

Workshop Manual

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Towball couplings

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Chapter 2

Overrun Devices

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Chapter 3

Axles and Brakes

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Height Adjustable Overrun Devices and Hitches

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Chapter 5

Safety Winches

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Chapter 6 **Accessories**

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Chapter 7

Tools and Lubricants

Workshop Manual

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To the User....

This manual is intended for everyone who maintains and repairs caravans/trailers with AL-KO components.

The individual chapters give an overview of the construction, maintenance and repair of AL-KO trailer components and enable maintenance personnel to carry out repairs quickly and efficiently.

Conventions used in the description

Lists always begin with a dash (-) or a number which corresponds to the item number in the associated graphic.

Example:

1 Handbrake system

or

- Handbrake system (1)

Instructions for operations always begin with a bullet (•). Here, the reader is asked to carry out work.

Example:

- Take out spring clip (3).



“Note” applies to special technical requirements which maintenance personnel must particularly observe (e.g. particular points when assembling, tolerance range when adjusting).



“Caution” is used to mark working procedures which must be followed precisely to avoid personnel being injured or components damaged.

This manual consists of seven chapters in which the construction, maintenance and repair of trailer components are explained and shown:



Chapter 1 “Towball couplings”



Chapter 2 “Overrun devices”



Chapter 3 “Axles and brakes”



Chapter 4 “Variable height overrun device with towing hitch”



Chapter 5 “Safety winches”



Chapter 6 “Accessories”



Chapter 7 “Tools and lubricants”

1 Towball couplings

1.1 Function and construction of the towball couplings

1.1.1 Function

The coupling is the connecting link between the towing vehicle and trailer/ caravan.

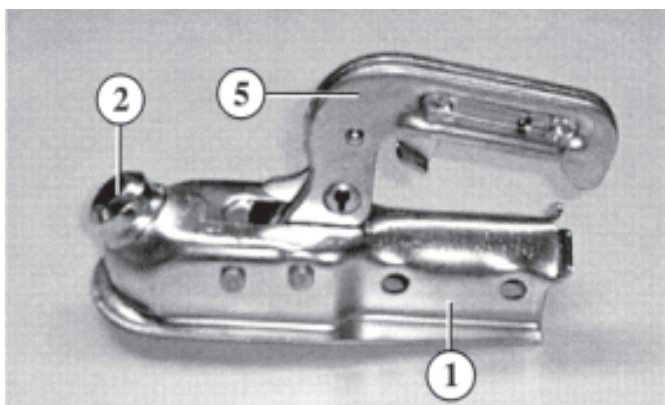
For this task, all components of the towball coupling must be in perfect condition from a technical point of view.

1.1.2 Construction

Components:

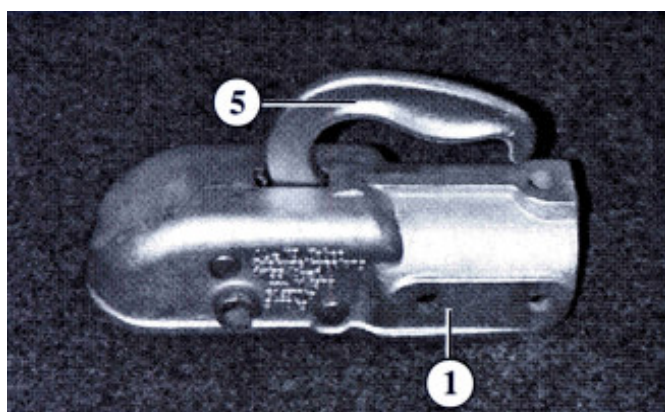
AK 7 / 10/2 / 252

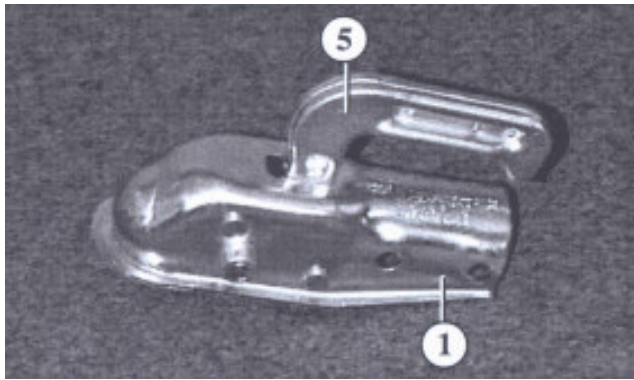
- 1 Housing
- 2 Safe coupling indicator
- 5 Coupling handle



AK 35

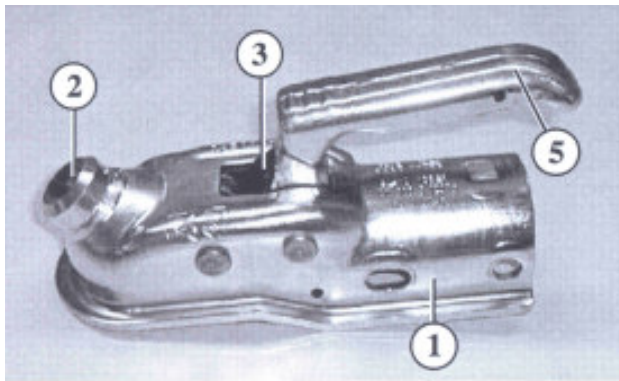
- 1 Housing
- 5 Coupling handle





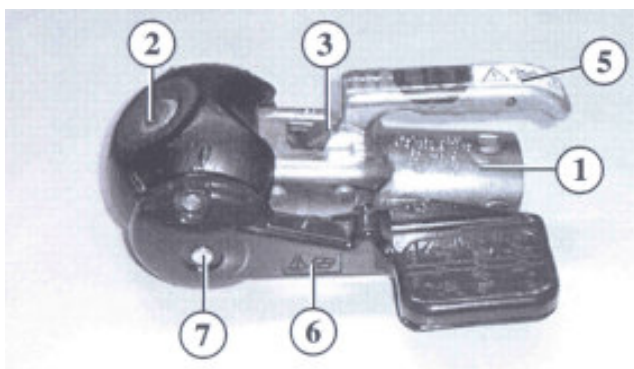
AK 26

- 1 Housing
- 5 Coupling handle



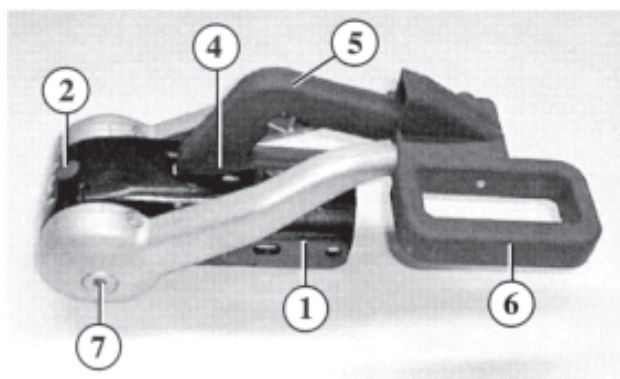
AK 160 / 300 / 350

- 1 Housing
- 2 Safe coupling indicator
- 3 Wear indicator
- 5 Coupling handle



AKS 1300

- 1 Housing
- 2 Safe coupling indicator
- 3 Wear indicator
- 5 Coupling handle
- 6 Stabiliser lever
- 7 Friction pads



AKS 2000/2500/2700

- 1 Housing
- 2 Safe coupling indicator
- 4 Wear indicator
- 5 Coupling handle
- 6 Stabiliser lever
- 7 Friction pads

1.2 Maintenance

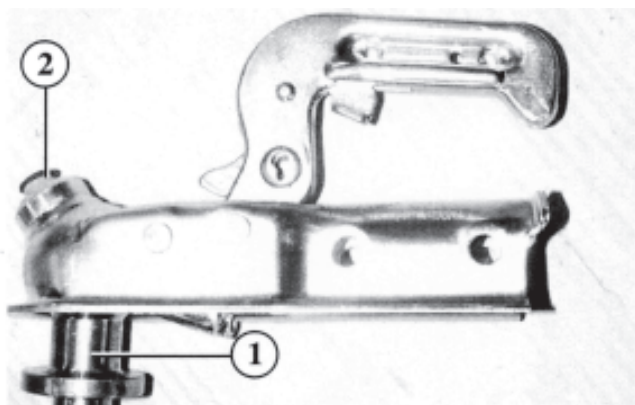
1.2.1 Checking the functions

General inspection

- Place the coupling onto the towball of the towing vehicle and couple the trailer/ caravan
- Check that the coupling mechanism moves freely
- Check the safe coupling indicator
- Check the wear indicator (if applicable)
- Check the coupling housing for damage

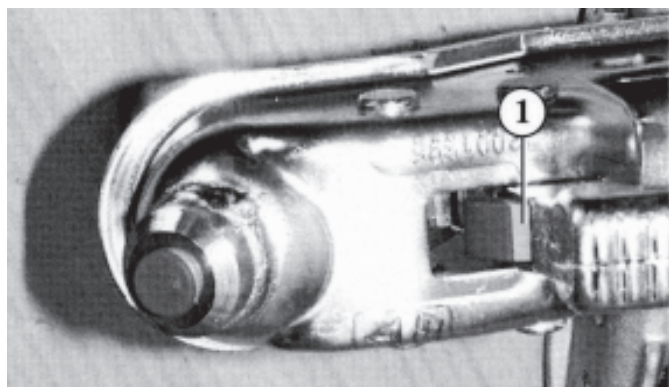
Safe coupling indicator

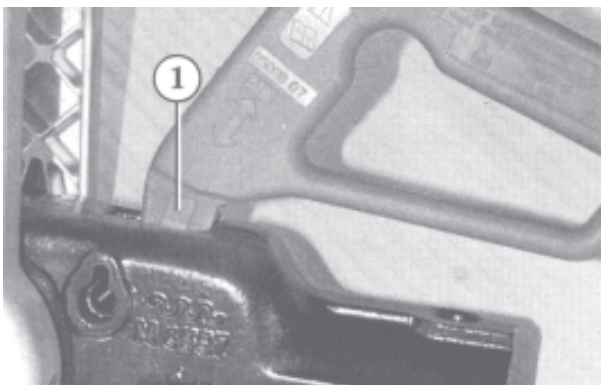
- Insert the test ball (1) (minimum diameter 49 mm) into the coupling
- The green area of the safe coupling indicator (2) must be visible




Wear indicator


- Insert the test ball (1) (minimum diameter 49 mm) into the coupling
- The coupling handle of the AK 7 / 10/2 / 252 / 750 must not touch the rear section of the housing
- The green area (1) of the wear indicator must be visible on the AK 160 / 300 / 350 and AKS 1300.

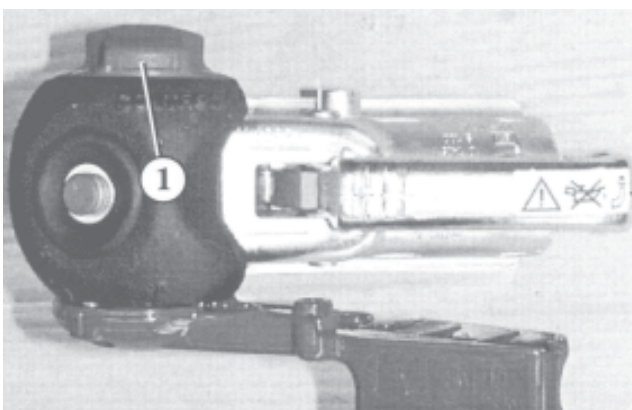




- The marking “zu” [closed] (1) must be visible on the AKS 2000/2500/2700.


 The test ball and the ball of the towing vehicle must have a diameter of not less than 49 mm.

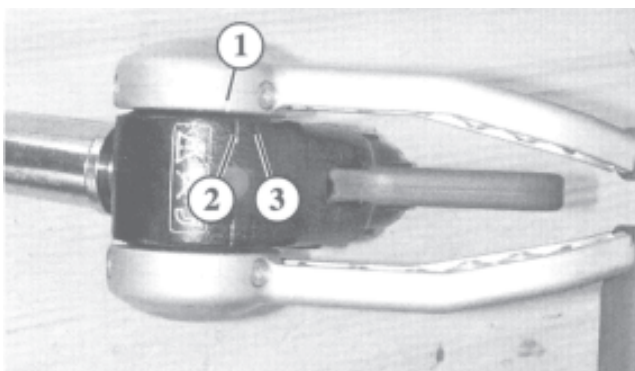
 If the coupling or towball is worn, it must be replaced immediately as there is a danger of the trailer/ caravan being uncoupled.



Friction pads on the AKS 1300

- Hitch up the coupling
- Turn the handwheel to the right until the wheel ratchets
- The control mark (1) on the handwheel must be visible
- If the control mark is no longer visible, the friction pads are worn and need replacing

 With older towing vehicles, the ball may also be worn if the control mark is no longer visible.

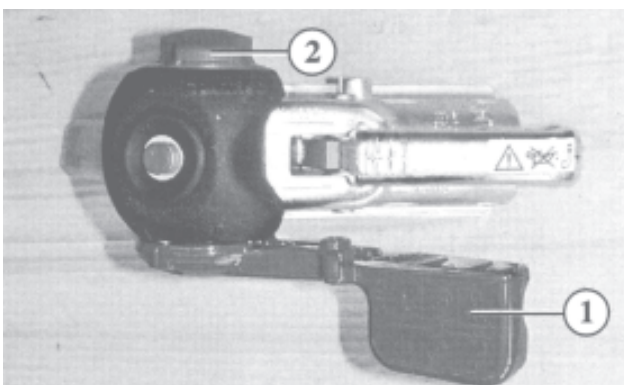


Friction pads on the AKS 2000/2500/2700

- Hitch up the coupling
- Close the stabiliser lever until resistance is felt
- The notch marking (1) on the pressure disc must be between the notch markings (2 and 3) on the housing
- If the notch marking (1) on the pressure disc has reached or gone past the rear replacement mark (3) on the housing, the friction pads are worn and need replacing

Testing the stabiliser lever on the AKS 1300 / 2000/2500/2700

- Hitch up the coupling
- Press the stabiliser lever (1) downwards past the clearly felt resistance until the friction pads are in contact and the lever engages



Testing the handwheel on the AKS 1300

- Hitch up the coupling
- Turn the handwheel (2) until the wheel ratchets.

