

**SUSPENSION****Steering and wheel alignment - Repair Instructions - 550i****ELECTRONIC CHASSIS ALIGNMENT****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:**

- Pour oil only into appropriately marked containers
- Do **not** pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- 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.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

**00 RISK 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 protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

**First aid measures:**

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes 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.**

**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:**

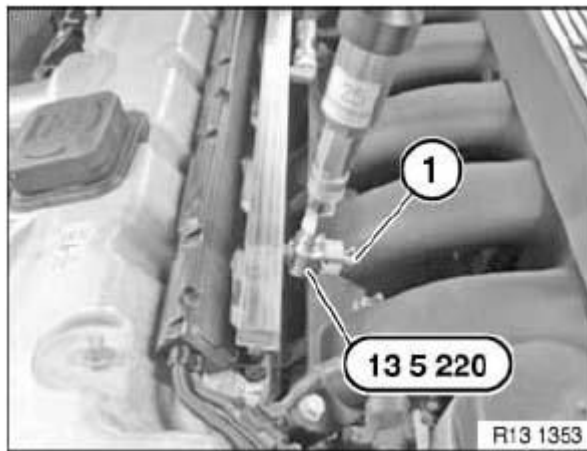
- **Personal precautionary measures:** Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- **Environmental protection measures:** Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- **Limiting 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.**

**00..... RAISING VEHICLE WITH TROLLEY JACK**

**IMPORTANT:** Observe the following trolley-jack-related instructions:

1. Use only BMW-distributed/approved trolley jacks which have rubber plate contact points.
2. Trolley jacks must be regularly serviced and always checked for functional reliability before they are used!
3. Check the rubber plate on the trolley jack prior to each use, replacing if necessary.

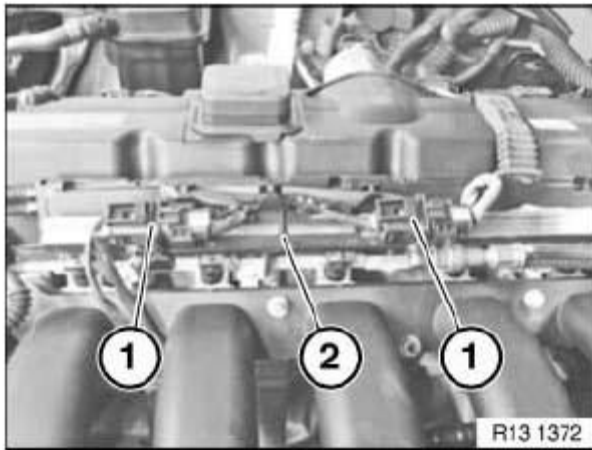


**Fig. 1: Identifying Trolley Jack**  
Courtesy of BMW OF NORTH AMERICA, INC.

**WARNING:** The vehicle may be raised with a trolley jack only at the following jacking points!

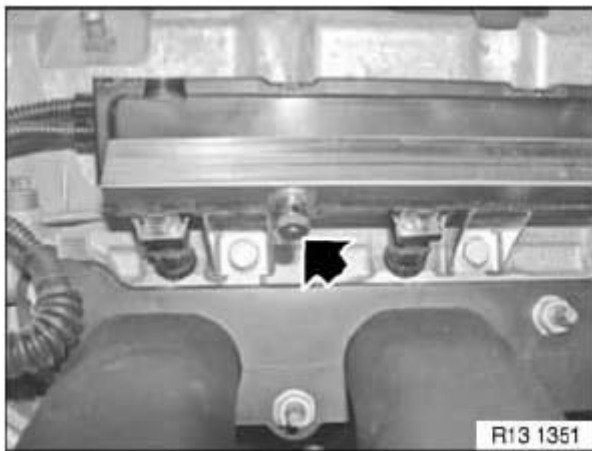
1. Car jacking point
2. Side car jacking points
3. Rear differential

**Risk of damage:** It is not permitted to raise the vehicle at the rear differential cover!



**Fig. 2: Identifying Vehicle Jacking Point**  
Courtesy of BMW OF NORTH AMERICA, INC.

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



**Fig. 3: Identifying Front Axle Carrier Components**  
Courtesy of BMW OF NORTH AMERICA, INC.

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

- **Release of following screw/bolt connections:**
  - Steering gear to front axle carrier
  - Control arm to front axle carrier
  - Support bearing to body (if centering pin is missing)
  - Tie rod end to tie rod
- **Replacement of following parts:**
  1. Front axle carrier

2. Steering gear
3. Gaiter (if the tie rod end has to be screwed off)
4. Control arm
5. Support bearing (if centering pin is missing)
6. Swivel bearing
7. Tie rod end
8. Tie rod

### 31 00... INSTRUCTIONS (DAMAGE TO SUSPENSION)

Substandard roadholding, atypical noises, tires worn on one side, camber and toe-in values which deviate from nominal value and mis-shaped components are all indicators of damage to the suspension caused by road traffic accidents or similar impacts.

