.



Undo nuts (1) at top of steering column.

Tightening torque 32 31 1AZ.

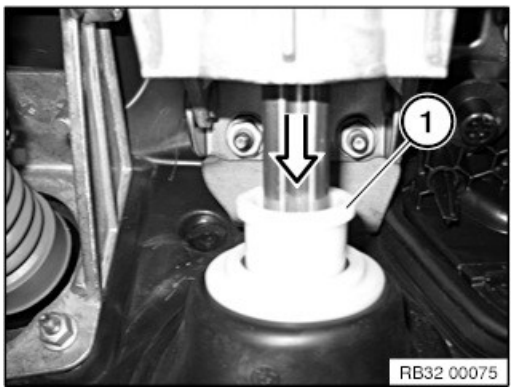


Secure steering column against falling out.

Undo nuts (1) at bottom of steering column.

Tightening torque 32 31 1AZ.

rdiagn.com



Installation note:
Align steering shaft and steering column! (encoding at spindle and joint)

With the assistance of another person, hold the universal joint in the engine compartment and slide spindle of steering column at plastic sleeve (1) from the footwell onto the universal joint.

When pushing in the steering shaft (1), ensure that the steering shaft collar is correctly positioned. Sleeve must be clipped into the bulkhead.

(See Removing and installing steering shaft collar)

After installation:

- Turn steering wheel in both directions to the limit position. The airbag indicator light must not light up!

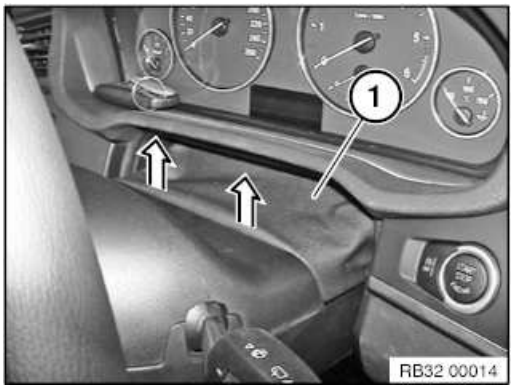
cardiagn.com

32 31 004 Removing and installing/replacing steering column shroud upper section \PREMIUM

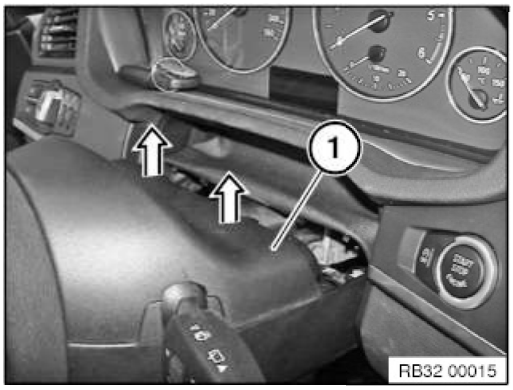
1 – Removing steering column shroud upper section

Prerequisite

Steering column in bottom and raised position.



- Carefully pull the gap cover for the steering column (1) upwards and unclip.

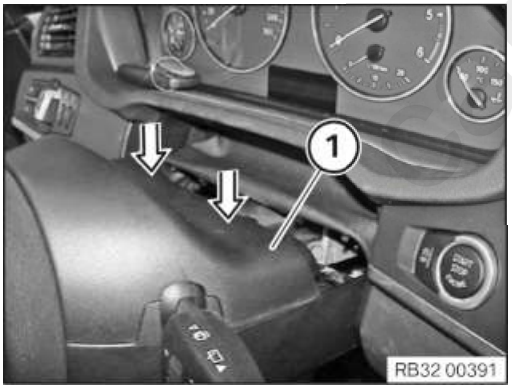


- Carefully pull the steering column shroud upper section (1) upwards at the rear, unclip and remove.

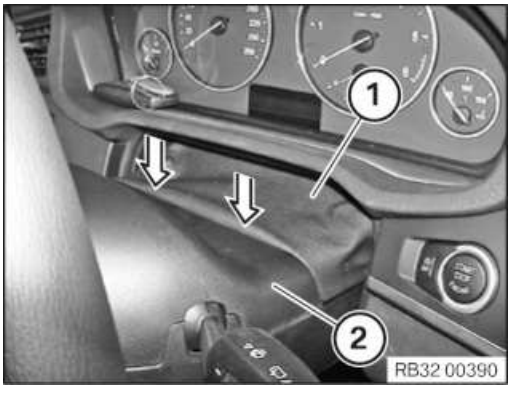
2 – Fit steering column shroud upper section

Prerequisite

Steering column in bottom and raised position.



- Insert the steering column shroud upper section (1) and clip in the direction of the arrow.



- Position and clip in the gap cover (1) for the steering column onto the steering column shroud upper section (2) in the direction of the arrow.

carldiagn.com

32 31 003 Removing and installing/replacing upper section of steering column shroud



Move steering column in "bottom" and "extended" position.

Push steering column shroud (1) upwards at rear and unclip.

Repeat process on right side.



Unclip steering column gap coverÂ (1) out of steering column shroud upper section.

cardiagn.com

32 31 241 Replacing adjusting lever for steering column

Necessary preliminary work:

- Remove trim panel for pedal mechanism



Release nuts (1) from footwell and detach adjustment lever.*Installation note:*
Replace nut (1).

In installed or closed condition, the adjustment lever must be positioned parallel with the steering column!

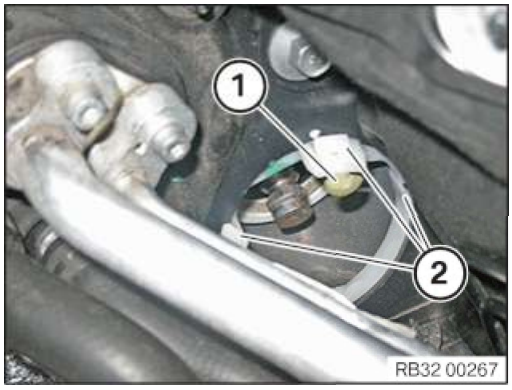
Tightening torque, 32 31 5AZ.

cardiagn.com

32 31 102 Replacing steering shaft collar

Necessary preliminary tasks:

- Remove trim panel for pedal mechanism
- US vehicles only: Remove airbag module for driver knee protection
- Unclip air duct in footwell.
- Remove bottom steering shaft in engine compartment.



Pull locking pin (1) off of steering shaft collar.

Press in latch mechanisms (2) from engine compartment and press steering shaft collar in passenger compartment.

- Remove steering column with steering shaft collar.

Installation note:
Mount steering column with steering shaft collar from passenger compartment.

Screw steering column on body.

Insert steering shaft collar into the recesses in the bulkhead and press in until the latch mechanisms engage audibly and palpably.

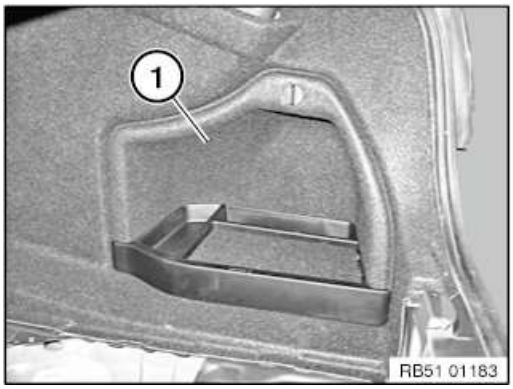
Check latch mechanisms from engine compartment for tight fit and mount locking pin.

cardiagn.com

32 33 000 Remove and install / replace the steering wheel \PREMIUM

PRELIMINARY WORK

1 – Remove right luggage compartment trim panel



- Remove right luggage compartment trim panel (1).

2 – Disconnecting the battery earth lead

Prerequisite

Ignition is switched off.

TECHNICAL INFORMATION

For additional information see:
61 00 ... Safety information on handling the vehicle battery
61 00 / 12 00 ... Notes on disconnecting and connecting the vehicle battery
61 12 ... Notes on the intelligent battery sensor (IBS)



RISK OF DAMAGE

Damage to battery terminal, the safety battery terminal or the intelligent battery sensor (IBS).