1.2.2 Operating notes (first time use)

Creaking noises on the AKS 1300 / 2000/2500/2700

The friction pads of the AKS 1300 / 2000/2500 /2700 do not normally cause noise when driving. If there is noise when driving, possible causes may be:

- Drawbar running dry in the overrun bushes
 - Grease using the grease nipple
 - Grease the drawbar exposed underneath the bellows
- Foreign objects or dirt between the friction pad and towball
 - Clean the towball
 - Clean the friction pads with abrasive paper.
- In winter operation, the safe coupling indicator has been sprayed with deicer.
 - Clean the towball
 - Clean the friction surfaces with abrasive paper.
- The surface of the ball was not smooth before first use

Towball of the towing vehicle for the AKS 1300/2000/2500/2700

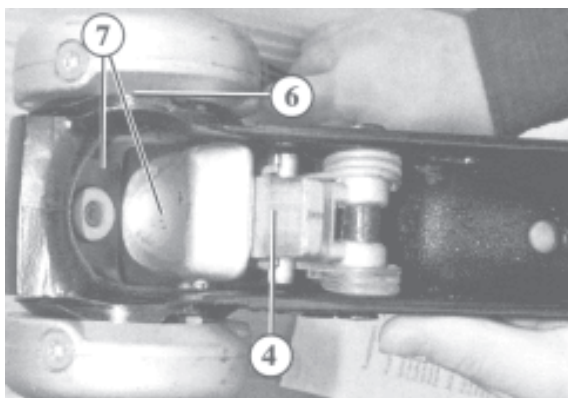
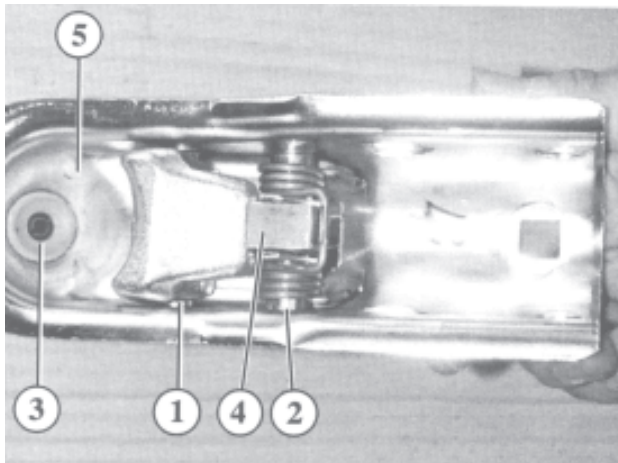
- For the stabilising action, the towball must be kept free of dirt and grease
- Dacromet-coated balls must be rubbed down because of the lower friction which is produced (abrasive paper)
The surface of the towball must be free from scoring, rust and seizure marks

1.2.3 Lubrication

Lubrication intervals

Every 10,000 – 15,000 km or every 12 months, grease or oil the sliding and swivelling points on the towball coupling.

- Components must be cleaned before oiling or greasing
- Only a thin film of oil or grease must be applied to the parts



Lubrication points

- 1 Grease the ball cup joint
- 2 Grease the joint of the coupling lever lock
- 3 Oil the safety indicator
- 4 Grease the contact surfaces of the ball cup and the coupling lever lock
- 5 Grease the ball cup (not on the AKS 1300 or AKS 2000/2500/2700)
- 6 Lightly grease the friction pad bearings on the AKS 1300 and AKS 2000/2500/2700
– no grease on the friction surface!



On the AKS 1300/AKS 2000/2500/2700 the inside of the ball cup (7) must not be greased because of the friction pads.

Lubricant type:

- Multi-purpose grease to DIN 51825 KTA 3K
- Teflon grease spray (see tools list)

1.3 Repair

1.3.1 Towball coupling

Coupling type details must not be painted over or covered by additional parts.

Removing the coupling

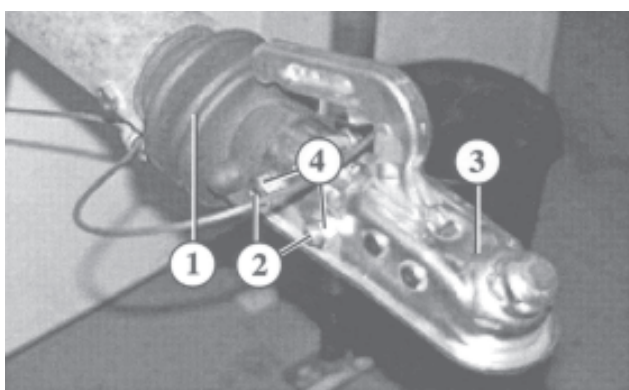
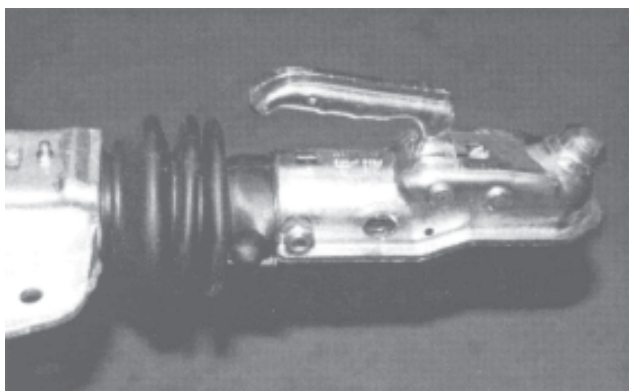
- Pull the bellows (1) off the rear attachment bolt (2) of the coupling (3)
- Unscrew the nuts (4) of the attachment bolts (2)
- Drive out the rear attachment bolt (2) with a 10 mm diameter retaining pin (length to suit drawbar diameter)
- Leave the retaining pin pushed through the drawbar and damper eye
- Drive out the front attachment bolt (2). (Remember the spacer tube)
- Take off the coupling (3)



The retaining pin keeps the eye of the damper in position.



With different types of overrun, the damper is held in the drawbar with spring pins instead of a coupling



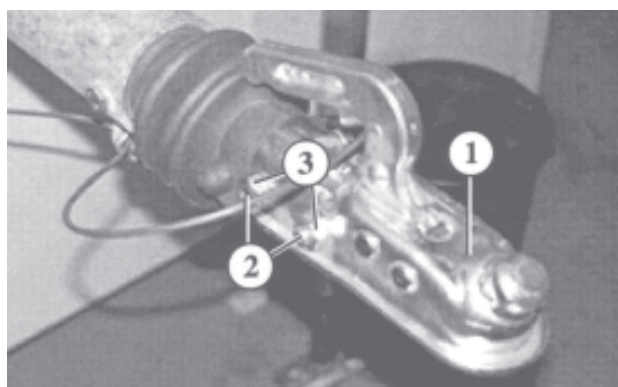
Tightening torque values

The tightening torque values for grade 8.8 M12 bolts are indicated in the table below.



The tightening torque for all bolts on the AKS 2000/2500/2700 is 100 Nm.

Overrun device type	Tightening torque
AL-KO 30 S	60 Nm
AL-KO 60 S – 60 S/3	60 Nm
AL-KO 90 S – 90 S/3	70 Nm
All other AL-KO overruns	86 Nm
Non-AL-KO overruns	77 Nm



Installing the coupling

- Insert the spacer tube into the drawbar in line with the front attachment bolt
- Fit the coupling (1)
- Insert attachment bolts (2)
- Fit new self-locking nuts (3) and tighten



The screws and nuts on the AKS 2000/2500/2700 are to be tightened to a torque of 100 Nm.

- Check that the damper operates by moving the drawbar in and out



When inserting the rear attachment bolt, the damper eye retaining pin is driven out.



Always fit the horizontal bolts through from the left side.



Do not re-use self-locking nuts.



Installing the AK 750 coupling

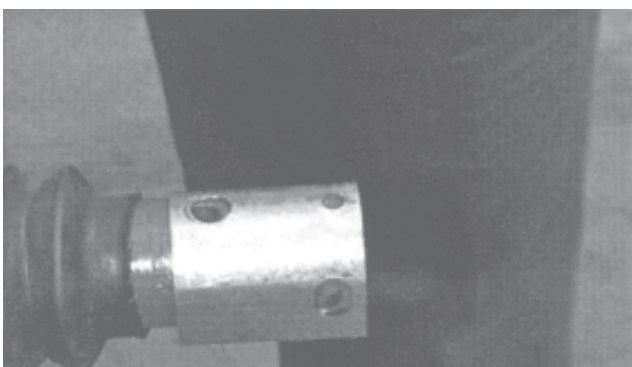
- Place the reinforcement plate of the coupling on the shaft
- Place the towball coupling on the shaft and position to suit the hole pattern
- Place the reinforcing plate on the coupling shaft
- Insert the spacer tubes for the coach bolts into the shaft
- Insert the coach bolts from above
- The square on the coach bolt engages in the slot on the reinforcement plate
- Fit new self-locking nuts and tighten to 86 Nm



For stability, a distance piece must be screwed on as well as the reinforcement plate and spacer tubes.



Do not re-use self-locking nuts.



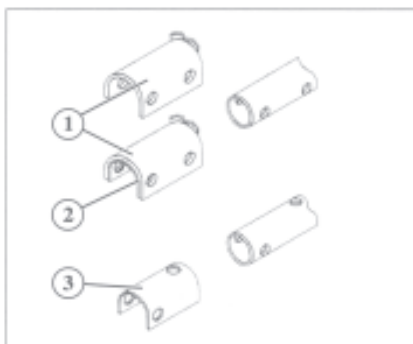
Distance Pieces

The drawbar connections are designed for 50 mm. For smaller drawbar diameters, distance pieces must be fitted. With the AKS 1300 / 2000/2500/2700, these are supplied as standard. For other towball couplings, they must be ordered separately.



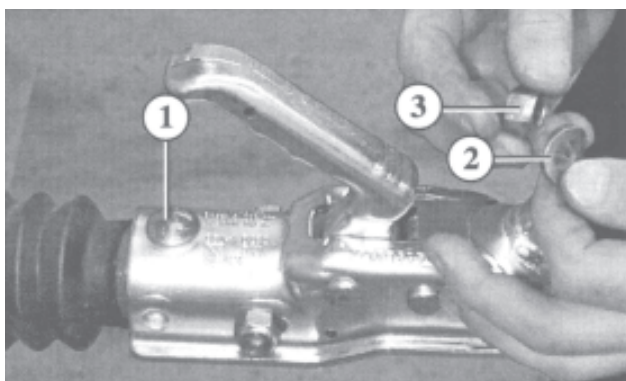
There are also towball couplings with smaller connection diameters.

Particulars of the three different distance pieces can be found in the following table.



Drawbar diam (mm)	Connection	Distance piece	
		Thickness (mm)	Item
50	Q	-	-
50/51	K	-	-
45/46	K	2.5	3
40	Q	5	1
35	Q	5	1
		+2.5	+2

Q = horizontal fastenings (AL-KO overrun devices)
K = horizontal and vertical fastenings



Horizontal/vertical and horizontal fastenings

The different drawbar connections of other manufacturers require vertical fastenings as well as horizontal fastenings.

With horizontal fastenings, the following points must be observed:

- When inserting the bolts, thread them through the spacer tube in the drawbar and the damper (see overrun devices)

With horizontal and vertical fastenings, the following points must be observed:

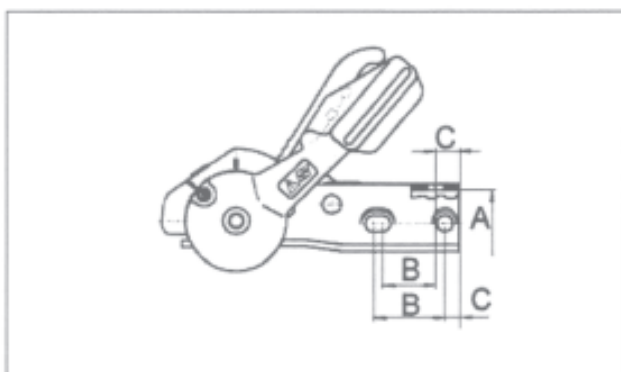
- Insert the vertical bolt (1) from above
- Engage the square on the vertical bolt in the hole
- Fit the shaped washer (2) from underneath
- Fit new self-locking nuts (3) and tighten to 86 Nm



On the AKS 2000/2500/2700, tighten the nuts on the horizontal fastenings to a torque of 100 Nm. For the vertical screw, see instructions given by the overrun manufacturer.



Do not re-use self-locking nuts.



The graphic opposite shows the connection dimensions of the towball coupling.

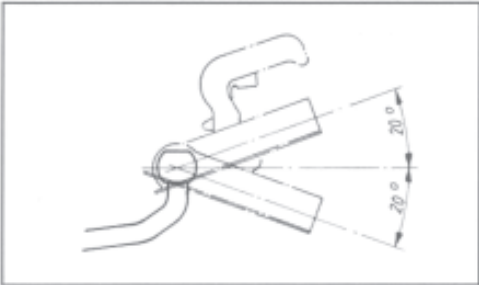
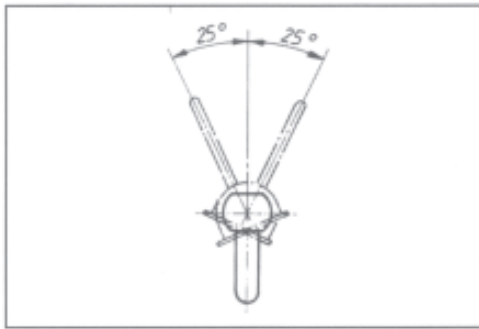
- Drawbar diameter A
- Hole spacing B
- Hole spacing C

The data for the bolt fastenings are given in the table below.