To repair vehicle correctly, depending on condition of vehicle, perform the following troubleshooting procedure:

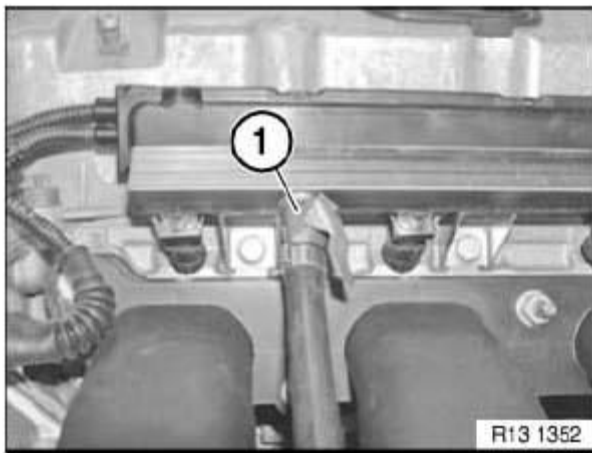
#### Troubleshooting

#### TROUBLESHOOTING CHART

Vehicle condition	Possible cause	Remedy
1 Camber inside/toe-in outside the nominal value, adjustment of track alignment possible	a. Screw connection not OK  b) Tie rod or journal of tie rod end is deformed  c) One or both tension struts is/are deformed  d) Control arm deformed	a. Check screw connections: <b>Tie rod end</b> to swivel bearing <b>Tie rod</b> to power steering gear <b>Power steering gear</b> to front axle carrier  b) Replace <b>tie rod, tension strut and swivel bearing</b>  <b>IMPORTANT:</b> <b>If the journal of the tie rod end is deformed, the power steering gear must also be replaced</b>  c) Replace <b>tension strut and swivel bearing</b>  d) Replace <b>control arm, tension strut and swivel bearing</b>
2 Camber inside/toe-in outside the nominal value, adjustment of track alignment possible	Powerful forces acting on steering/front axle components	Replace <b>tie rods</b> Replace <b>swivel bearing</b> Replace <b>power steering gear</b> Replace <b>tension strut</b> Replace <b>control arms</b>
3 Camber/toe-in outside the	Powerful forces acting on	

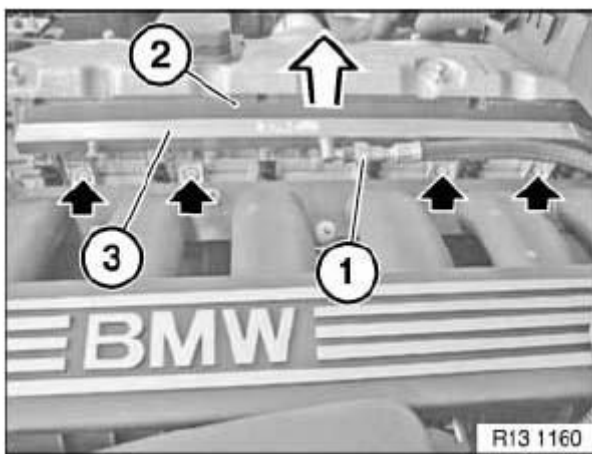
nominal value, adjustment of track alignment not possible	front axle with distortion of:	
	<ul style="list-style-type: none"> <li>a. Screw connections</li> <li>b. Front axle support</li> <li>c. See Pt. 1b) to d)</li> <li>f) Spring strut/piston rod</li> </ul>	<ul style="list-style-type: none"> <li>a. Check screw connections, replace the relevant part if necessary</li> <li>b. Replace <b>front axle carrier</b></li> <li>c. See Pt. 1b) to d)</li> <li>d. Replace <b>spring strut</b></li> </ul>