Damaged battery terminals can lead to malfunctions or vehicle electrical system faults.

- Pull off battery terminal from battery pole by carefully moving to and fro. Do not pry off using a tool.

- Slacken nut (1).
- Pull off the battery earth lead including intelligent battery sensor (IBS) (2) upwards, put to one side and secure the components.

3 – Removing the airbag unit

▸ **Removing the airbag unit (standard steering wheel)**

carlagn.com

WARNING

Airbag unit.

Danger! Life-threatening injuries!

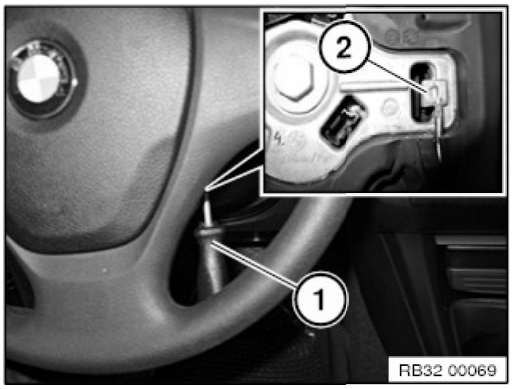
- Before performing any work on the airbag, always disconnect the battery earth lead from the battery.
- Airbag unit may only be set down with the cushion (airbag itself) facing upwards.
- For additional information see: 72 00 ... Safety regulations on handling airbag system components/gas generators

TECHNICAL INFORMATION

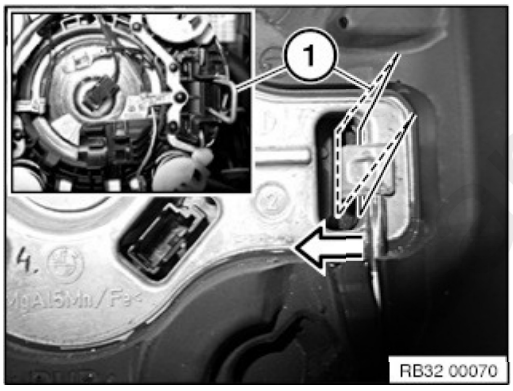
Steering wheel must be replaced if airbag unit has been deployed.

Only with M Sport steering wheel: Impact plate must be replaced if airbag unit has been deployed.

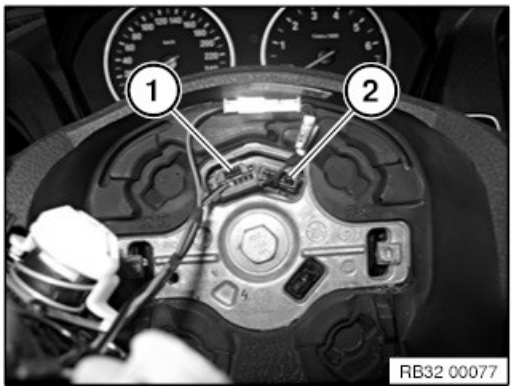
For additional information see: 72 12 ... Procedure after airbag deployment as result of an accident



- Guide Torx screwdriver T20 (1) up to limit position (2) vertically into the covered opening.
- Pull Torx screwdriver approx. 2-3 mm out of opening.
- Carefully push handle of the Torx screwdriver (1) to the centre of the steering wheel and at the same time push back into the opening; while doing so, position the Torx screwdriver (1) behind the retaining spring.



- Press the retaining spring (1) with the Torx screwdriver from the airbag unit inward and at the same time pull the airbag unit upward.
- Repeat process on other side.



- Tilt airbag unit forwards.
- Disconnect plug connections (1) and (2) and remove airbag unit.

▸ **Removing the airbag unit (sports steering wheel)**

WARNING

Airbag unit.

Danger! Life-threatening injuries!

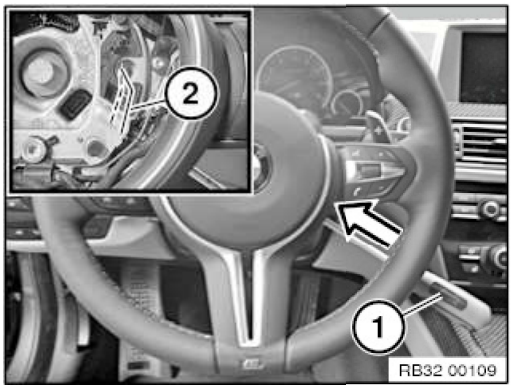
- Before performing any work on the airbag, always disconnect the battery earth lead from the battery.
- Airbag unit may only be set down with the cushion (airbag itself) facing upwards.
- For additional information see: 72 00 ... Safety regulations on handling airbag system components/gas generators

TECHNICAL INFORMATION

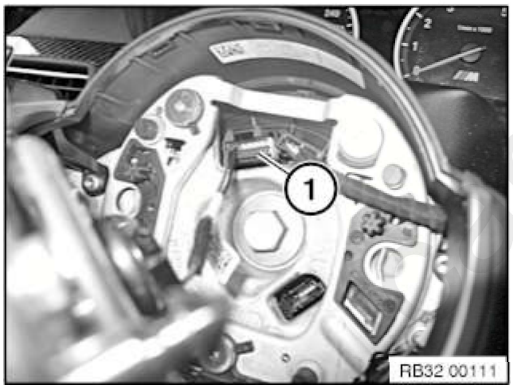
Steering wheel must be replaced if airbag unit has been deployed.

Only with M Sport steering wheel: Impact plate must be replaced if airbag unit has been deployed.

For additional information see: 72 12 ... Procedure after airbag deployment as result of an accident



- Insert the Torx screwdriver T27 (1) straight into the concealed opening up to the resistor.
- Press in the retaining spring (2) using the Torx screwdriver (1) in the direction of the arrow until the airbag unit has been unlocked.
- Repeat process on other side.

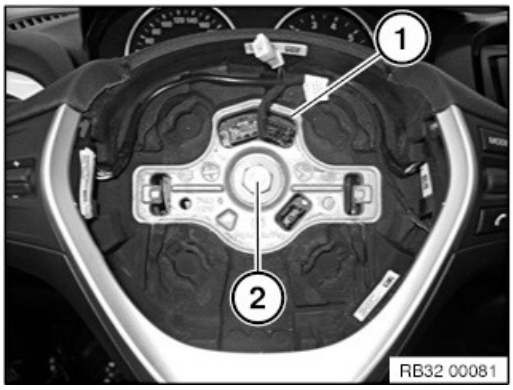


- Raise airbag unit towards rear.
- Disconnect the plug connection (1) and remove the airbag unit.

MAIN WORK

4 – Removing the steering wheel

▸ **Removing the steering wheel (standard steering wheel)**

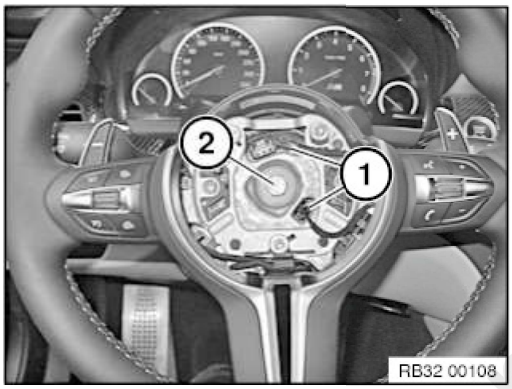


- Move steering to straight-ahead driving position.
- Disconnect plug connection (1).
- Loosen the screw (2) and remove the steering wheel.



- Check the neutral position of the clock spring on the steering column switch cluster (SZL) using the yellow mark (1).
- Do not twist the clock spring.

▸ **Removing the steering wheel (sports steering wheel)**



- Move steering to straight-ahead driving position.
- Disconnect plug connection (1).
- Loosen the screw (2) and remove the steering wheel.



