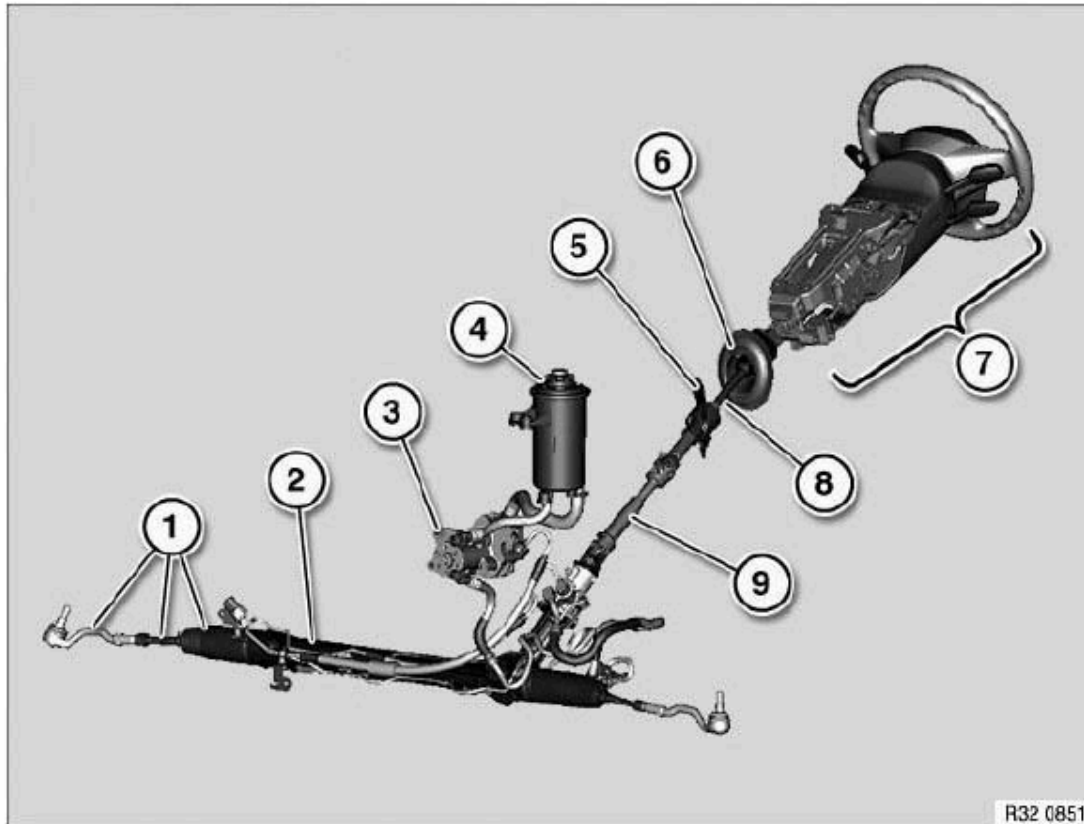


SUSPENSION

Steering and Wheel Alignment - Repair Instructions - X6

ELECTRONIC CHASSIS ALIGNMENT

32.... OVERVIEW OF STEERING

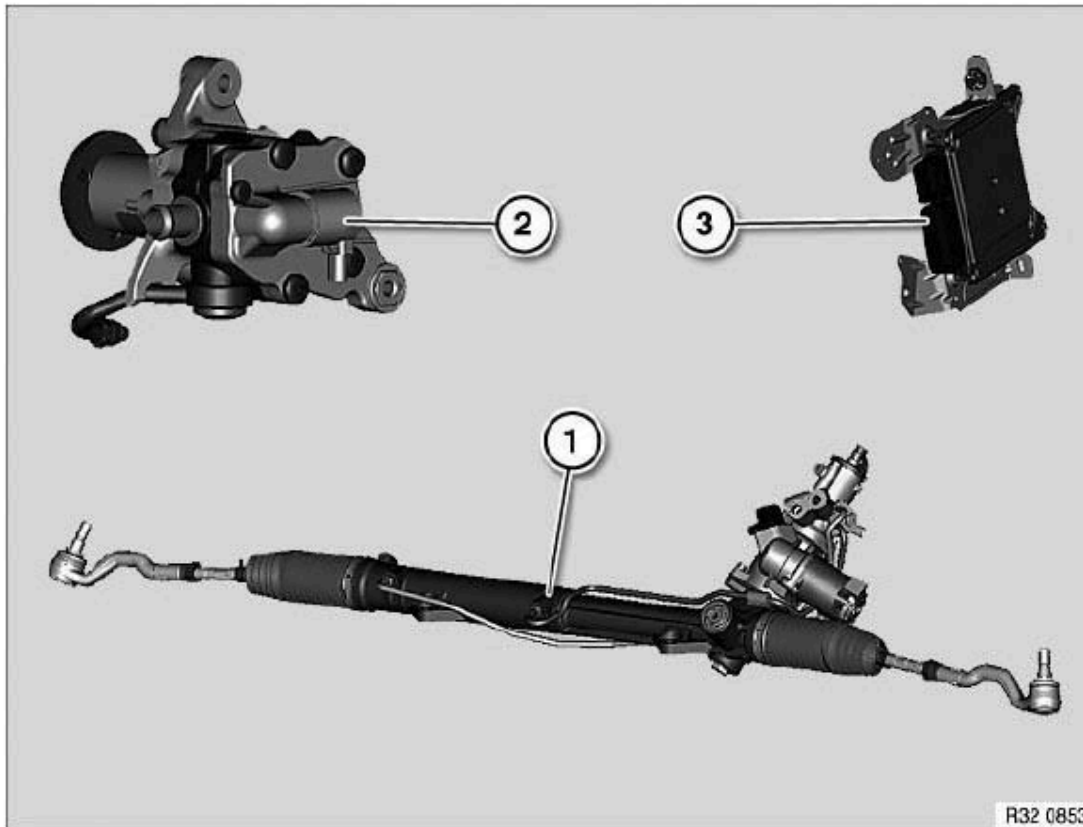


- | | | | |
|---|------------------------------------------------|---|-------------------------------------------------|
| 1 | Tie rod end / tie rod / gaiter | 7 | Overview of steering (interior) |
| 2 | Power steering gear | 8 | Steering spindle middle section |
| 3 | Vane pump | 9 | Steering spindle lower section |
| 4 | Oil container | | |
| 5 | Bearing plate | | |
| 6 | Sleeve | | |

Fig. 1: Overview Of Steering

Courtesy of BMW OF NORTH AMERICA, INC.

32..... OVERVIEW OF ACTIVE FRONT STEERING



- 1 [Power steering gear](#)
- 2 [Eco valve \(on power steering pump\)](#)
- 3 [Control unit](#)

Fig. 2: Overview Of Active Front Steering
Courtesy of BMW OF NORTH AMERICA, INC.

32..... OVERVIEW OF STEERING (INTERIOR)



- | | | | |
|---|----------------------------------------------|---|----------------------------------------------------------------------------|
| 1 | Airbag unit | 5 | Lower steering column casing |
| 2 | Steering wheel | 6 | Steering angle sensor (see steering column switch cluster) |
| 3 | Upper steering column casing | | |
| 4 | Steering column | | |

Fig. 3: Overview Of Steering (Interior)

Courtesy of BMW OF NORTH AMERICA, INC.

32 00... ADDITIONAL WORK FOR CAMBER CORRECTION

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

NOTE: The upper control arm may only be replaced if the camber is outside the specified tolerance after toe adjustment.

Adjust TOE-IN.