### 32.... OVERVIEW OF STEERING



**Fig. 4: Overview Of Steering**  
Courtesy of BMW OF NORTH AMERICA, INC.

### 32.... OVERVIEW OF STEERING WHEEL / CASING COMPONENTS / LOCK CYLINDER



**Fig. 5: Overview Of Steering Wheel / Casing Components / Lock Cylinder**

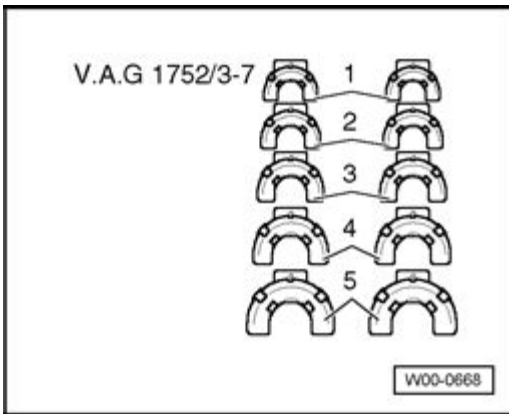
Courtesy of BMW OF NORTH AMERICA, INC.

### 32 00... CHASSIS/WHEEL ALIGNMENT CHECK PROCEDURE

#### CHASSIS/WHEEL ALIGNMENT CHECK PROCEDURE

Check adherence to <b>test conditions</b>		
I V		
Position vehicle on measuring stand		
I V		
Measure <b>vehicle ride height</b>	OK ->	Carry out <b>chassis/wheel alignment check</b> with ride-height measurement without load
Read off setpoint value in KDS Tolerance -20 / +40 mm per wheel permissible Difference between left / right max. 10 mm permissible		
Not OK / no data I V		
Move vehicle into <b>normal position</b>		
Introduce load and measure ride heights		
Read off setpoint value in KDS Tolerance $\pm 10$ mm per wheel permissible Difference between left / right max. 10 mm permissible	Not OK ->	
OK I V		Check suspension for damage, repair if necessary
Move vehicle into <b>design position</b>	<- Not OK	
Add/distribute weights and measure ride heights		
Read off setpoint value in KDS Tolerance $\pm 2$ mm per wheel permissible Difference between left / right max. 2 mm permissible		
I V		
Carry out KDS <b>chassis/wheel alignment check</b> with load up to design position		

### 32 00... GENERAL CHASSIS AND SUSPENSION DEFINITIONS



**Fig. 6: General Chassis And Suspension Definitions**  
 Courtesy of BMW OF NORTH AMERICA, INC.

### 32 00... GENERAL INFORMATION AND DEFINITIONS

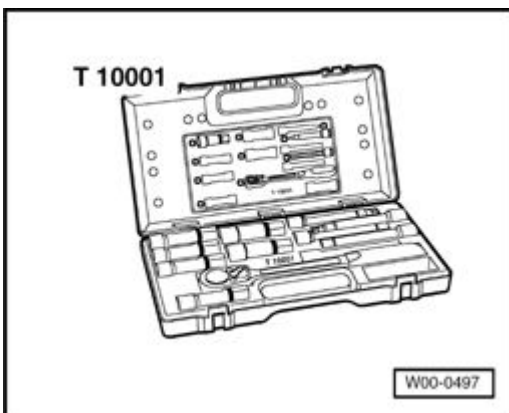
#### Toe angle difference

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.