- Check the neutral position of the clock spring on the steering column switch cluster (SZL) using the yellow mark (1).
- Do not twist the clock spring.

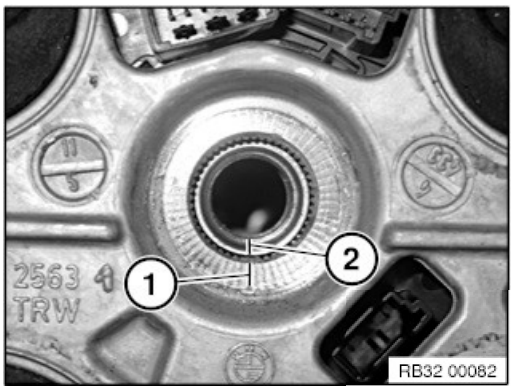
5 – Installing the steering wheel

▸ **Installing the steering wheel (standard steering wheel)**

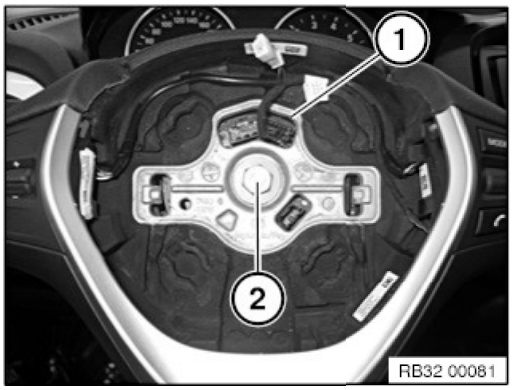
rdiagn.com



- Check the neutral position of the clock spring on the steering column switch cluster (SZL) using the yellow mark (1).



- Align and connect the steering wheel using the mark (1) and the mark (2) on the steering column.



- Route the wiring and connect the connector (1).
- Tighten down screw (2).

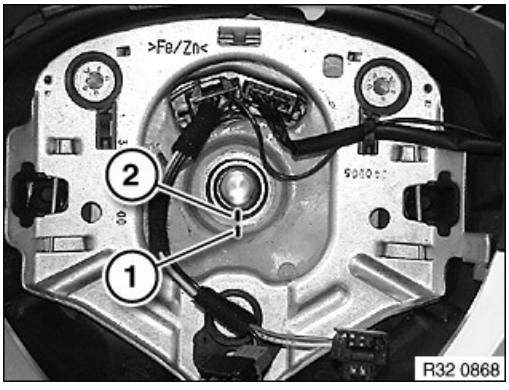
Steering wheel to steering column

M14			62 Nm

▸ **Installing the steering wheel (sports steering wheel)**

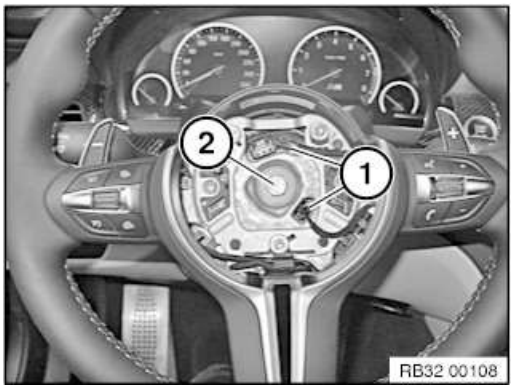


- Check the neutral position of the clock spring on the steering column switch cluster (SZL) using the yellow mark (1).



- Align and connect the steering wheel using the mark (1) and the mark (2) on the steering column.

rdiagn.com



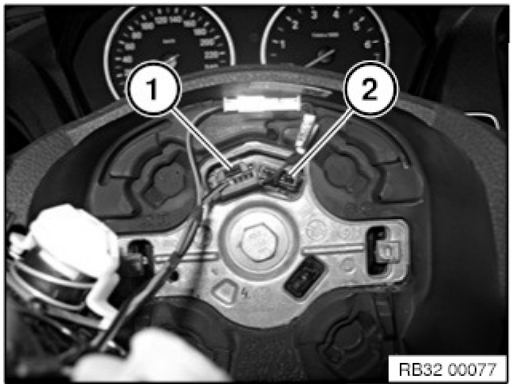
- Route the wiring and connect the connector (1).
- Tighten down screw (2).

Steering wheel to steering column

M14			62 Nm

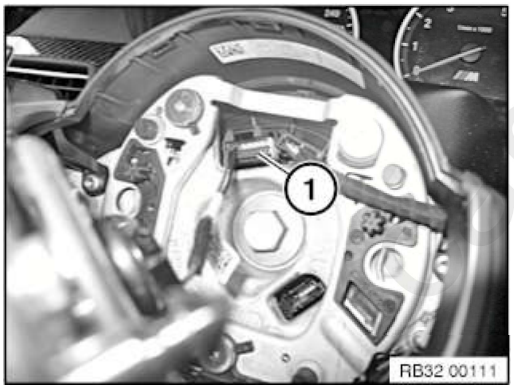
POSTPROCESSES

6 – Installing the airbag unit



▸ **Installing the airbag unit (standard steering wheel)**

- Connect connectors (1) and (2).
- Attach airbag unit and lock with even pressure into retaining springs.



▸ **Installing the airbag unit (sports steering wheel)**

- Connect connector (1).
- Attach airbag unit and lock with even pressure into retaining springs.

7 – Connecting the battery earth lead

TECHNICAL INFORMATION

For additional information see:
61 00 ... Safety information on handling the vehicle battery
61 00 / 12 00 ... Notes on disconnecting and connecting the vehicle battery
61 12 ... Notes on the intelligent battery sensor (IBS)

.com

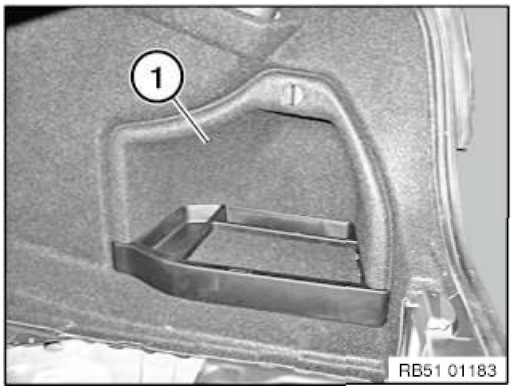


- Connect battery earth lead with intelligent battery sensor (IBS) (2) to negative battery terminal.
- Tighten nut (1).

Battery cable on the battery

M6			5 Nm

8 – Install right luggage compartment trim panel



- Insert right luggage compartment trim panel (1).

Additional Information

Overview of Tightening Torques

Steering wheel to steering column — Used in step 5

M14			62 Nm

Battery cable on the battery — Used in step 7

M6			5 Nm

Links

General repair instructions	Used in step
61 20 ... Notes on AGM battery	27
61 12 ... Notes on intelligent battery sensor (IBS)	27
61 00 ... Notes for disconnecting and connecting battery	27
72 00 ... Safety regulations for handling components with gas generators	3
72 12 ... Procedure after airbag deployment as result of an accident	3

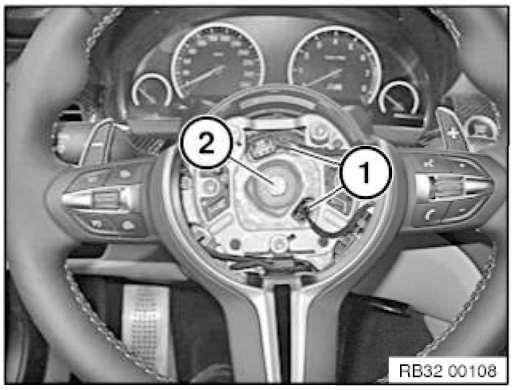
cardiagn.com

32 33 010 Removing and installing (replacing) M sports steering wheel

Note:
Chassis / wheel alignment is not necessary after the steering wheel has been removed and installed or replaced.

Necessary preliminary work:

- Remove airbag unit



Move wheels/sports steering wheel into straight-ahead position.