Check camber values; if necessary, replace upper control arm with over- or underdimension variant. (See [31 12 002 REMOVING AND INSTALLING/REPLACING TOP LEFT CONTROL ARM](#) and [31 12 003 REMOVING AND INSTALLING/REPLACING TOP RIGHT CONTROL ARM](#))

NOTE: Control arms with + or - marking (see Fig. 4) are camber correction arms:

- Underdimension variant

+ Overdimension variant

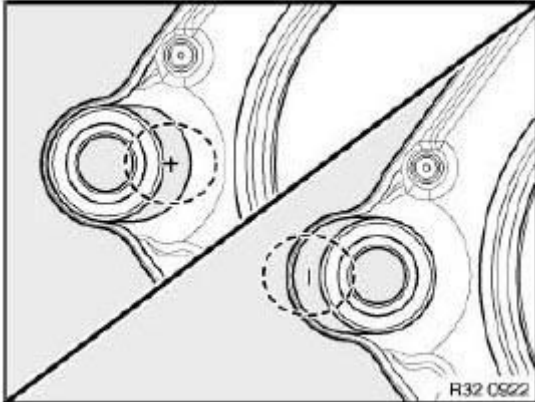


Fig. 4: Identifying Underdimension And Overdimension Variant
Courtesy of BMW OF NORTH AMERICA, INC.

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

An unmarked control arm is a standard part.

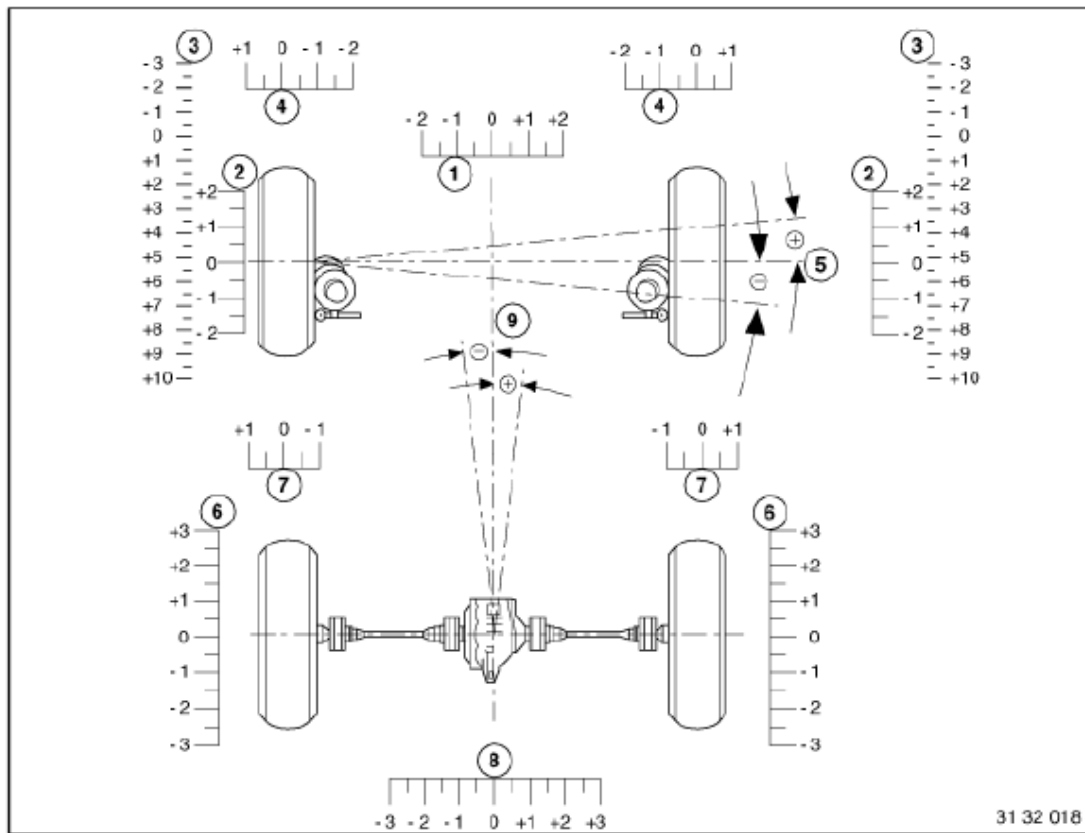
After installation

- Check directional stability of car; if necessary, repeat **TOE-IN** adjustment

31 00... FRONT AXLE + STEERING: WHEEL/CHASSIS ALIGNMENT CHECK MUST BE CARRIED OUT AFTER THE FOLLOWING WORK

See 31 00... FRONT AXLE + STEERING: WHEEL/CHASSIS ALIGNMENT CHECK MUST BE CARRIED OUT AFTER THE FOLLOWING WORK .