Drawbar diameter A (mm)	Connection	Hole spacing	
		B (mm)	C (mm)
50	Q	50	11
35/40	Q	54	11
45/46	K	40	18
50/51	K	40	18

Q = horizontal fastenings (AL-KO overruns)

K = horizontal and vertical fastenings

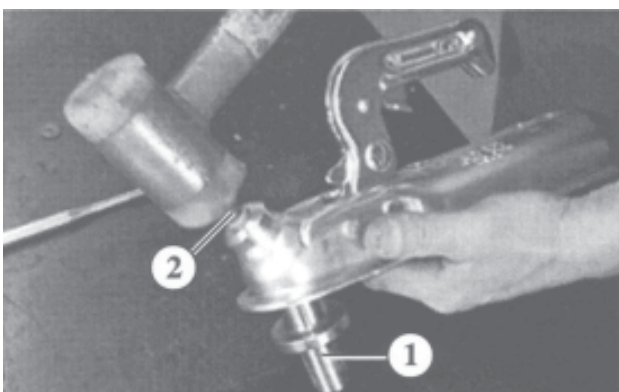
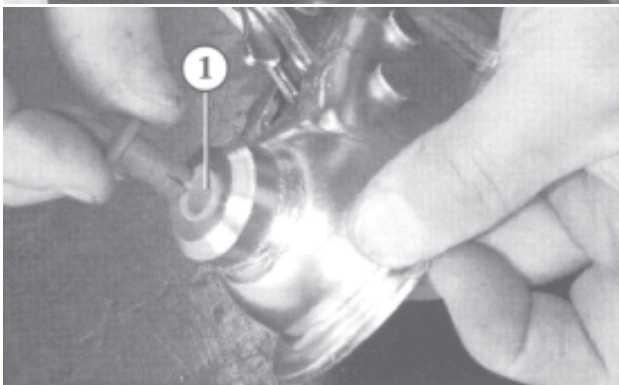
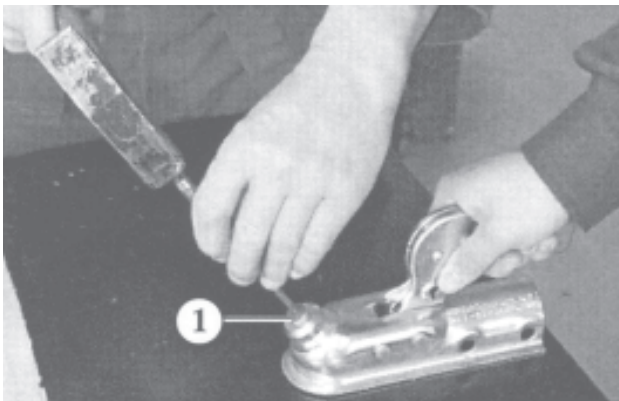


Swivel angle

If the swivel angles are exceeded, components are overloaded. This means that correct operation is no longer assured. The area above the coupling must be clear of additional parts or parts of the vehicle.

The vertical swivel angle of ± 25 degrees must not be exceeded

- The horizontal swivel angle of ± 20 degrees must not be exceeded



Removing the safe coupling indicator



The safe coupling indicator is destroyed upon removal.

- Drive the stop of the safe coupling indicator (1) inwards using a punch
- Remove the safe coupling indicator from inside

Installing the safe coupling indicator

- Push the safe coupling indicator (1) through the housing from inside, with the pressure spring inserted
- Insert the test ball (1)
- Drive the stop pin (2) into the safe coupling indicator, until it locks in it

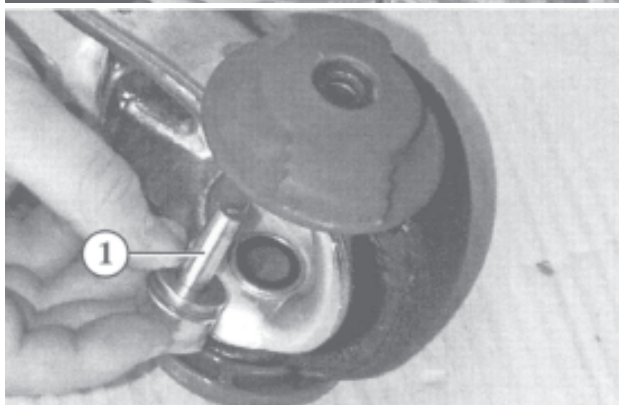
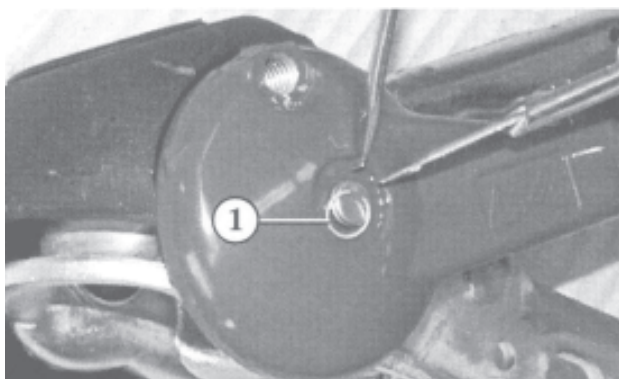
1.3.2 AKS 1300 stabiliser

Removing friction pads and pressure bearings

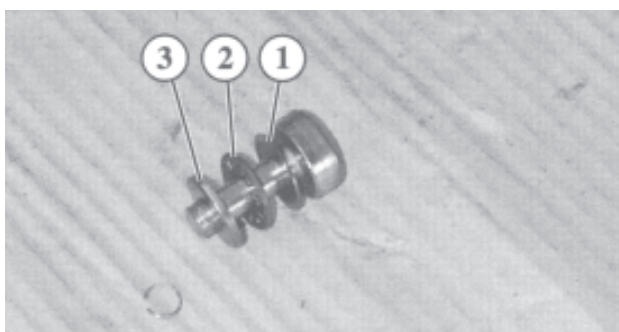
- Remove the friction pad retaining ring (1)



Take steps to avoid injury when removing the retaining ring.



- Take out the friction pads (1) complete with washers and pressure bearings

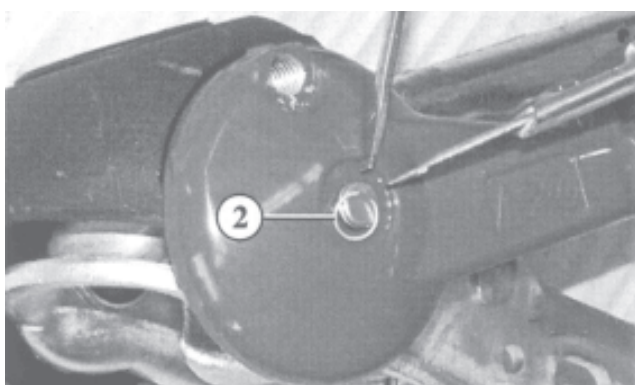
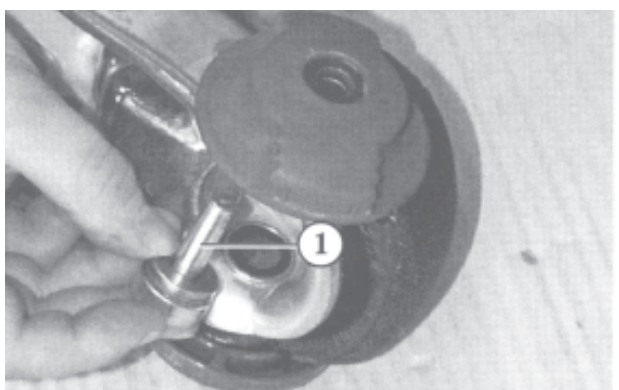


Installing friction pads and pressure bearings



The friction pads must always be replaced in pairs.

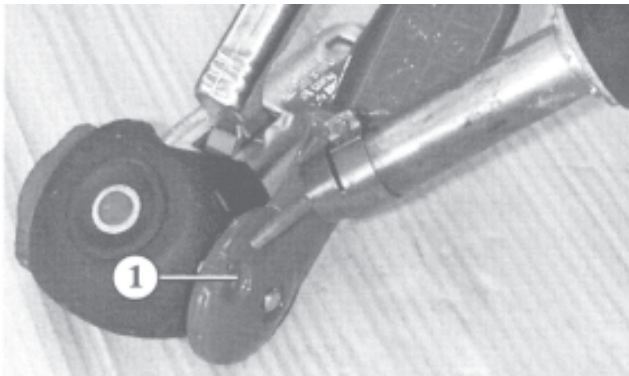
- The washers and pressure bearing must be threaded onto the friction pad in the order: thin washer (1), pressure bearing (2) and thick washer (3)
- Insert the friction pad (1)



- Secure the friction pad with the retaining ring (2)

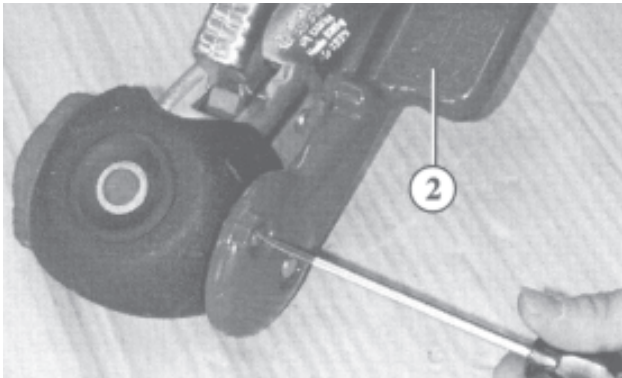


Always use new retaining rings.

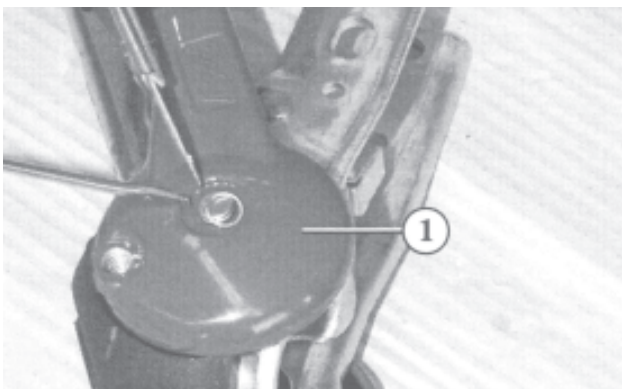


Removing the stabiliser lever

- Heat up the screw (1) with a hot air blower

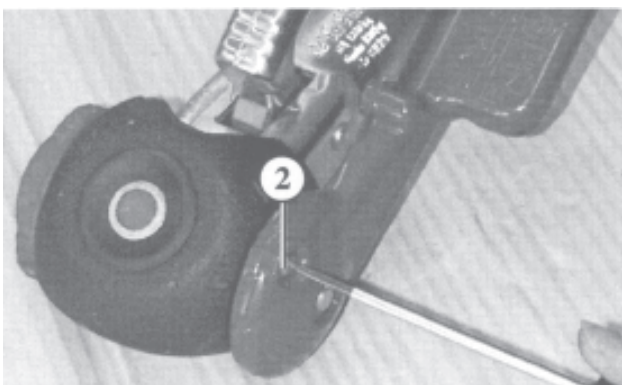


- Unscrew and remove the screw
- Remove the friction pad
- Unscrew the stabiliser lever (2)

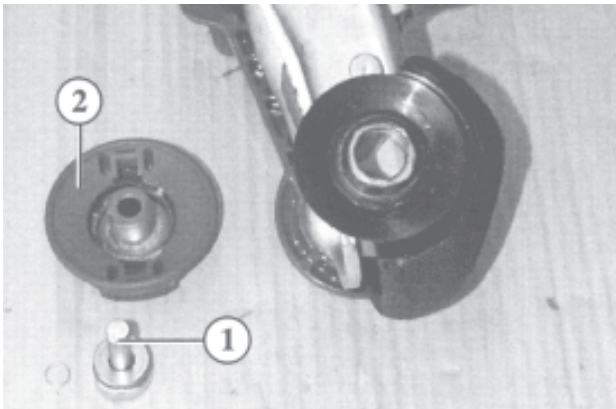


Installing the stabiliser lever

- Screw on the stabiliser lever (1)
- Open the stabiliser lever to the middle position

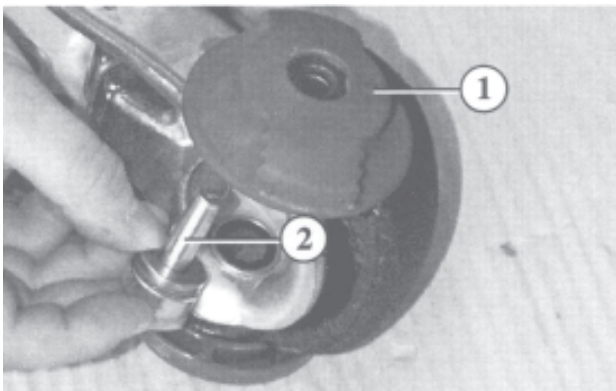


- Clean the screw (2) and coat with Loctite
- Screw in the screw until it locks and then back off by a quarter of turn (it must be possible to move the lever).
- Install the friction pad



Removing the handwheel

- Remove the friction pad (1)
- Unscrew the handwheel (2)

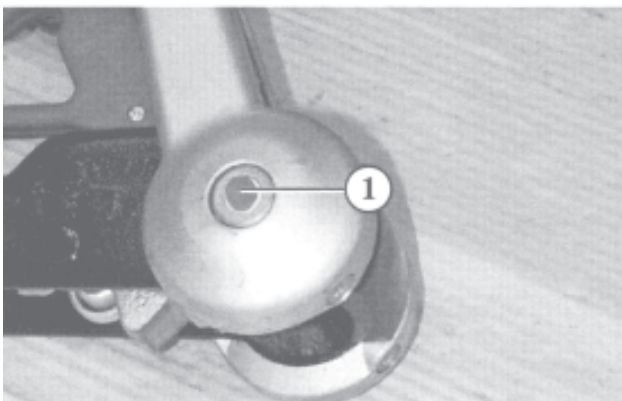


Installing the handwheel

- Screw on the handwheel (1)
- Install the friction pad



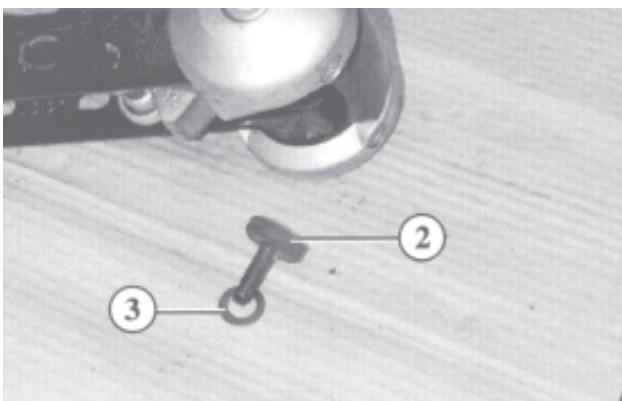
Always use new retaining rings.