Disconnect and detach plug connections (1).

Release screw (2) and remove sport steering wheel.

Installation note:
Make sure connecting line(s) is/are correctly laid.

Tightening torque 32 33 1AZ.



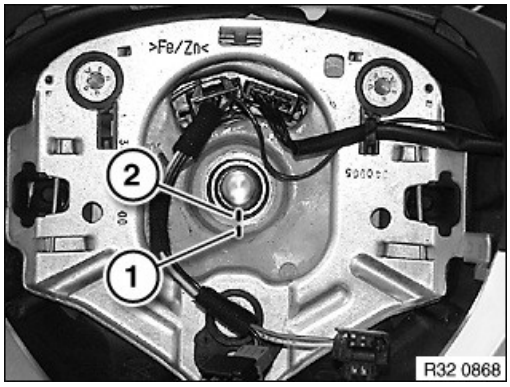
Note:
There are clock springs installed with and without a mechanical anti-twist lock.

Clock spring without mechanical anti-twist lock:

(recognisable at the inspection glass for the mark of the neutral position)

- Do not twist the clock spring.
- Check zero position of clock spring on steering column switch cluster.
- Zero position is correct only when yellow mark (1) is clearly visible!

cardiagn.com



Installation note:
Before fitting sports steering wheel on steering column, ensure correct cable routing.

Align sports steering wheel by way of marking (1) to steering column marking (2) and attach.

Replacement:

- Modify shift paddles
- Modify both multifunction steering wheel switches
- Modify design cover for sports steering wheel at front and rear
- Modify steering wheel module control unit
- If necessary, modify the lane departure warning engine electrical system

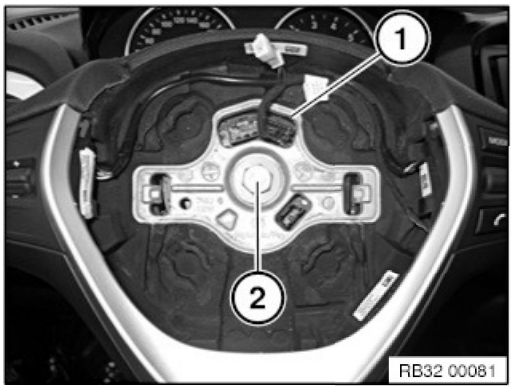
cardiagn.com

32 33 010 Removing and installing/replacing sport steering wheel

Note:
Chassis / wheel alignment is not necessary after the steering wheel has been removed and installed or replaced.

Necessary preliminary work:

- Remove airbag unit



Move wheels/sport steering wheel into straight-ahead position.

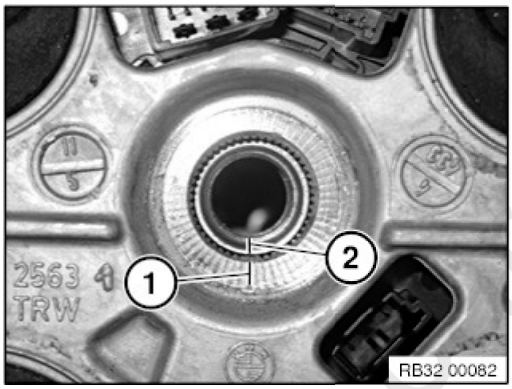
Disconnect plug connection (1).

Release screw (2) and remove sport steering wheel.

Installation note:
Only on vehicles with microencapsulated screw: Clean thread in the steering column and replace screw!

Tightening torque 32 3 3 1AZ.

Make sure connecting line(s) is/are correctly laid.



Installation note:
Align sport steering wheel by way of marking (1) to steering column marking (2) and attach.

Replacement:

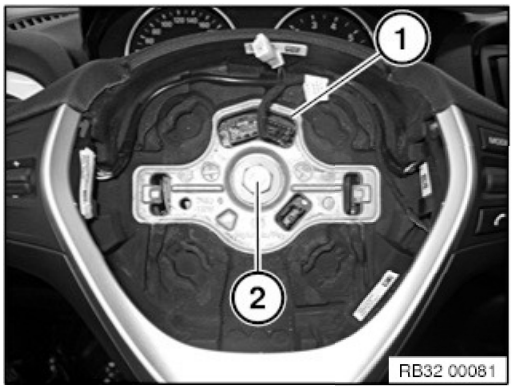
- If necessary, remount both shift paddles
- Remount the design cover
- Remount both switches on the sports steering wheel
- If applicable, remount the steering wheel module

32 33 000 Removing and installing/replacing steering wheel

Note:
Wheel alignment is not necessary after the steering wheel has been removed and installed or replaced.

Necessary preliminary work:

- Remove airbag unit



Move wheels/steering wheel into straight-ahead driving position.

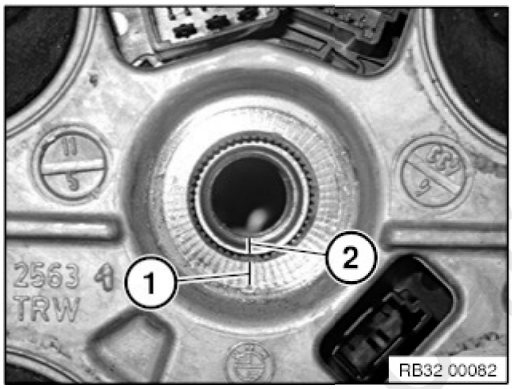
Disconnect plug connection (1).

Release screw (2).

Remove steering wheel.

Installation note:
Only on vehicles with microencapsulated screw (2): Clean thread in the steering column and replace screw (2)!

Tightening torque 32 33 1AZ

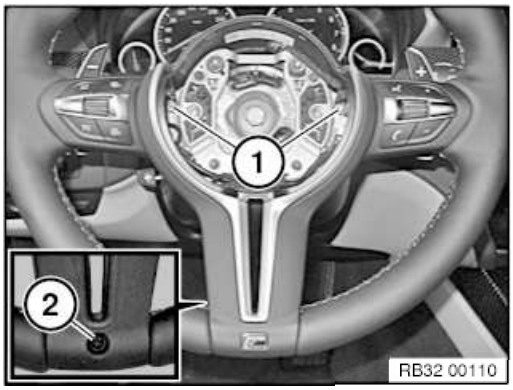


Installation note:
Align steering wheel by way of marking (1) to steering column marking (2) and attach.

32 33 016 Replacing design cover for M sports steering wheel

Necessary preliminary tasks:

- Remove airbag unit



Release screwsÂ (1) on steering wheel.
Release screw (2) on rear side of steering wheel.
Remove design cover.

cardiagn.com

32 33 ... Replacing design cover for sports steering wheel



Note:
Procedure is described under removing switches for multifunction steering wheel

cardiagn.com

72 12 ... Procedure after airbag deployment as result of an accident

Replace all components that were affected by the accident and check all others!