32 00... GENERAL CHASSIS AND SUSPENSION DEFINITIONS



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

Fig. 5: General Chassis And Suspension Definitions
 Courtesy of BMW OF NORTH AMERICA, INC.

32 00... GENERAL INFORMATION AND DEFINITIONS

Toe angle difference

a - Toe angle difference

D - Center 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 center position.

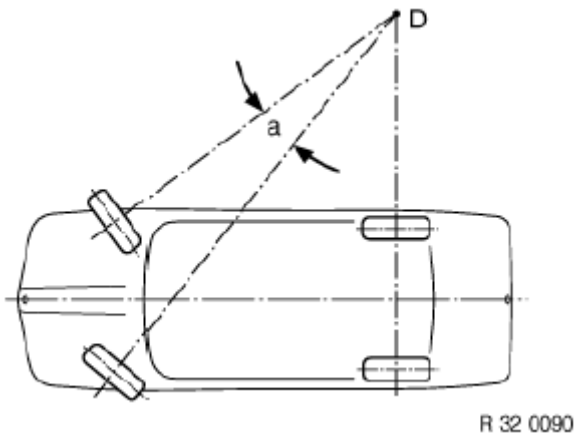


Fig. 6: Identifying Toe Angle
Courtesy of BMW OF NORTH AMERICA, INC.

Camber

Inclination of the wheel from the perpendicular.

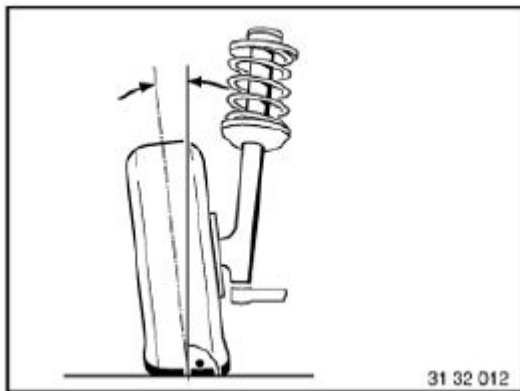


Fig. 7: Identifying Camber Angle
Courtesy of BMW OF NORTH AMERICA, INC.

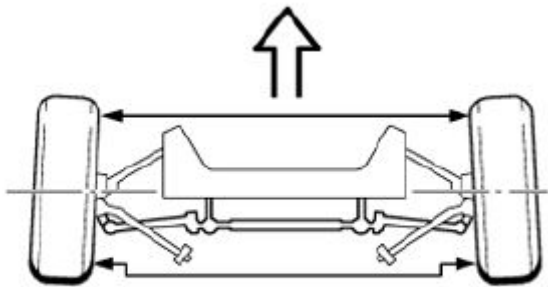
Toe

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".



31 32 010

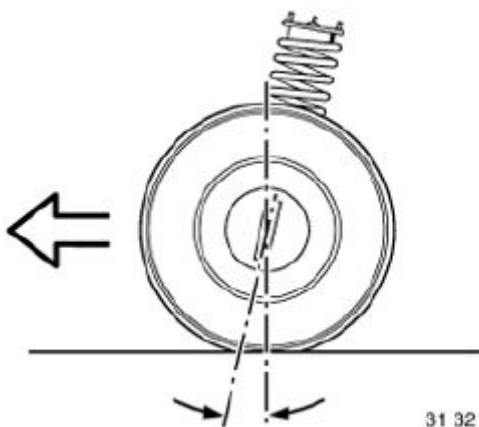
Fig. 8: Identifying Toe Angle

Courtesy of BMW OF NORTH AMERICA, INC.

Caster

Is the inclination of the kingpin in the direction of travel viewed from the side. The line through the center 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.



31 32 014

Fig. 9: Identifying Caster Angle

Courtesy of BMW OF NORTH AMERICA, INC.

Geometrical axis 1