1.3.3 AKS 2000/2500/2700 stabiliser

Removing friction pads

- Take off protective caps (1)



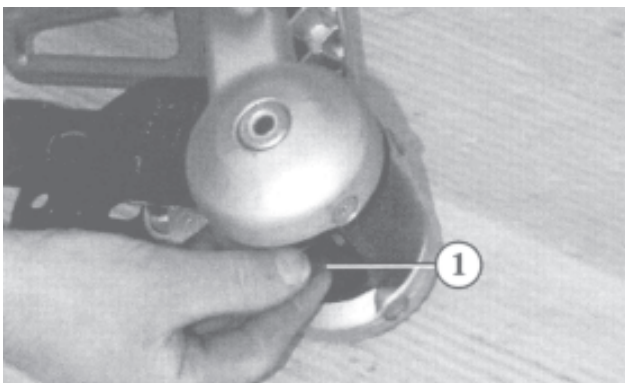
- Press out the friction pads (2) inwards with a punch
- Remove the friction pads from the coupling, together with any shims (3) fitted



Friction pads must always be replaced in pairs.



The friction pad shims must be refitted in their original positions.



Installing friction pads

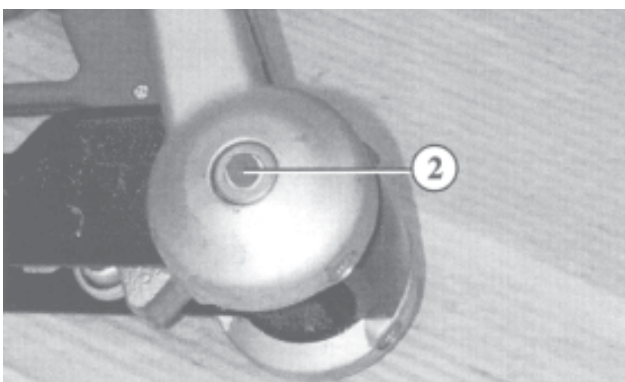
- Insert the new friction pads (1), with shims fitted (if any), into the bearing from the inside
- Press in the friction pad by hand, until it is heard to engage



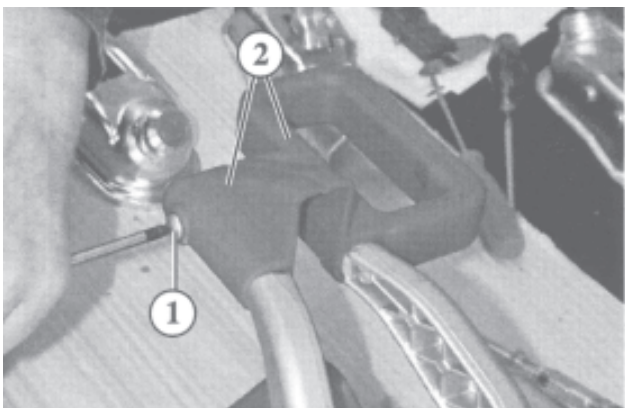
Friction pads must always be replaced in pairs.



The friction pad shims must be refitted in their original positions

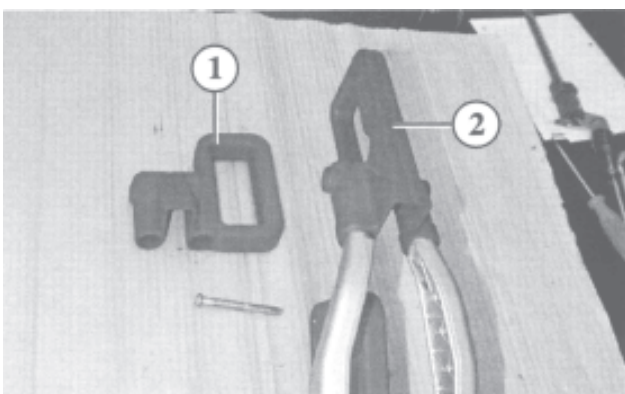


- Position the protective caps (2) and press in



Removing the handle shells

- Loosen the Torx screw (1) and unscrew
- Take the two handle shells (2) off the levers



Installing the handle shells

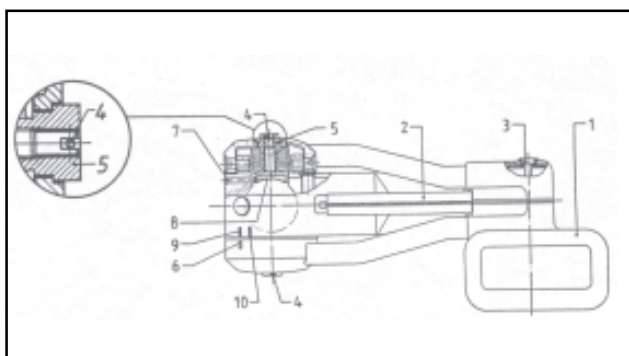
- Push the handle shell halves onto the levers as far as they will go
- Engage the handle shell halves at the rear first (snap fastening)
- Insert and tighten the Torx screw



In some cases the standard handle (1) cannot be fitted. In these cases, the replacement handle (2) is installed.

1.3.4 AKS 2000 Stabiliser (pre 1994 models)

Removing friction pads



- Couple AKS 2000 to towing vehicle (ensure visual indicator is green) - press down coupling handle (1).

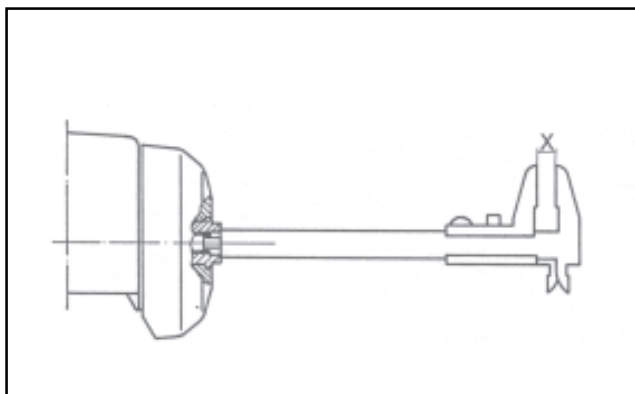


Friction pads must always be replaced in pairs.



The friction pad shims must be refitted in their original positions

- The mark on the pressure plate (6) should coincide with the markings on the housing (10) or passes it.
- Remove screw (3) from stabiliser handle
- Punch out roll pins (4) with 2mm punch
- Open stabiliser lever until marks (9) coincide with marks on housing (6)
- Rotate the adjusting bush with spanner (SW 19) anticlockwise (5) until friction lining (8) is in contact with the towball.



When the stabiliser lever reaches the final position, the markings (6) must coincide when resistance is felt.



Check wear condition of linings using vernier callipers.

Dimension "X" above 1.0 mm:

Replace linings (see page 16)

Dimension "X" 1.0 mm or below:

Setting OK (Lining still has reserve)



If the friction linings are worn above the limit, the towball could be damaged.

- Drive in the safety pins (4) to the next possible position.



Check alignment markings again (6)

- Screw cross-screw (3) into the stabiliser handle.



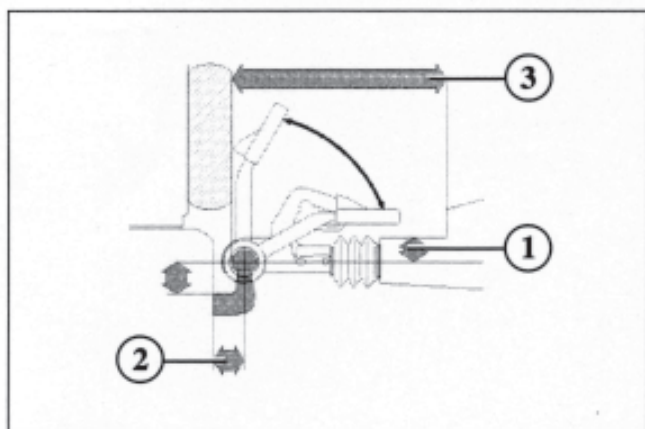
Replacing friction pads

If Dimension "X" is above 1.0 mm then:

- Uncouple AKS 2000
- With spanner, rotate adjusting bush anti-clockwise until friction pad is released
- Feed in new pad making sure that groove is lined up with the pin on the inside of coupling head.
- Rotate adjusting bush clockwise until pad is fully engaged and the shaft protrudes through the adjusting bush
- Couple AKS 2000 to towing vehicle and carry out 'setting' (see page 15).

Clearances

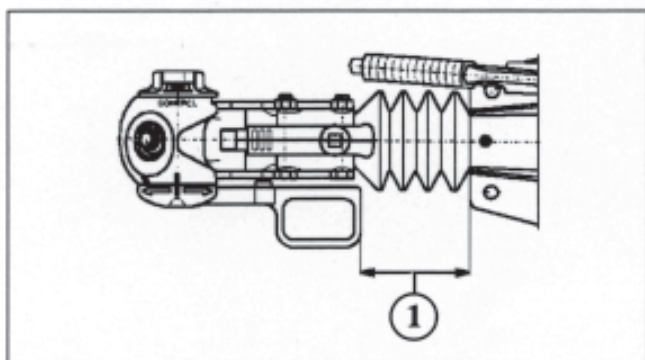
It is essential to comply with the following particulars concerning clearances.



- The AKS 1300/2000/2500/2700 must only be used with coupling balls to DIN 74058 (EC directive 94/20). This will provide the stipulated swivel angle of ± 25 degrees
- The AKS 1300 and AKS 2000 cannot be used for rotating overrun devices above ± 25 degrees
- The rear of the towing vehicle must have no additional or projecting parts

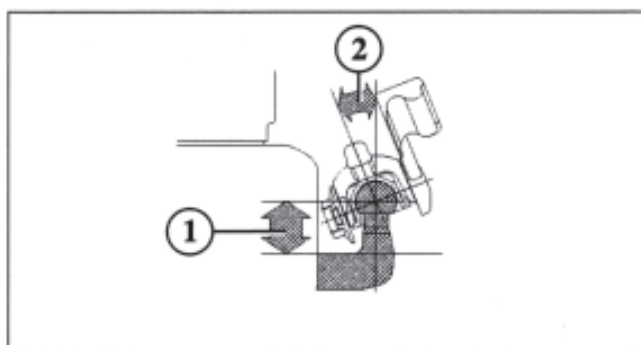
The clearances required for the AKS 2000/2500/2700 are shown in the graphic opposite.

- The distance (1) between the coupling handle and the centre axis of the drawbar must be at least 50 mm
- The distance (2) between the ball and the rear of the towing vehicle must be at least 65 mm
- The distance (3) to the stabiliser lever must be at least 440 mm
- Clearances in the handle areas must be at least 25 mm in any operating conditions. Various handle shells and bearing bolts for the handbrake lever are available for these cases



No components of the overrun device must be located in the area behind the stabiliser handle on the AKS 1300.

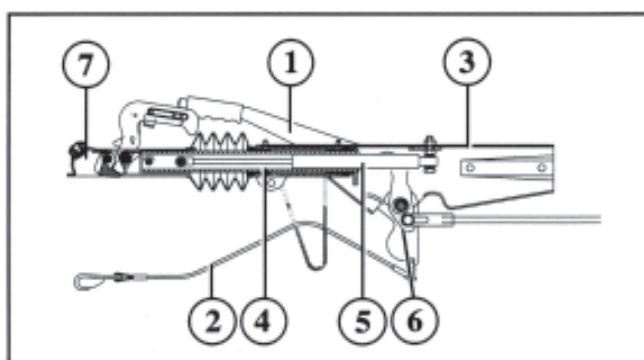
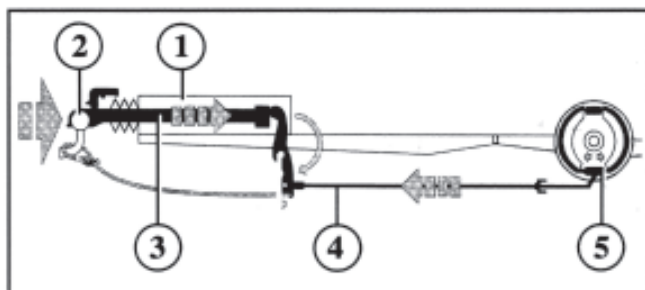
- The distance (1) must be at least 100 mm
- For the AKS 1300/2000/2500/2700 the distance (1) between the centre of the ball and the top of the cross member must be at least 60 mm for the sideways swivel angle of ± 25 degrees.



The clearances required as per DIN 74058 impose the following limitations.

- Class A 50 – 1 coupling balls to DIN 74058 must not be used.
- Screw-in balls are only permitted if they have positive locking.
- The AKS 1300 must not be used with a reversing lock fitted on the left-hand side.
- No distance pieces must be used with the AKS 1300

2 Overrun Devices



2.1 Function and construction of the overrun device

2.1.1 Function

The overrun device (1) may be described as the control unit for the overrun braking system. Braking by the towing vehicle generates a towbar force at the coupling point (2). When the operating threshold is exceeded, the drawbar (3) is pushed in. This causes the wheel brakes (5) to operate via the linkage system (4).

2.1.2 Construction

The overrun device consists of a number of assemblies:

- 1 Handbrake system
- 2 Breakaway cable
- 3 Housing
- 4 Drawbar
- 5 Damper
- 6 Overrun lever in linkage system
- 7 Coupling head

2.2 Maintenance

2.2.1 Checking the functions

Handbrake

- Pull the handbrake lever on and check that it moves freely
- Check the condition of the gas strut.
- Check the condition of the overrun unit.

Jockey wheel and locking handle

- Check the wheel for damage
- Release the locking handle and check the thread
- Move the jockey wheel up and down
- Tighten the locking handle
- Wind the jockey wheel up and down with the crank.

Drawbar bearings

- Pull the drawbar out as far as the stop
- Press the drawbar up and down. With square, delta and tubular overrun devices, play must be not more than ± 1.5 mm.