Check and/or replace following components after airbag deployment:

- Components
  - Safety battery terminal
  - Sensor B-pillar (left/right)
  - Sensor front door (left/right)
  - Sensor seat, Driver-/passenger's side
  - Airbag control unit, vehicle interior
  - Pedestrian protection sensor
  - Front sensor (engine compartment)
- Procedure
  - Inspect visually for mechanical damage (housing, plug connections). Replace damaged components
  - Connect diagnosis system
  - Read fault memory
  - Disconnect the vehicle battery and adhere to the waiting period (at least 30 seconds)
  - Inspect visually for mechanical damage
  - Rectify faults
  - Reconnect the vehicle battery and adhere to the waiting period (at least 10 seconds)
  - Delete fault memory
  - Switch off ignition and wait at least 2 minutes (no consumers may be switched on during this period such as interior light, radio, etc.)
  - Switch the ignition on (wait for at least 10 seconds)
  - Delete fault memory
  - If you cannot delete the fault memory: Replace the component that is causing the fault

Replace the airbag control unit in the following cases only:

- In the case of visible external damage
- In the case of a corresponding fault memory entry (airbag indicator light is illuminated)

Cables and connectors

- Components and procedure
  - Check cables and connectors for damage, replace if necessary.
    (e. g. corrosion, correct engagement, bent pin)

Seat belt system

- Components
  - Automatic reel
  - Seat belt tensioner
  - Seat belt height adjustment
  - End fitting pretensioner
  - Seat belt buckle
- Procedure
  - Check components, replace if necessary
  - Additional door lock: Check for foreign body, remove it if necessary

Seats

- Components
  - Seat
  - Airbag module
  - Active head restraint
- Procedure
  - Check seats (functional check of seat mechanism), replace if necessary

cardiagn.com

- Check seat connection
- Replace gas generator of active head restraint

  If the severity of the crash has not caused any other damage to the seat, only the triggered gas generator needs to be replaced
  External feature: The triggered head restraint is folded forwards and engaged
  The repair work can be carried out in the vehicle with the rear panel removed. The entire system can be pushed back into its original position and the new gas generator installed
  The gas generator can be replaced up to 5 times
- Replace airbag module and seat cover with upholstery

- **I01 only:** If one of the following criteria is met, the backrest frame must be replaced
  (Part number of backrest frame: 52 10 7 388 646)
  - Activated belt tensioner
  - Activated end fitting pretensioner
  - Outer cover unclipped by a side collision
  - Outer cover ripped off by a side collision
  - Faulty clip connection on outer cover caused by a side collision

Driver's airbag

- Components
  - Airbag module
  - Steering wheel
  - Steering column (if damaged)
- Procedure
  - Check components, replace if necessary
  - Replace steering wheel

Front passenger airbag

- Components
  - Airbag module
  - Dashboard trim panel (must be replaced!)
  - Supporting tube (if damaged)
- Procedure
  - Check components, replace if necessary

Side airbag, front/rear

- Components
  - Airbag module
  - Door trim panel
  - Door in white
  - Seat
- Procedure
  - Check components; replace if necessary

Head airbag

- Components
  - Airbag module
  - A-pillar trim panel
  - Roofliner
  - B-pillar trim panel (if damaged)
  - C-pillar trim panel (if damaged)
  - Connection/mount (on side frame)
- Procedure
  - Check components, replace if necessary

cardiagn.com

Knee airbag

- Components
  - Trim panel (driver's side)
  - Lower section of glove box
  - Knee protection(Driver- and passenger's side)
- Procedure
  - Check components, replace if necessary

Knee protection

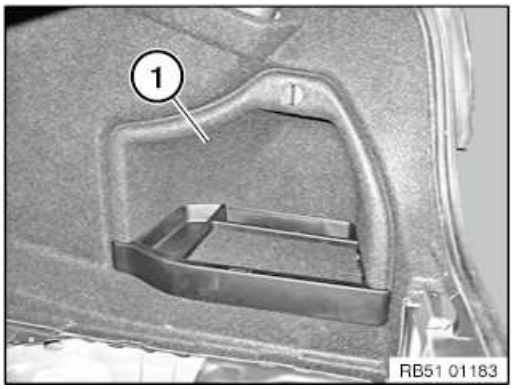
- Components
  - Trim panel (driver's side)
  - Glove box incl. knee protection (passenger's side)
- Procedure
  - Check components for damage, replace if necessary
  - Check retaining elements

cardiagn.com

32 34 030 Removing and installing (replacing) the airbag unit \PREMIUM

PRELIMINARY WORK

1 – Remove right luggage compartment trim panel



- Remove right luggage compartment trim panel (1).

2 – Disconnecting the battery earth lead

Prerequisite

Ignition is switched off.

TECHNICAL INFORMATION

For additional information see:

61 00 ... Safety information on handling the vehicle battery

61 00 / 12 00 ... Notes on disconnecting and connecting the vehicle battery

61 12 ... Notes on the intelligent battery sensor (IBS)



RISK OF DAMAGE

Damage to battery terminal, the safety battery terminal or the intelligent battery sensor (IBS).

Damaged battery terminals can lead to malfunctions or vehicle electrical system faults.

- Pull off battery terminal from battery pole by carefully moving to and fro. Do not pry off using a tool.

- Slacken nut (1).
- Pull off the battery earth lead including intelligent battery sensor (IBS) (2) upwards, put to one side and secure the components.

MAIN WORK

3 – Removing the airbag unit

▸ **Removing the airbag unit (standard steering wheel)**

carmagn.com

WARNING

Airbag unit.

Danger! Life-threatening injuries!

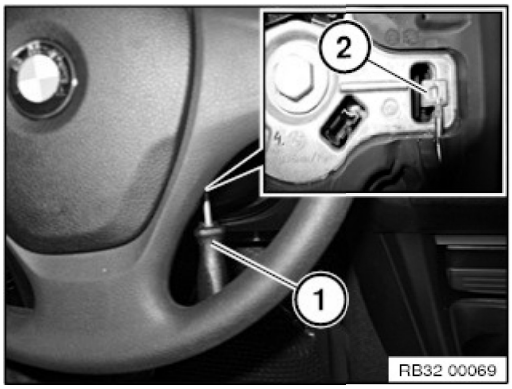
- Before performing any work on the airbag, always disconnect the battery earth lead from the battery.
- Airbag unit may only be set down with the cushion (airbag itself) facing upwards.
- For additional information see: 72 00 ... Safety regulations on handling airbag system components/gas generators

TECHNICAL INFORMATION

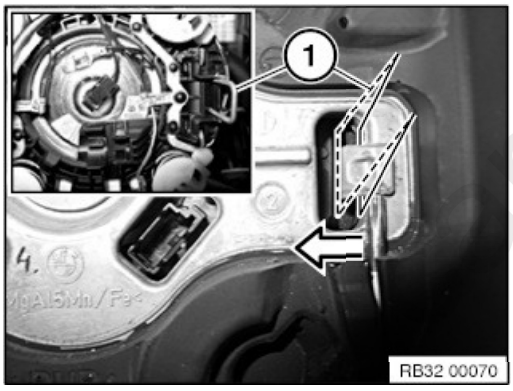
Steering wheel must be replaced if airbag unit has been deployed.

Only with M Sport steering wheel: Impact plate must be replaced if airbag unit has been deployed.

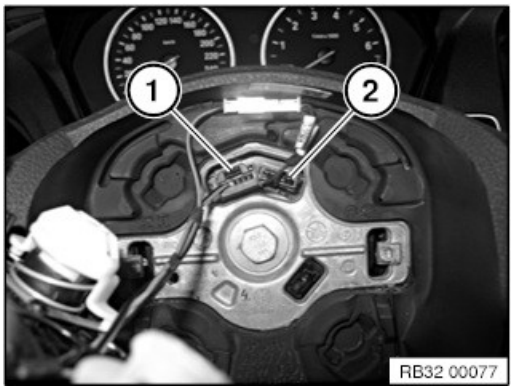
For additional information see: 72 12 ... Procedure after airbag deployment as result of an accident



- Guide Torx screwdriver T20 (1) up to limit position (2) vertically into the covered opening.
- Pull Torx screwdriver approx. 2-3 mm out of opening.
- Carefully push handle of the Torx screwdriver (1) to the centre of the steering wheel and at the same time push back into the opening; while doing so, position the Torx screwdriver (1) behind the retaining spring.



- Press the retaining spring (1) with the Torx screwdriver from the airbag unit inward and at the same time pull the airbag unit upward.
- Repeat process on other side.



- Tilt airbag unit forwards.
- Disconnect plug connections (1) and (2) and remove airbag unit.

▸ **Removing the airbag unit (sports steering wheel)**

WARNING

Airbag unit.

Danger! Life-threatening injuries!