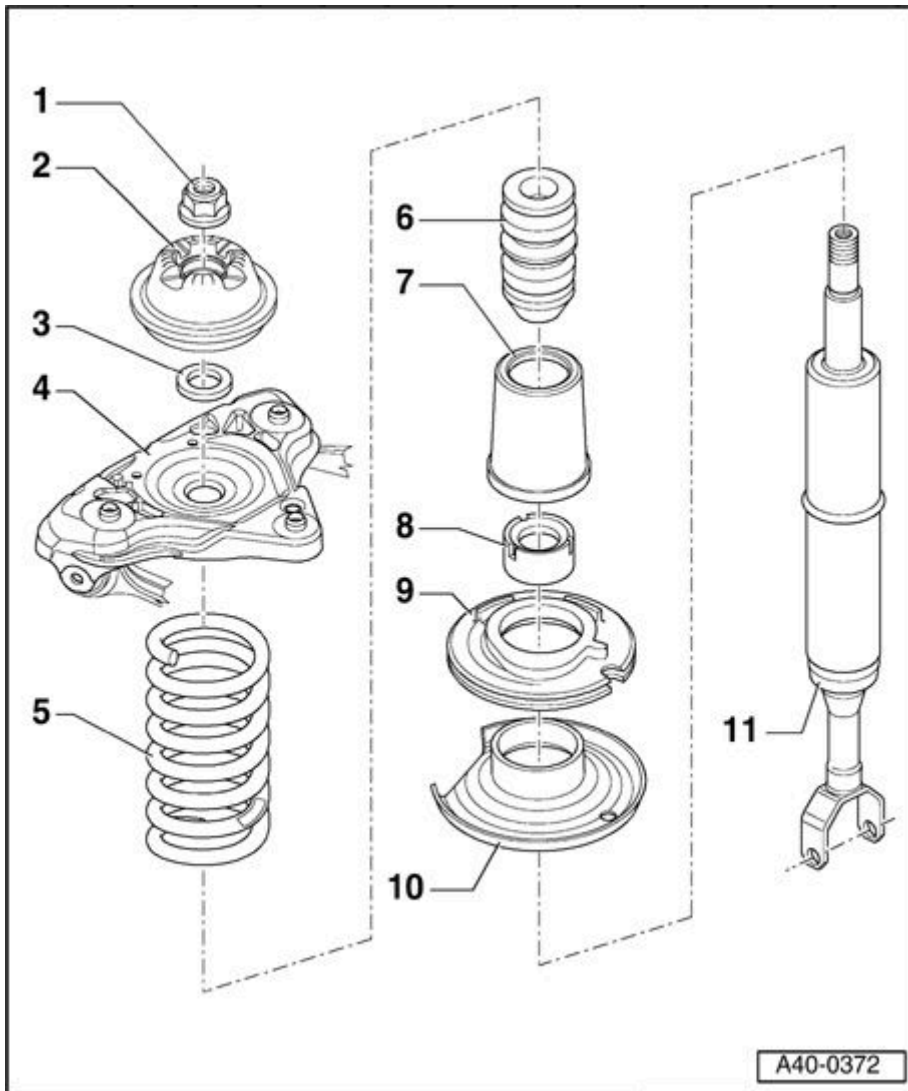


**Fig. 7: Identifying Toe Angle**  
 Courtesy of BMW OF NORTH AMERICA, INC.

#### Camber



Inclination of the wheel from the perpendicular.



**Fig. 8: Identifying Camber Angle**

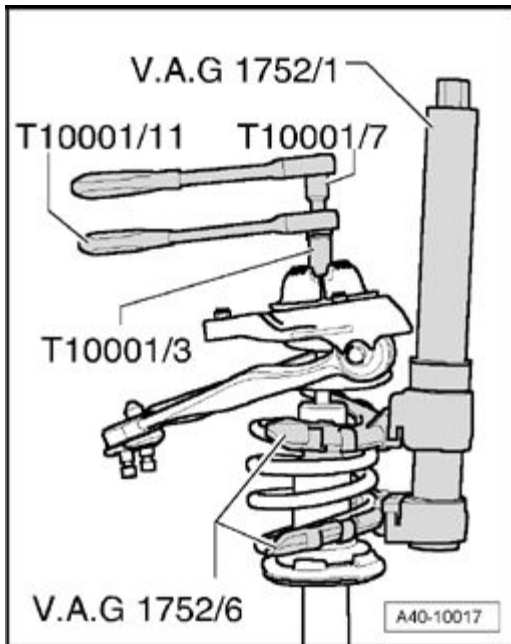
Courtesy of BMW OF NORTH AMERICA, INC.

### 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".

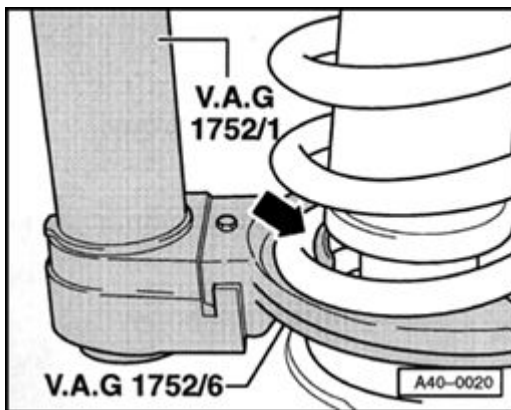


**Fig. 9: Identifying Distance Between Of Front Of Front Wheels**  
 Courtesy of BMW OF NORTH AMERICA, INC.

### 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.



**Fig. 10: Identifying Caster Angle**  
 Courtesy of BMW OF NORTH AMERICA, INC.

### Geometrical axis 1

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