Overrun and coupling attachment bolts

- Check all attachment bolts of the overrun device and coupling for tightness. (Ensure the correct tightening torque)

Breakaway cable

- Check the ring of the breakaway cable on the handbrake lever
- Check the condition of the cable guide
- Check the condition of the snap hook
- Check the condition of the cable

2.2.2 Lubrication

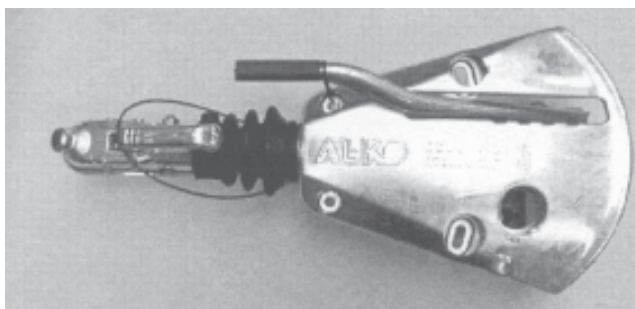
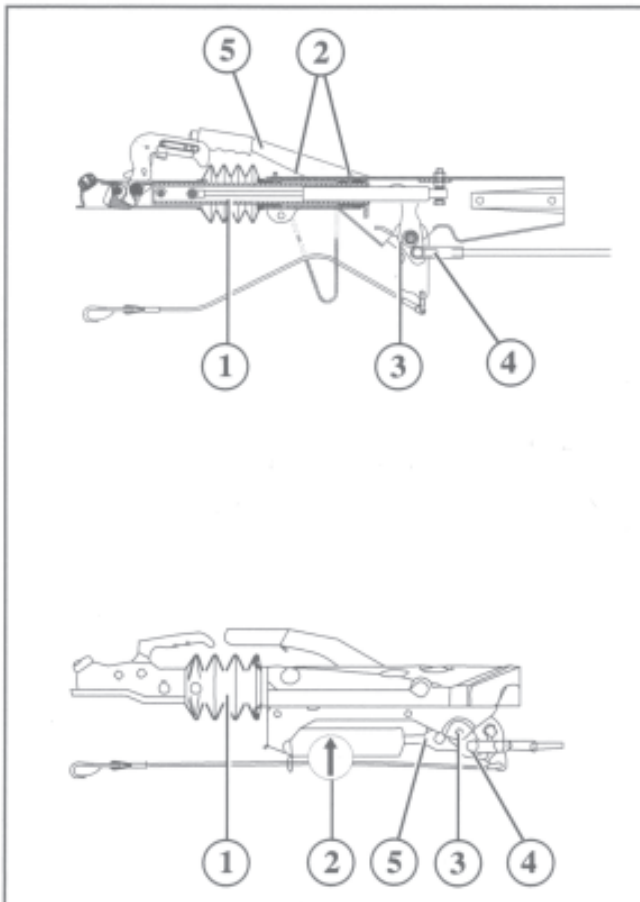
Lubrication intervals

Grease or oil sliding and swivelling points of the overrun device every 10,000 – 15,000 km or 12 months.

Lubrication points

- 1 Grease the drawbar in the area of the bellows.
- 2 Grease the bearing bush through the grease nipples on the housing and the cartridge.
- 3 Grease the pivot bolt of the overrun lever and handbrake levers through the grease nipple.
- 4 Grease the joint of the Brake rod end fitting.
- 5 Oil the joints of the spring cylinder in the handbrake lever.

Lubricant type: Multi-purpose grease to DIN 51825 KTA 3K4

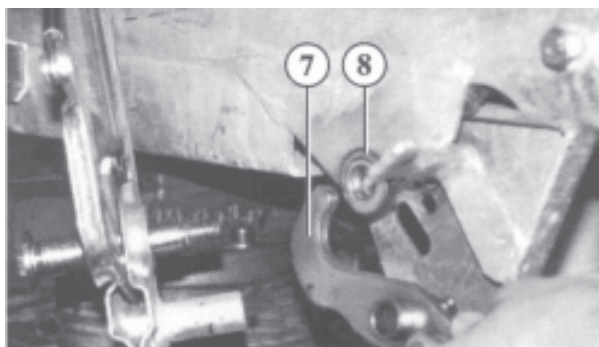
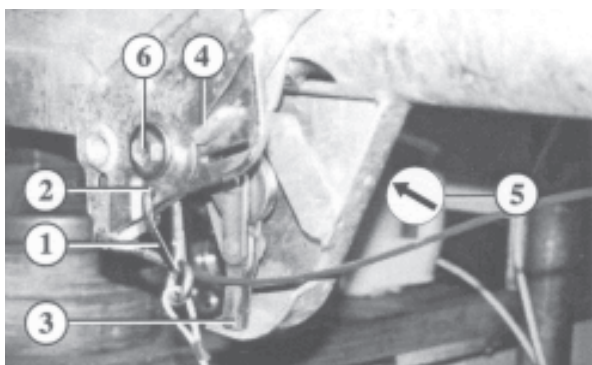


2.3 Repair

2.3.1 Removing the handbrake lever



Repairing the overrun device is made easier if the complete overrun device is unbolted and removed.



Removing the handbrake lever on delta, square and tubular overrun devices

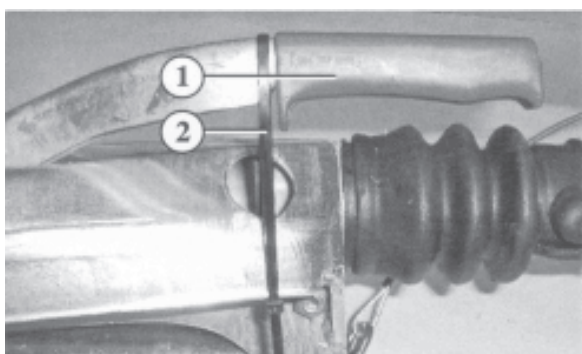


Caution: Injuries can be caused by the handbrake flying up

- Clip the snap hook (1) of the breakaway cable into hole (2).
- Unscrew the brake rod from the rod end fitting (3).
- Unclip the snap hook (1) of the breakaway cable.
- Position the handbrake cable (4) vertically.
- Unscrew the nut (5) from the pivot screw (6).
- Withdraw the handbrake lever (4) with pivot screw (6).



When withdrawing the handbrake lever, the overrun lever (7) and a shim washer (8) will drop out of the overrun device.

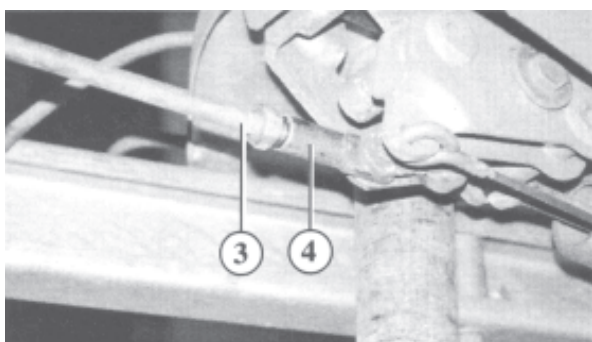


Removing the handbrake lever on the Euro overrun device

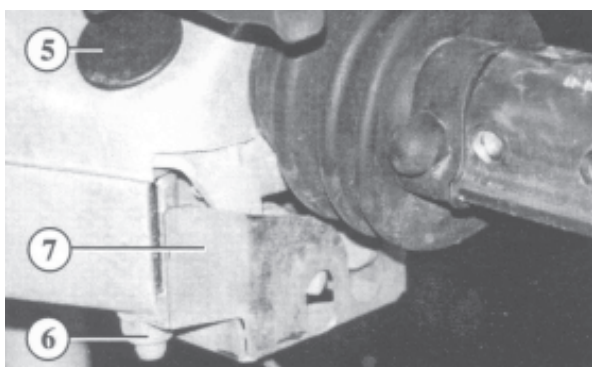


Caution: Injuries can be caused by the handbrake lever flying up.

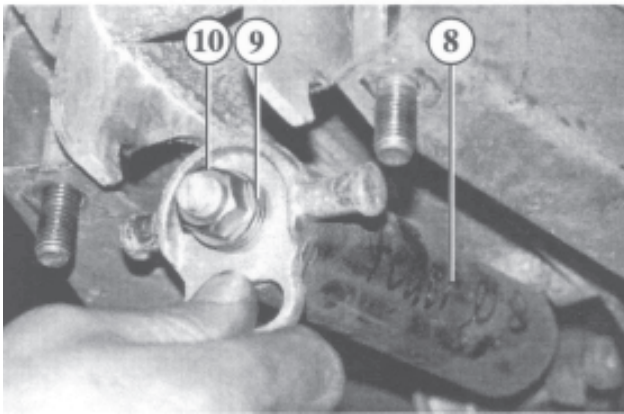
- Secure the handbrake lever (1) with a cable tie (2).



- Unscrew the brake rod (3) from the rod end fitting (4)



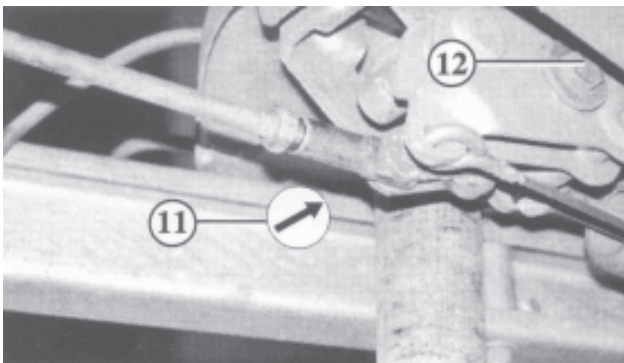
- Remove plug (5)
- Unscrew nuts (6) and take off the cover plate (7)



- Secure the spring cylinder (8) with 4 to 5 DIN 125 A13 washers (9) and a DIN 934 M12 nut (10)
- Remove the cable tie
- Position handbrake lever vertically and remove the spring cylinder (8) from underneath



When dismantling, the spring cylinder (8) will drop out



- Unscrew the nut (11) from the pivot screw (12).
- Take out the pivot screw (12).
- Position the handbrake lever vertically and withdraw downwards.



When withdrawing the handbrake lever, the overrun lever (7) and a shim washer (8) will drop out of the overrun device.

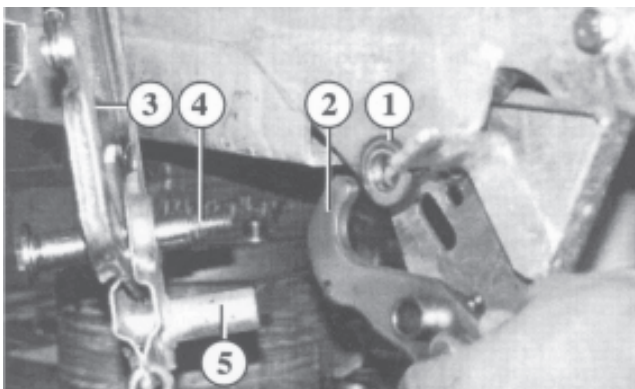
2.3.2 Installing the handbrake lever

Installing the handbrake lever on delta, square and tubular overrun devices



Caution: Injuries can be caused by the handbrake lever flying up

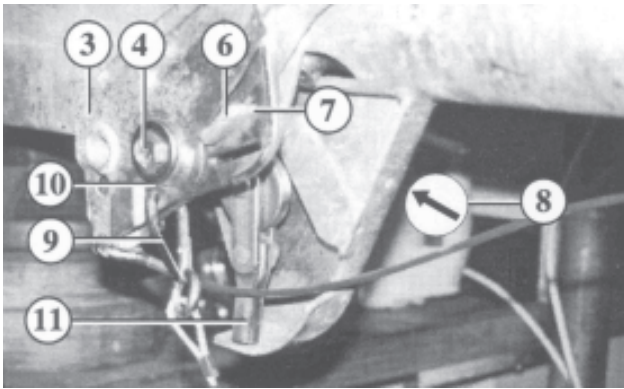
- Using grease, stick the shim washer to the opening of the hole in the housing
- Insert and hold the overrun lever (2) with the hook in the direction of travel
- Insert the handbrake lever (3) with pivot screw (4) pushed through



The overrun lever (2) must be in front of the carrier (5) of the hand brake lever (3) in the direction of travel



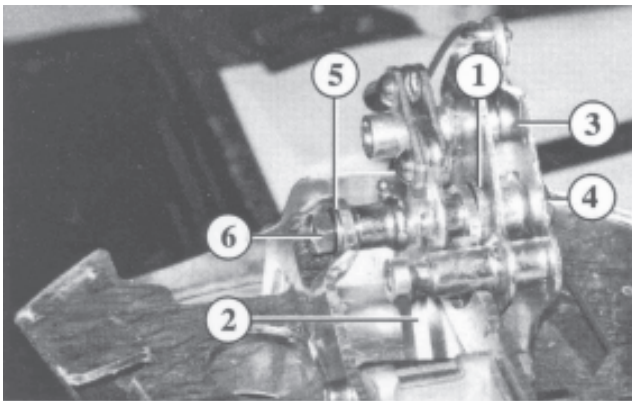
Fit the slotted hole (7) on the handbrake lever segment onto the tongue (6) on the housing (see page 5)



- Screw the nut (8) onto the pivot screw and tighten to 86 Nm
- Move the handbrake lever (3) downwards
- Clip the snap hook (9) of the breakaway cable into hole (10)
- Screw the brake rod into the rod end fitting (11) and tighten the locknut
- Unclip the snap hook of the breakaway cable.
- Adjust the braking system and check for correct operation



The shim washer (1) must not be tilted between the handbrake lever and the housing.



Installing the handbrake lever on the Euro overrun device

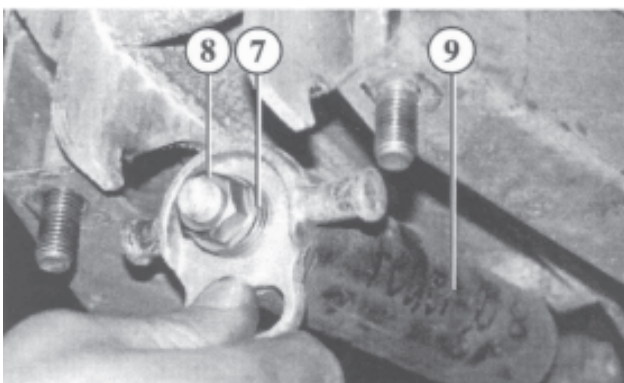


Caution: Injuries can be caused by the handbrake lever flying up



Beware of trapped fingers when installing the spring cylinder.

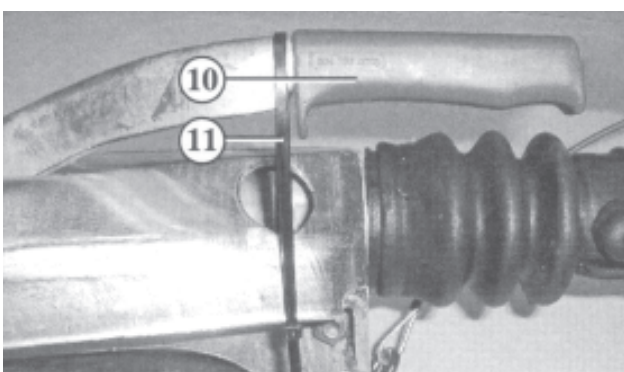
- Using grease, stick the shim washer to the opening of the hole in the housing
- Insert and hold the overrun lever (2) with the hook in the direction of travel
- Insert the handbrake lever (3) from below.
- Insert the pivot screw (4) and put on the shim washer (5).
- Fit the nut (6) and tighten to 86 Nm.
- Position the handbrake lever vertically.