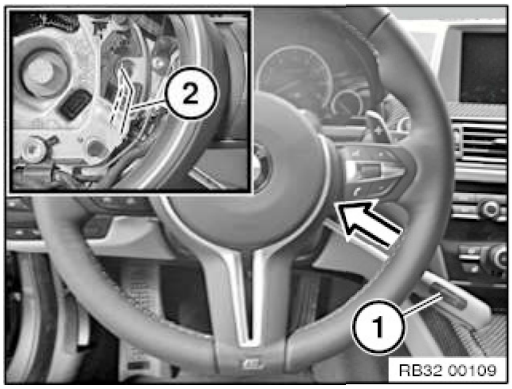
- Before performing any work on the airbag, always disconnect the battery earth lead from the battery.
- Airbag unit may only be set down with the cushion (airbag itself) facing upwards.
- For additional information see: 72 00 ... Safety regulations on handling airbag system components/gas generators

TECHNICAL INFORMATION

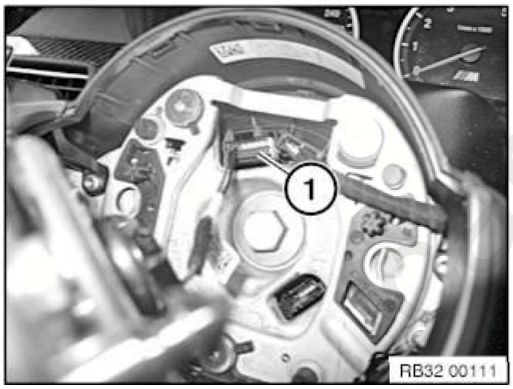
Steering wheel must be replaced if airbag unit has been deployed.

Only with M Sport steering wheel: Impact plate must be replaced if airbag unit has been deployed.

For additional information see: 72 12 ... Procedure after airbag deployment as result of an accident

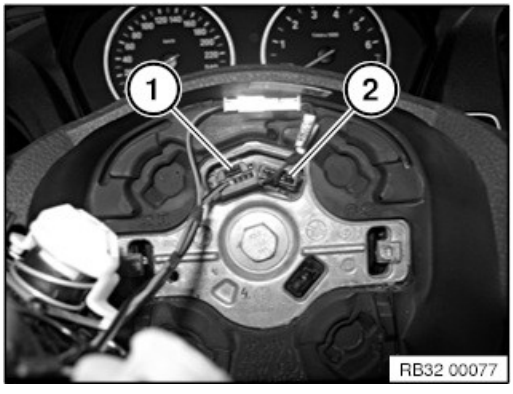


- Insert the Torx screwdriver T27 (1) straight into the concealed opening up to the resistor.
- Press in the retaining spring (2) using the Torx screwdriver (1) in the direction of the arrow until the airbag unit has been unlocked.
- Repeat process on other side.



- Raise airbag unit towards rear.
- Disconnect the plug connection (1) and remove the airbag unit.

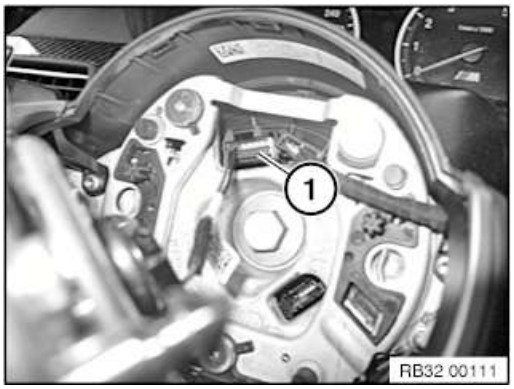
4 – Installing the airbag unit



▶ **Installing the airbag unit (standard steering wheel)**

- Connect connectors (1) and (2).
- Attach airbag unit and lock with even pressure into retaining springs.

▶ **Installing the airbag unit (sports steering wheel)**



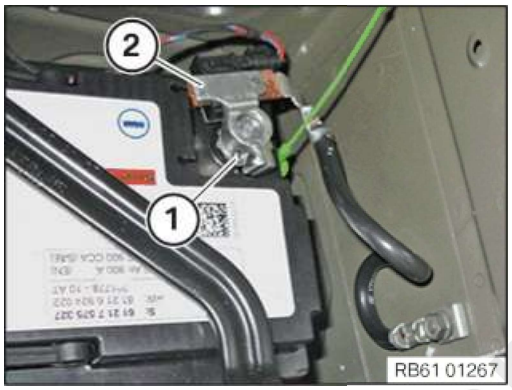
- Connect connector (1).
- Attach airbag unit and lock with even pressure into retaining springs.

POSTPROCESSES

5 – Connecting the battery earth lead

TECHNICAL INFORMATION

For additional information see:
61 00 ... Safety information on handling the vehicle battery
61 00 / 12 00 ... Notes on disconnecting and connecting the vehicle battery
61 12 ... Notes on the intelligent battery sensor (IBS)

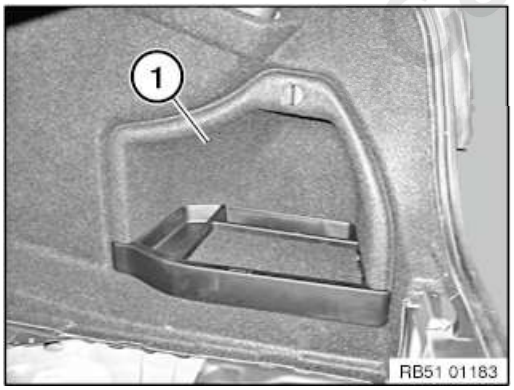


- Connect battery earth lead with intelligent battery sensor (IBS) (2) to negative battery terminal.
- Tighten nut (1).

Battery cable on the battery

M6		5 Nm

6 – Install right luggage compartment trim panel



- Insert right luggage compartment trim panel (1).

Additional Information

Overview of Tightening Torques

Battery cable on the battery — Used in step 5

M6			5 Nm

Links

General repair instructions	Used in step
61 20 ... Notes on AGM battery	25
61 12 ... Notes on intelligent battery sensor (IBS)	25
61 00 ... Notes for disconnecting and connecting battery	25
72 00 ... Safety regulations for handling components with gas generators	3
72 12 ... Procedure after airbag deployment as result of an accident	3

cardiagn.com

32 34 020 Removing and installing/replacing airbag unit

Warning!

Observe the following instructions to avoid any risk of injury by the airbag unit.

- Comply with safety regulations for handling components with gas generators.
- Do not exert any force on the airbag unit.
- Use only specified tools for releasing the airbag unit.

Note: Incorrect handling may result in triggering of the airbag unit and thereby cause serious injury.

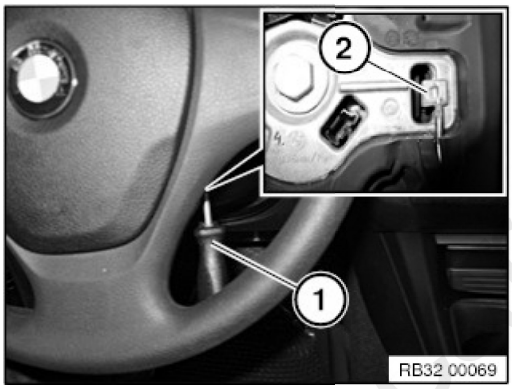
Important!

Steering wheel must be replaced if airbag unit has been triggered!

Follow procedure after airbag deployment.

Necessary preliminary tasks:

- Disconnect battery earth lead

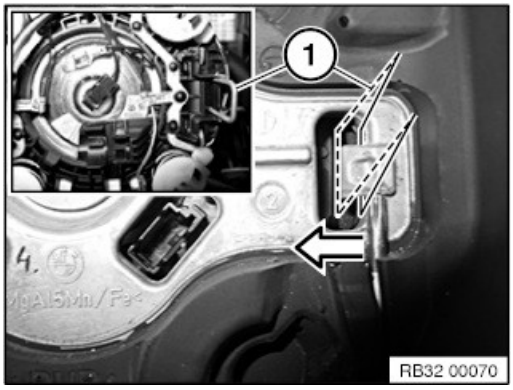


Insert Torx screwdriver T20 (1) vertically into the concealed opening until limit position (2) can be felt.

Pull Torx screwdriver (1) approx. 2-3 mm out of opening. Press screwdriver handle carefully towards middle of steering wheel and simultaneously slide into opening to position Torx screwdriver behind retaining spring bracket (refer to graphic below)

Important!

Press Torx screwdriver carefully towards the middle of steering wheel and slide it in again! Pushing the Torx screwdriver too much further in the direction of steering wheel centre will lead to damage of the steering wheel trim/ the steering wheel.



Press retaining spring bracket (1) of airbag unit inwards and simultaneously pull airbag unit upwards until it unlocks.

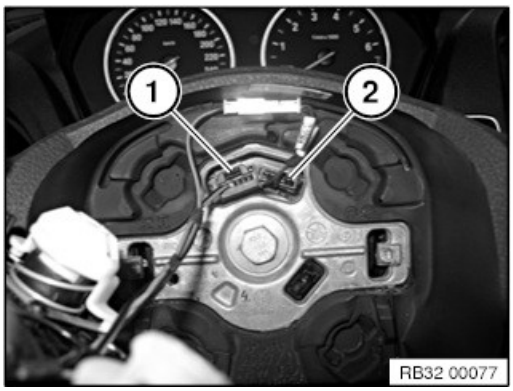
Repeat procedure on other side.

Installation note:
Snap airbag unit with uniform pressing force plane-parallel in direction of steering column shaft into steering wheel.

Warning!

Danger of injury!

The airbag unit may only be set down with the airbag itself facing up.



Tilt airbag unit forwards.

Disconnect plug connections(1) and remove airbag unit.

Installation note:
Make sure electrical leads are correctly positioned.

cardiagn.com

32 34 030 Removing and installing/replacing airbag unit (M sports steering wheel)

Warning!

Observe the following instructions to avoid any danger of injury by the airbag unit.

- Comply with safety regulations for handling components with gas generators.
- Do not exert any force on the airbag unit.
- Use only specified tools for releasing the airbag unit.

Note: Incorrect handling may result in triggering of the airbag unit and thereby cause serious injury.

Caution!

After the replacement of the airbag unit or any conversion of the steering wheel and airbag unit, a software update or programming/encoding must be carried out via ISTA!

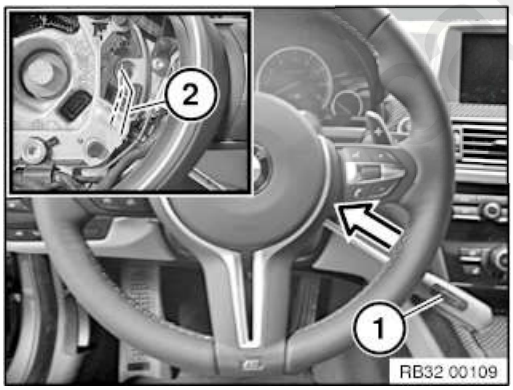
Caution!

Steering wheel must be replaced if airbag unit has been triggered!

Follow procedure after airbag deployment.

Necessary preliminary work:

- Disconnect battery negative cable



Insert Torx screwdriver T27 (1) straight into concealed opening until a spring resistance can be felt.

Press in wire spring clip (2) with Torx screwdriver T27 (1) in direction of arrow until the airbag unit is unlocked.

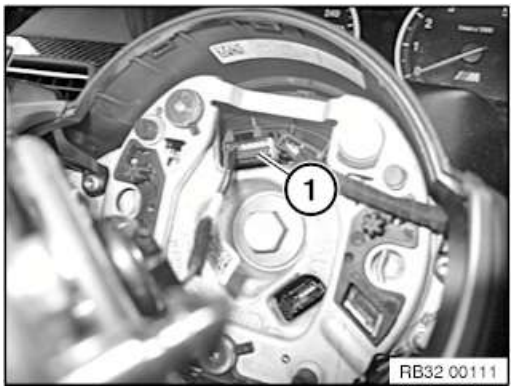
Repeat the procedure on the left steering wheel side and carefully raise the airbag unit.

Warning!

Danger of injury!

Airbag unit may only be set down with the airbag itself facing upwards.

bmwdiagn.com



Raise airbag unit towards rear.

Disconnect plug connections (1) and remove airbag unit.

Installation note:
Make sure electrical leads are correctly positioned.

Carefully press airbag unit plane-parallel in direction of steering column shaft into steering wheel with uniform pressing force until it engages noticeably and audibly.

cardiagn.com

32 34 030 Removing and installing/replacing airbag unit (sport steering wheel)

Warning!

Observe the following instructions to avoid any risk of injury by the airbag unit.

- Comply with safety regulations for handling components with gas generators.
- Do not exert any force on the airbag unit.
- Use only specified release tool for the airbag unit.

Note: Incorrect handling may result in triggering of the airbag unit and thereby cause serious injury.

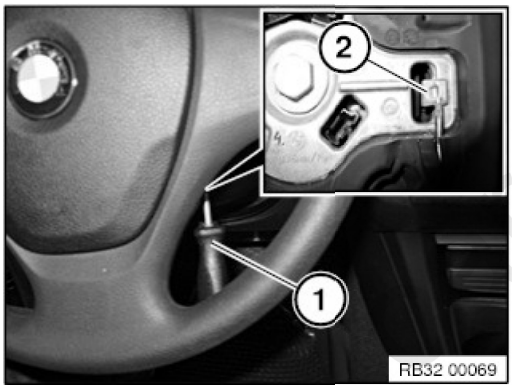
Important!

Steering wheel must be replaced if airbag unit has been triggered!

Follow procedure after airbag deployment.

Necessary preliminary tasks:

- Disconnect battery earth lead

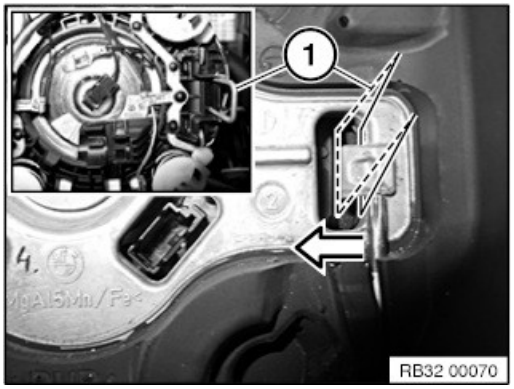


Insert Torx screwdriver T20 (1) vertically into the concealed opening until limit position (2) can be felt.

Pull Torx screwdriver (1) approx. 2-3 mm out of opening. Press screwdriver handle carefully towards middle of steering wheel and simultaneously slide into opening in order to position the Torx screwdriver behind retaining spring bracket (refer to graphic below).

Important!

Press Torx screwdriver carefully towards the middle of steering wheel and slide it in again! Pushing the Torx screwdriver too much further in the direction of steering wheel centre will lead to damage of the steering wheel trim/ the steering wheel.



Press retaining spring bracket (1) of airbag unit inwards and simultaneously pull airbag unit upwards until it unlocks.

Repeat procedure on other side.

Installation note:
Carefully push airbag unit in direction of steering column shaft into steering wheel with uniform pressing force until airbag engages noticeably and audibly.



Warning!

Danger of injury!

The airbag unit may only be set down with the airbag itself facing up.



Tilt airbag unit forwards.

Disconnect plug connections(1) and remove airbag unit.

Installation note:
Make sure electrical leads are correctly positioned.

cardiagn.com

72 00 ... Safety regulations for handling components with gas generators

It is essential to comply with the regulations as specified in the law relating to the use of explosives when working on airbag units and seat belt tensioners.

Airbags, seat belt tensioners etc. are pyrotechnical objects. Pyrotechnical objects are assigned to different danger classes on the basis of the quantity of propellant that they contain. The assignment can be ascertained from the identification marking on the product:

Attention!

> Failure to comply with the warning notices and repair instructions for gas generator components can cause accidental deployment and result in injury and vehicle damage!

This applies in particular to the following components:

- Airbag modules (driver's/front passenger airbags, side airbags)
- Seat belt tensioner
- Head airbag
- Active knee protection
- Active head restraint
- Safety battery terminal

1. Regulations

The regulations quoted in the following refer to the Federal Republic of Germany.