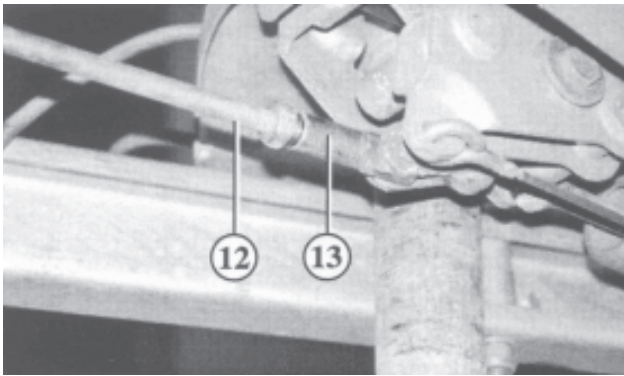
- Place the spring cylinder (9) secured with the washers (7) and nut (8) in its mounting and move the handbrake lever downwards.



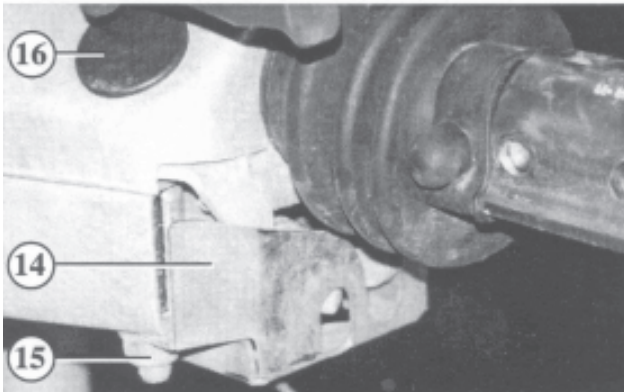
Caution: Injuries can be caused by the handbrake lever flying up.



- Secure the handbrake lever (10) with a cable tie (11).
- Remove the nut and washers from the spring cylinder.



- Screw the brake rod (12) to the end fitting (13) and tighten the locknut



- Put on the cover plate (14).
- Fit new self-locking nuts (15) and tighten to 86 Nm
- Insert plug (16)
- Remove cable tie
- Adjust braking system and check for correct operation

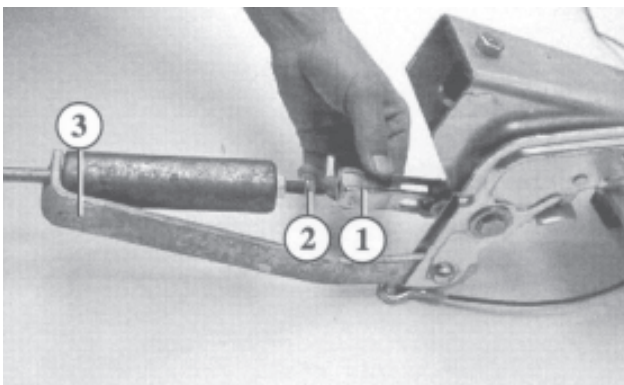


Do not re-use self-locking nuts.

2.3.3 Removing the spring cylinder

Removing the spring cylinder unit with delta, square and tubular overrun devices

- Unscrew the brake rod from the clevis (1)
- Loosen the locknut (2)
- Take the rod out of the clevis (1) and out of the support bracket (3).



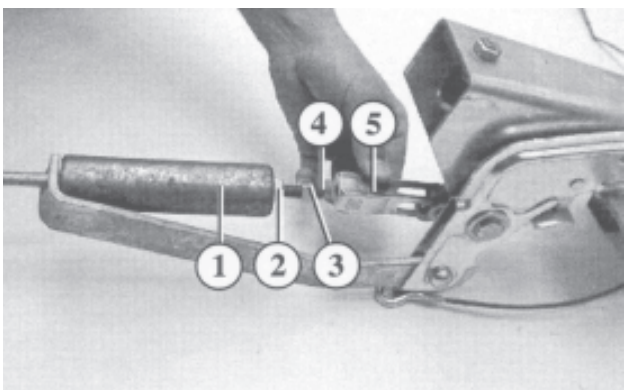
Removing the spring cylinder on the Euro overrun device

This work is described in the section "Removing the handbrake lever on the Euro overrun device".

2.3.4 Installing the spring cylinder

Installing the spring cylinder on delta, square and tubular overrun devices

- Thread the cylinder (1) onto the rod
- Screw on the adjusting nut (2)
- Screw the locknut (3) onto the rod
- Screw the rod (4) into the clevis fitting (5)
- Screw the adjusting nut (2) up against the spring cylinder (1) so that there is no play
- Adjust the brake system and check for correct operation



2.3.5 Removing the overrun lever

Removing the overrun lever on delta, square, tubular and Euro overrun devices

This work is described in the section “Installing the handbrake lever on delta, square, tubular and Euro overrun devices”.

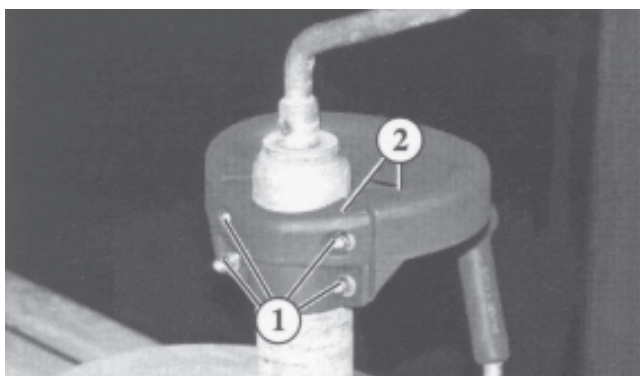
2.3.6 Replacing the overrun lever

Removing the overrun lever on delta, square, tubular and Euro overrun devices

This work is described in the section “Installing the handbrake lever on delta, square, tubular and Euro overrun devices”.

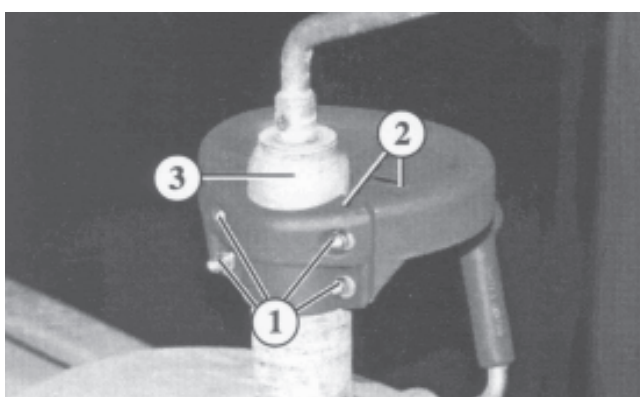
2.3.7 Removing the manoeuvring handle

- Unscrew and remove the screws (1)
- Remove the half shells from the jockey wheel tube



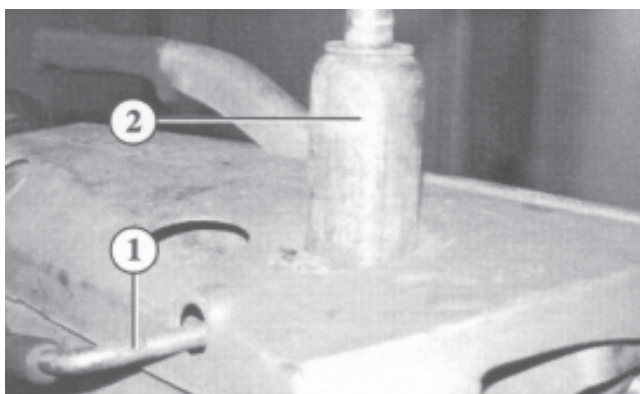
2.3.8 Installing the manoeuvring handle

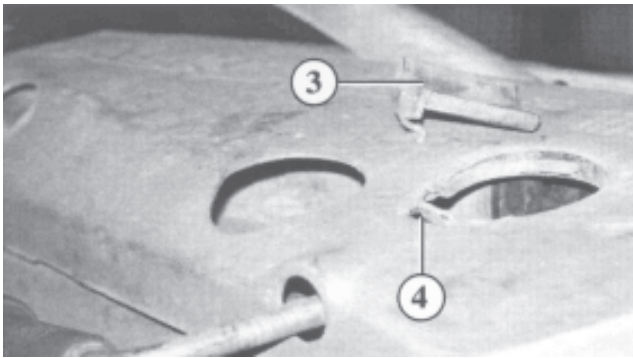
- Press the two half shells together on the jockey wheel tube (3)
- Insert the four screws (1) and tighten in a diagonal sequence.



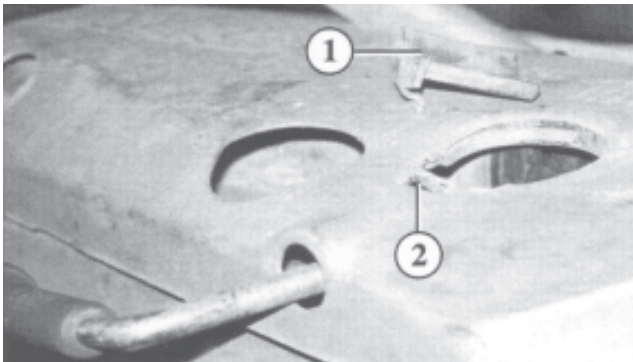
2.3.9 Removing the jockey wheel and clamp on the Euro-overrun device

- Loosen the locking lever (1)
- Take the jockey wheel (2) downwards out of the guide



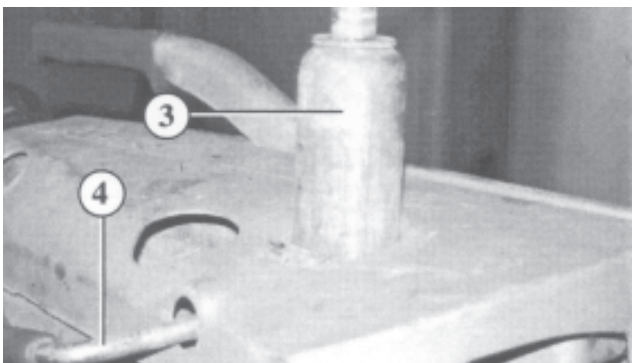


- Take the clamping shoe (3) out of the holder (4).

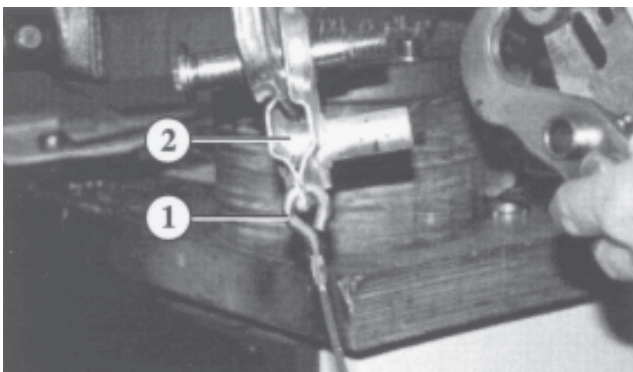


2.3.10 Installing the jockey wheel and clamp on the Euro-overrun device

- Insert the clamping shoe (1) into the holder (2)

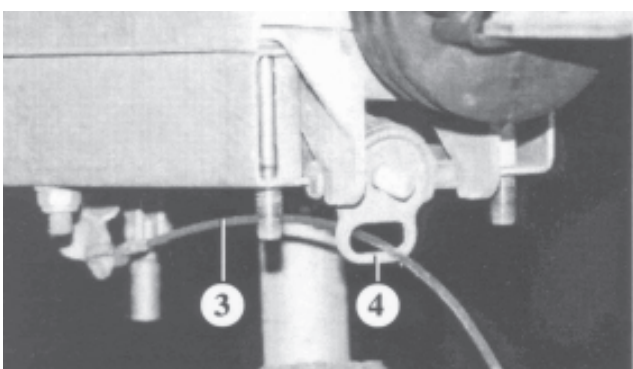


- Insert the jockey wheel (3) through the guide from underneath and pull up until the recess is reached
- Tighten the locking lever (4)

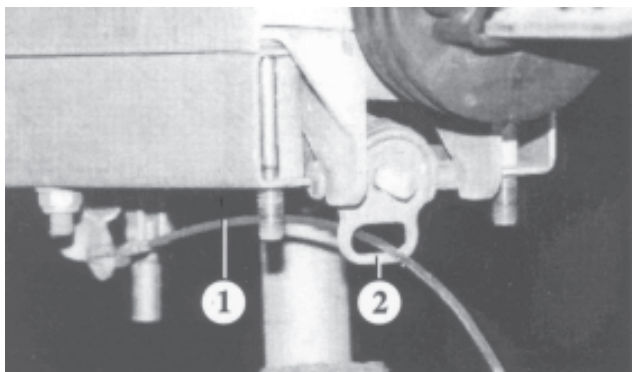


2.3.11 Removing the breakaway cable

- Using two pairs of pliers, open the breakaway eye (1) on the brake lever (2) and unhook it

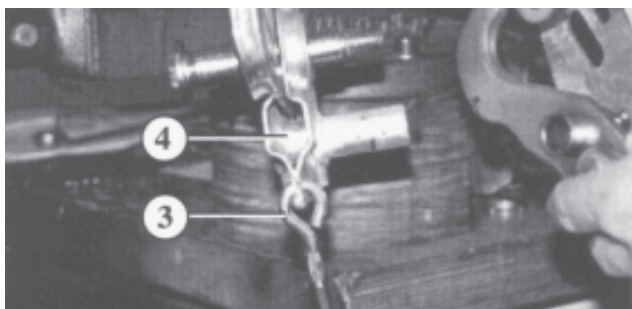


- Withdraw the breakaway cable (3) through the guide bracket (4)



2.3.12 Installing the breakaway cable

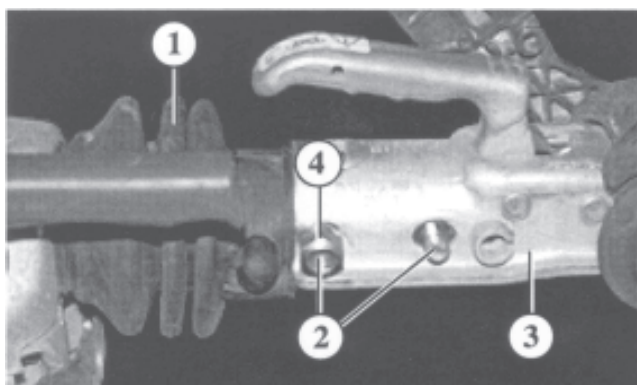
- Pull the breakaway cable (1) through the guide bracket (2)
- Hook the breakaway cable (3) onto the brake lever (4) and press together with pliers



The breakaway eye (3) must be completely closed.