In all other countries, the relevant legislation and regulations must be observed in each case. Country-specific legal regulations that go beyond this information or court decisions based thereon must be followed in each case or given precedence over these regulations.

- Pyrotechnical restraint systems are subject to danger class PT1
- Gas generators are pyrotechnical objects belonging to danger class T1

Handling, transporting and storing non-fired gas generators are subject to the "Explosive Materials Act" (law relating to the use of explosives dated 13/09/1976).

The relevant trade supervisory authority must be notified at least 2 weeks before pyrotechnical objects are handled for the first time. In this process, notify the person responsible at the relevant authority (e.g. dealership owner, holder of general power of attorney, technical supervisor) in writing. A certificate of qualification, i.e. specific training, is not required for the person responsible.

2. Dismantling and installation

- Checking and installation work must be carried out by professionally trained personnel only.
- Work on airbag system components must only ever be carried out with a disconnected vehicle battery, covered negative terminal and disconnected plug connection of the cable leading to the gas generator. Observe the specified waiting period if merely the vehicle battery is disconnected:
  - 30 min. for vehicles up to 9/93
  - 1 min. for vehicles from 9/93 onward
- In the event of breaks in work, a component with a gas generator that has been removed must be secured against access by other persons.
- Individual components must never be repaired. Instead, always replace them.
- Do not treat airbag system components with cleaning agents or grease.
- Components of the airbag system must not be exposed to temperatures in excess of 75 °C.
- Airbag system components, including electronic diagnostic components, which have been dropped from heights in excess of 0.5 m must not be reinstalled in the vehicles.
- Do not remove components of the airbag system from the original packaging until immediately before they are to be installed in the vehicle.

- Before installing, subject components such as housing, connector pins ,etc. of the airbag system (including diagnosis electronics) to a visual inspection for damage and replace if necessary.
- Airbag system components may only be electrically tested while they are installed and only with the diagnosis system.
- **Danger of injury:** The airbag module may only be set down with the airbag itself facing *upwards*. Otherwise the gas generator may be propelled upwards upon potential ignition of the gas generator.
- Do not point the ignition squib of a gas generator at other persons.
- Components with gas generators must not be fired while they are removed. They must be disposed of by special disposal companies or returned in the packaging of the new parts.
- When carrying out straightening and welding work with an electric welder:
  - Disconnect the vehicle battery
  - Cover negative terminal (post)
- Avoid all contact with the skin when removing a fired airbag module - wear gloves. Wash with water after contact with the skin.

3. Transport

- Components with gas generators must be sent off in the packaging of the new components.

4. Storage

- Observe the regulations of the relevant trade supervisory authority and the applicable national regulations.

cardiagn.com

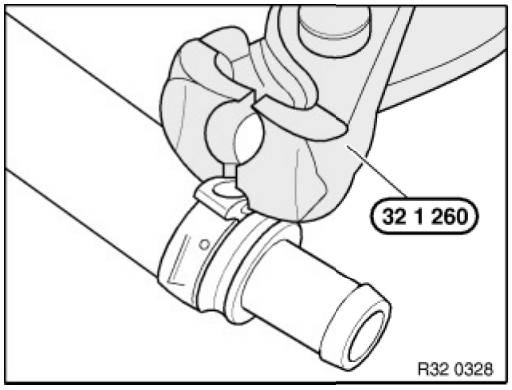
32 41 ... Instructions for removing and installing ear clips

Special tools required:

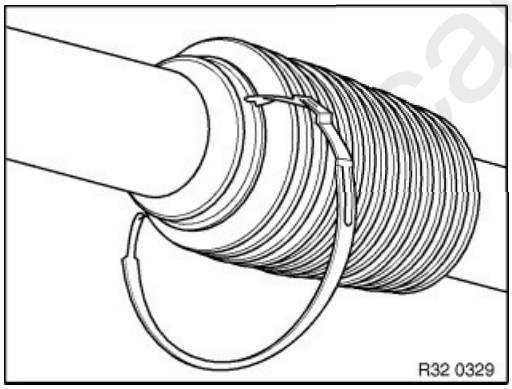
- 32 1 260

Note:
The work steps are show on assorted components.

Ear clip must always be replaced.

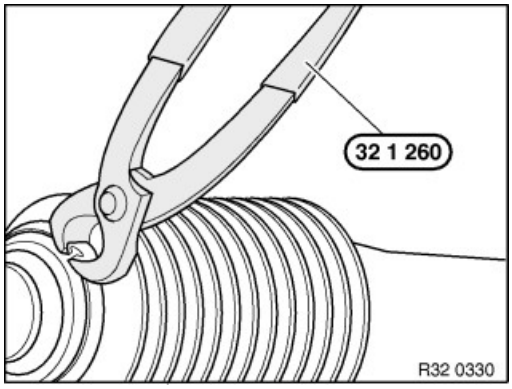


To remove an ear clip, place special tool 32 1 260 at right angles to ear and cut ear open.

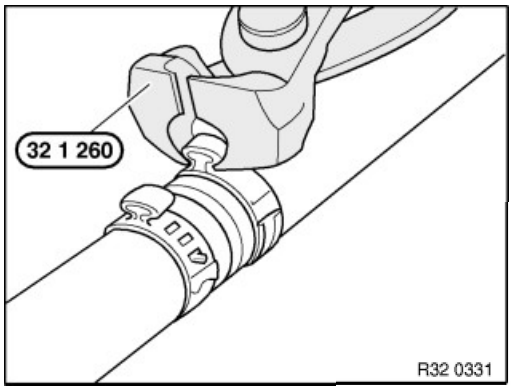


The ear clip can be fitted not only axially but also radially after the hook fastener has been opened.

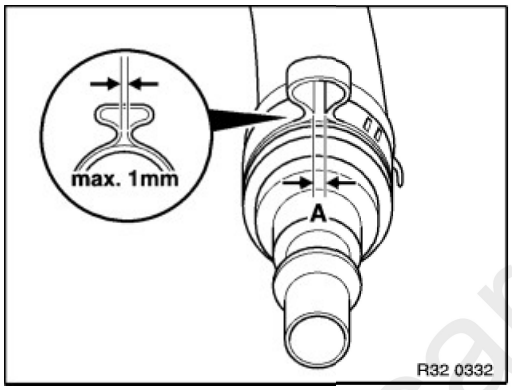
cardiagn.com



Attach hook fastener and press ear together with special tool 32 1 260 .



The diagonal cutting pliers of special tool 32 1 260 can be used in areas which are difficult to access.



Important!

Gap (A) max. 1 mm!

cardiagn.com

34 52 .. Start-up of ICM control unit



Note:
Start-up of ICM control unit must be carried out:

- After replacement or removal and installation of ICM control unit



Connect vehicle to BMW diagnosis system.

Select and carry out start-up of ICM control unit under Service functions.

cardiagn.com

00 00 ... Microencapsulated screws



Screw securing adhesive is a means of preventing a screwed connection from being loosened by external influences.

Once the screw has been coated with adhesive, the adhesive remains inactive until such time that it is activated by the encapsulation breaking when the screw is inserted and then cures (hardens) at room temperature.



Installation note:

- Screw connection must be completed within 20 mins. (start of curing)
- Microencapsulated screws must not be retightened
- Thread of nut must be cleaned beforehand in event of repeated use

cardiagn.com

32 00 ... Test conditions for chassis/wheel alignment check

Observe the following test conditions prior to the chassis/wheel alignment check:

1. Only BMW approved wheel and tyre combinations may be installed on the vehicle
2. Correct tread depth. The tread depth for each axle may differ from left to right by max. 1-2 mm.
3. Correct tyre pressure (see label on vehicle).
4. All chassis and suspension components must be technically OK.
5. Condition of suspension and shock absorbers OK: Visually inspect for breakage, etc.
6. Vehicles with self-levelling suspension: Pull fuse of air supply system so that there is no controlling down or up.

cardiagn.com