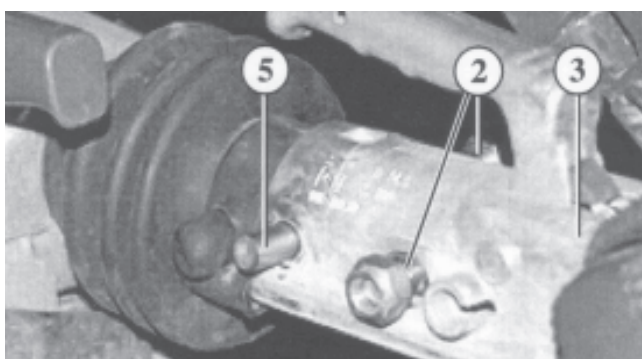


The breakaway ring used in older models can be replaced with the new breakaway eye.



2.3.13 Removing the bellows

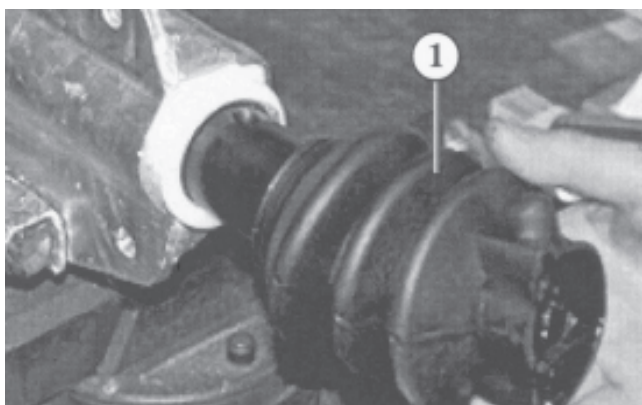
- Pull the bellows (1) off the rear attachment bolt (2) of the coupling (3)
- Unscrew the nuts (4) of the attachment bolts (2)



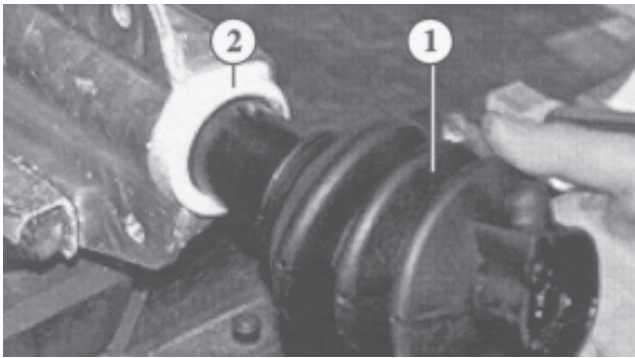
- Drive out the rear attachment bolt (2) with a 10 mm diameter retaining pin (5) (length to suit drawbar diameter)
- Leave the retaining pin pushed through the drawbar
- Drive out the front attachment bolt (2). (Remember the spacer tube)
- Take off the coupling (3)



The retaining bolt (5) keeps the eye of the damper in position. This is necessary because of the outward force exerted by the damper.

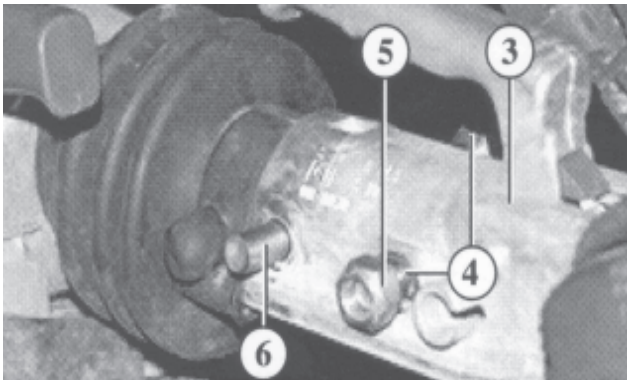


- Pull off the bellows (1)



2.3.14 Installing the bellows

- Fit the bellows (1) onto the bearing bush (2)
- Insert the spacer tube into the drawbar in line with the front attachment bolt



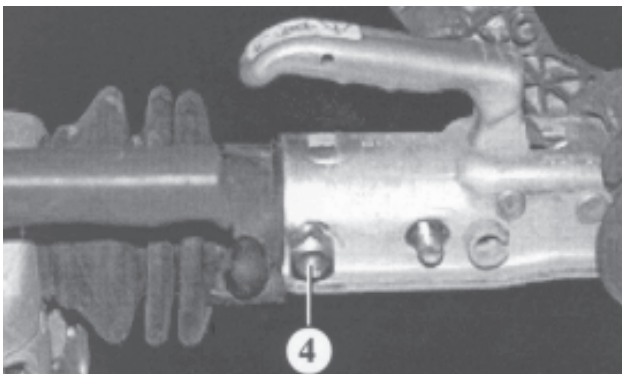
- Fit the coupling (3)
- Insert the attachment bolts (4)
- Fit new self-locking nuts (5) and tighten to 86 Nm



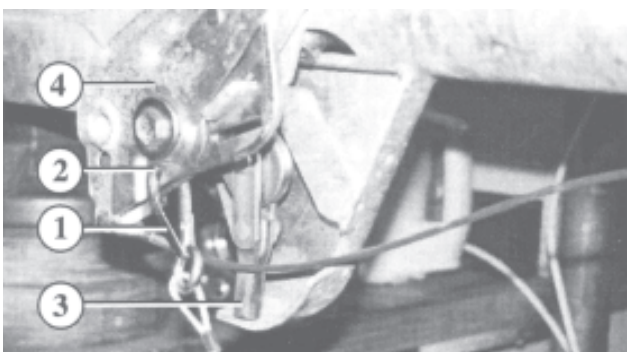
When inserting the rear attachment bolt, the damper eye retaining pin (6) is driven out.



Do not re-use self-locking nuts.



- Pull the bellows over the attachment bolt (4)



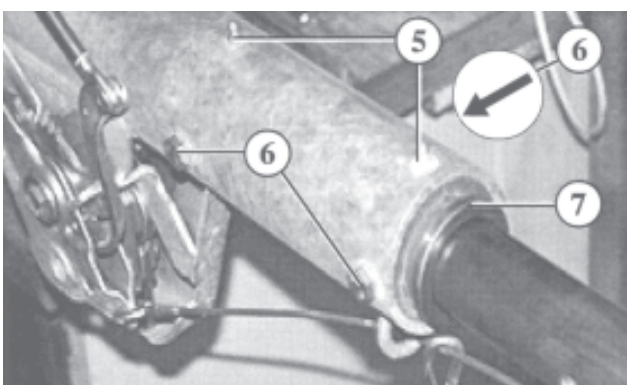
2.3.15 Removing the drawbar bearings

Removing the drawbar bearings on a tubular overrun device

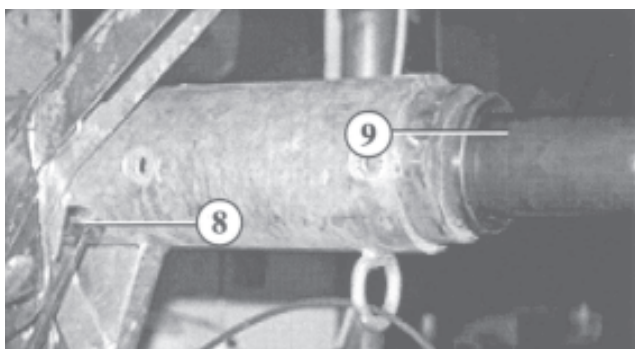


Caution: Injuries can be caused by the handbrake flying up

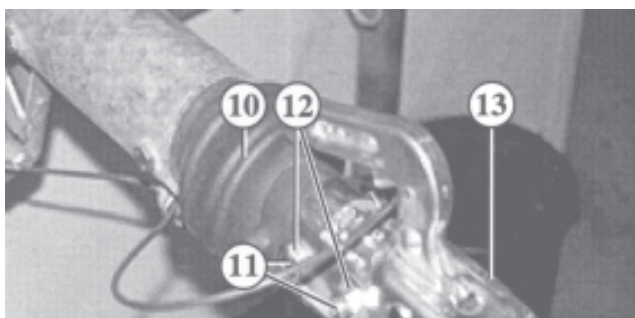
- Clip the snap hook (1) of the breakaway cable into hole (2)
- Unscrew the brake rod from the rod end fitting (3)
- Unclip the snap hook (1) of the breakaway cable
- Position the handbrake cable (4) vertically



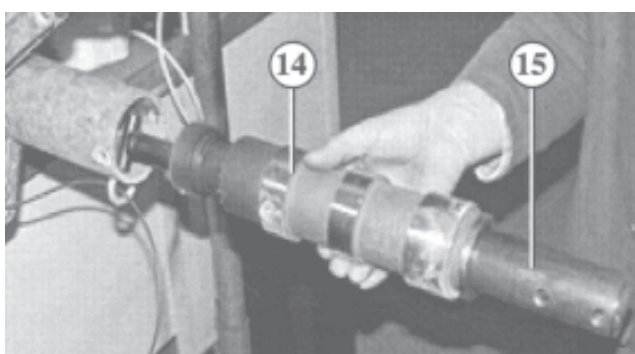
- Unscrew grease nipple (5)
- Unscrew and remove the retaining screws (6) of the bearing cartridge (7)



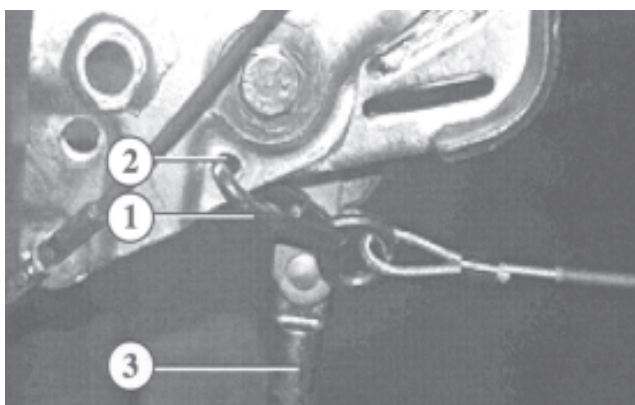
- Unscrew and remove the locating pin (8) of the drawbar (9)



- Pull the bellows (10) off the rear attachment bolt (11)
- Unscrew the nuts (12) of the attachment bolts (11)
- Take out the attachment bolts (11)
- Take off the coupling (13)
- Pull off the bellows (10)



- Pull out the bearing cartridge (14) with the drawbar (15)
- Pull the drawbar backwards out of the bearing cartridge (14)

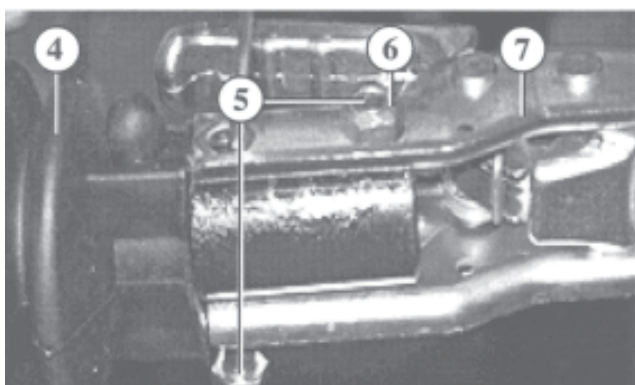


Removing the drawbar bearings on delta, square and tubular overrun devices

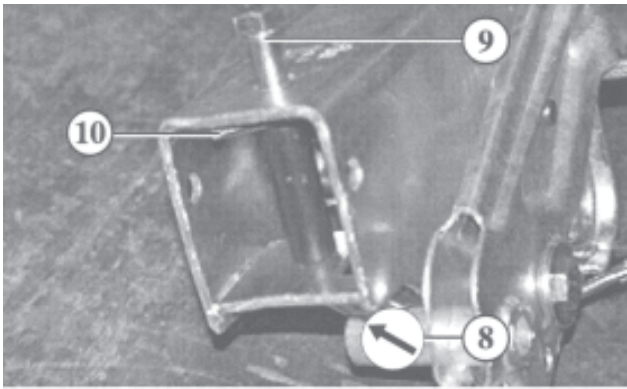


Caution: Injuries can be caused by the handbrake flying up

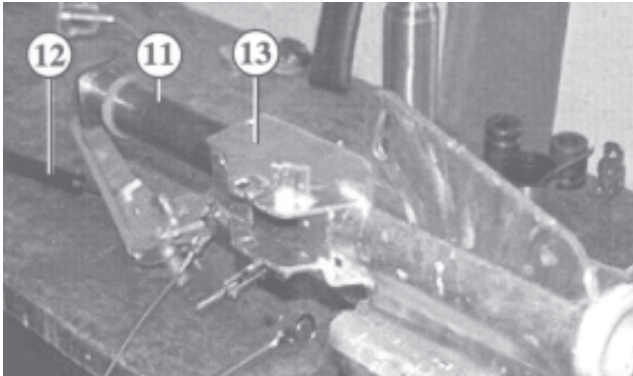
- Clip the snap hook (1) of the breakaway cable into hole (2)
- Unscrew the brake rod from the rod end fitting (3)



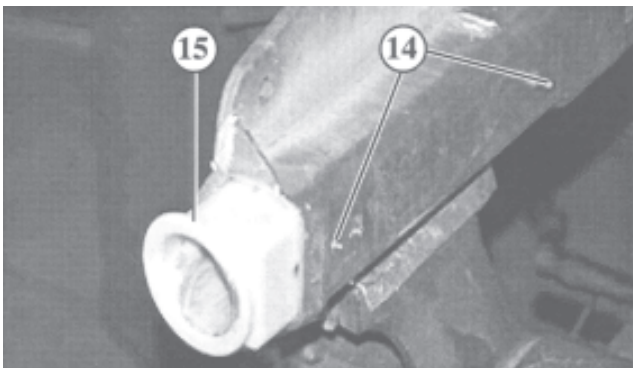
- Pull the bellows (4) off the rear attachment bolt (5)
- Unscrew the nuts (6) of the attachment bolts (5)
- Take out the attachment bolts (5)
- Take off the coupling (7)
- Pull off the bellows (4)



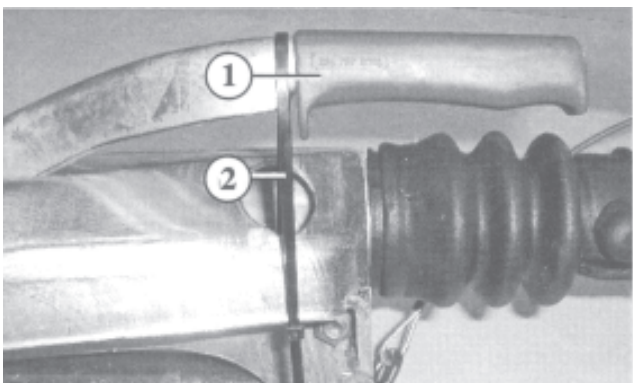
- Unscrew the nut (8) of the damper retaining bolt (9)
- Take out the damper retaining bolt (9)
Take out the stop plate (10) of the drawbar



- Pull the drawbar (11) and damper (12) backwards out of the overrun device (13)



- Unscrew the grease nipples (14)
- Drive out the front and rear bearing bushes from the back and front respectively using a tube or extractor

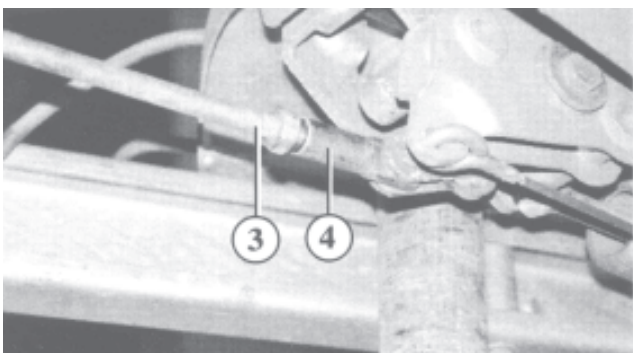


Removing the drawbar bearings on the Euro overrun device

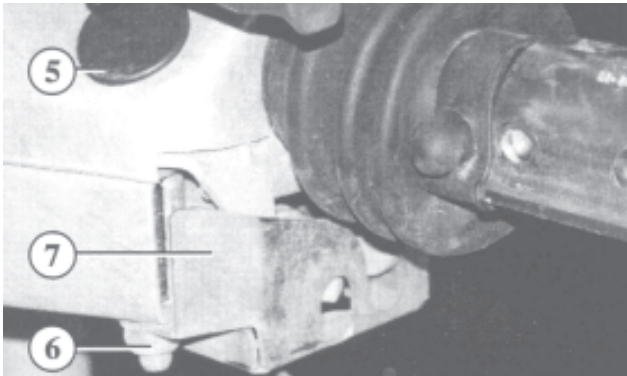


Caution: Injuries can be caused by the handbrake lever flying up.

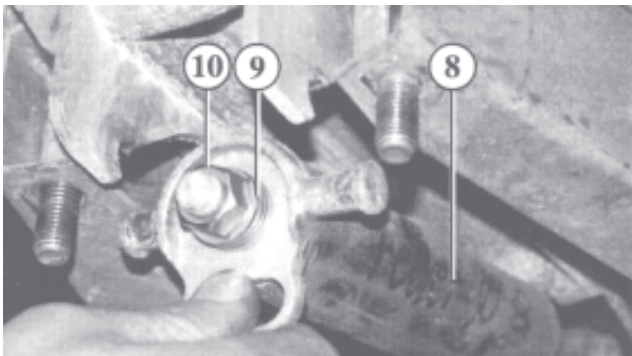
- Secure the handbrake lever (1) with a cable tie (2).



- Unscrew the brake rod (3) from the rod end fitting (4)



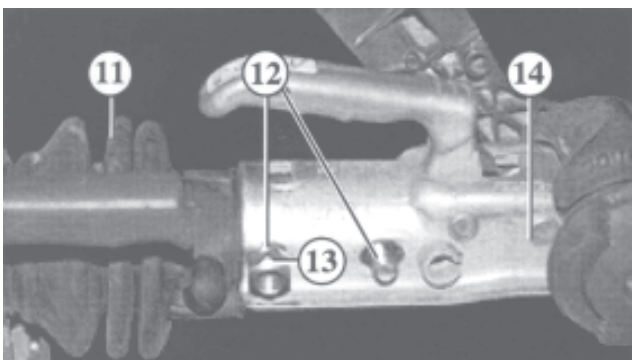
- Remove plug (5)
- Unscrew the nuts (6) and take off the cover plate (7).



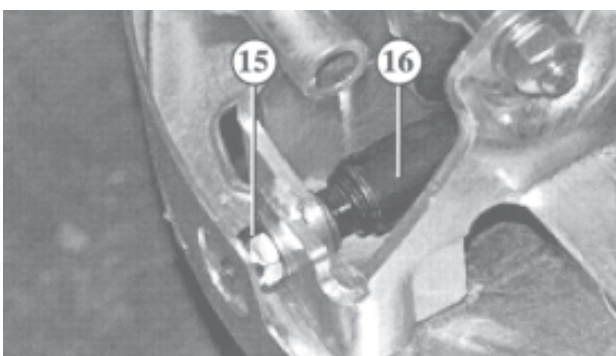
- Secure the spring cylinder (8) with 4 to 5 DIN 125 A13 washers (9) and a DIN 934 M12 nut (10).
- Remove the cable tie.
- Position the handbrake lever vertically and remove the spring cylinder (8) from underneath.



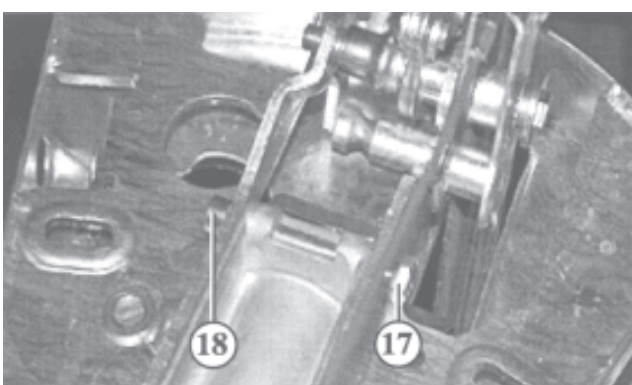
When dismantling, the cylinder (8) will drop out.



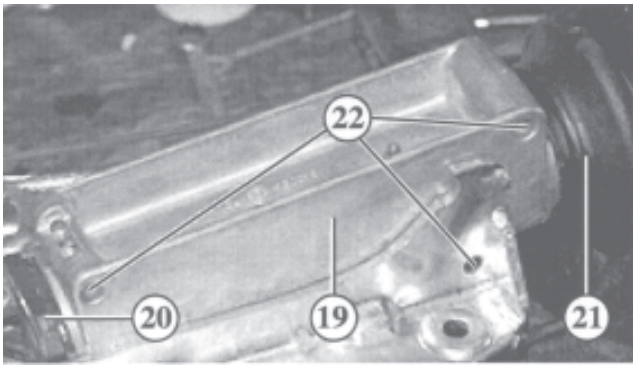
- Pull the bellows (11) off the rear attachment bolt (12)
- Unscrew the nuts (13) of the attachment bolts (12)
- Take out the attachment bolts (12)
- Take off the coupling (14)



- Unscrew nut (15)
- Pull the damper (16) frontwards out of the drawbar



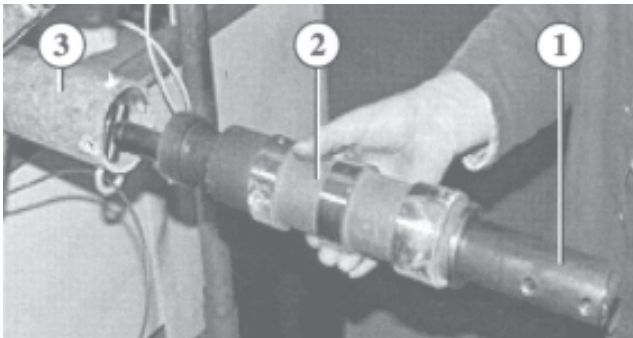
- Unscrew the nuts (17) of the attachment bolts (18)
- Take out the attachment bolts (18)



- Lift out the cast bearing cartridge (19) with the drawbar (20)
- Pull out the drawbar (20) and take off the bellows (21)



The holes (22) take the attachment screws for the cast bearing cartridge.



2.3.16 Installing the drawbar bearings

Installing the drawbar bearings on the tubular overrun device

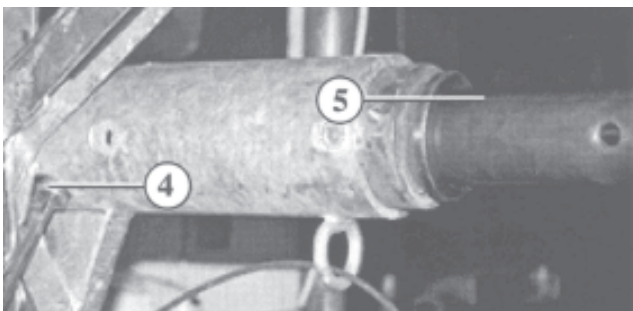


Caution: Injuries can be caused by the handbrake lever flying up.

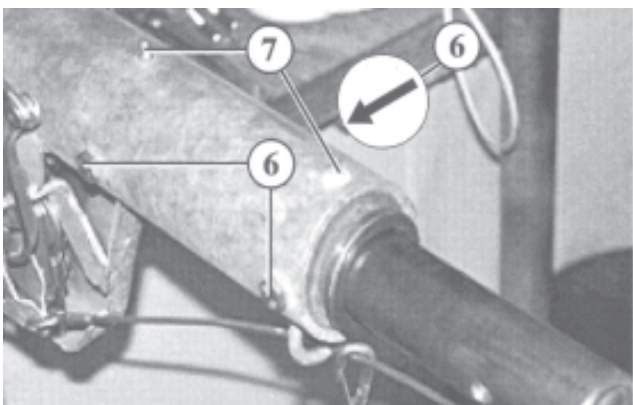
- Insert the drawbar (1) into the bearing cartridge (2)
- Slide the bearing cartridge (2) into the housing (3)



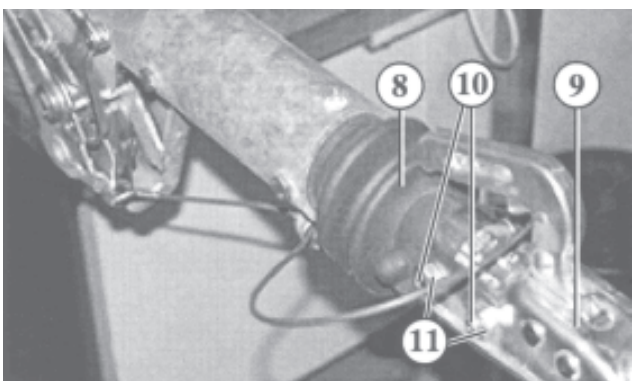
When inserting the bearing cartridge, make sure that the holes are correctly positioned.



- Screw the locating pin (4) into the drawbar (5)



- Insert the retaining bolts (6) and tighten to 50 Nm
- Screw in grease nipples (7)
- Check that the drawbar moves freely
- Insert the spacer tube into the drawbar in line with the front attachment bolt



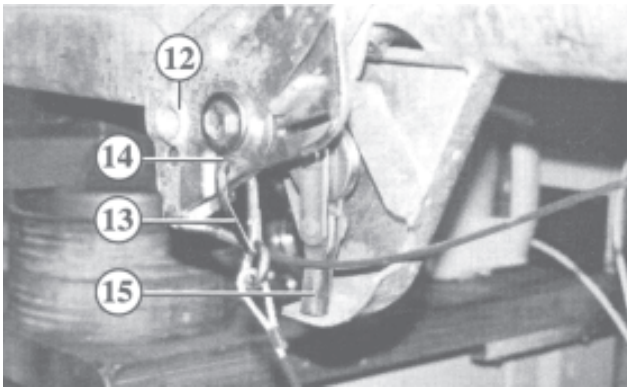
- Fit the bellows (8) onto the bearing cartridge
- Position the coupling (9)
- Insert the attachment bolt (10)
- Fit new self-locking nuts (11) and tighten to 86 Nm



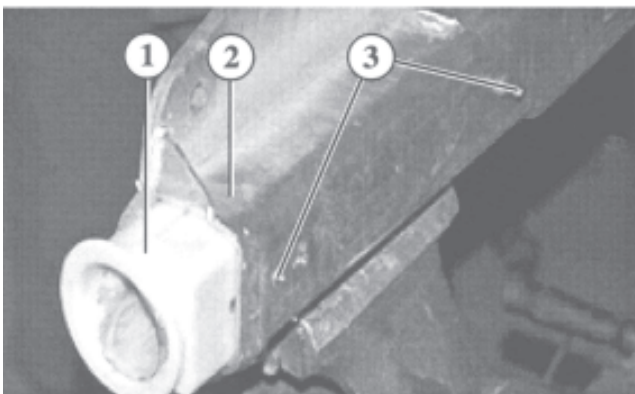
The rear attachment bolt must pass through the front damper eye.



Do not re-use self locking nuts.



- Move the handbrake lever (12) downwards
- Clip the snap hook (13) of the breakaway cable into hole (14)
- Screw the brake rod into the rod end fitting (15) and tighten the locknut
- Adjust the braking system and check for correct operation

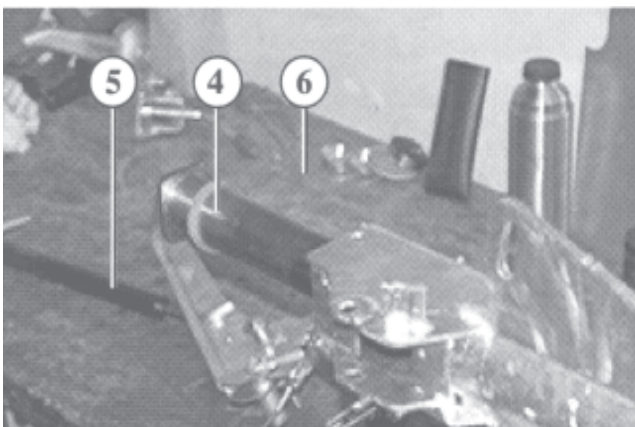


Installing the drawbar bearings on delta and square overrun devices



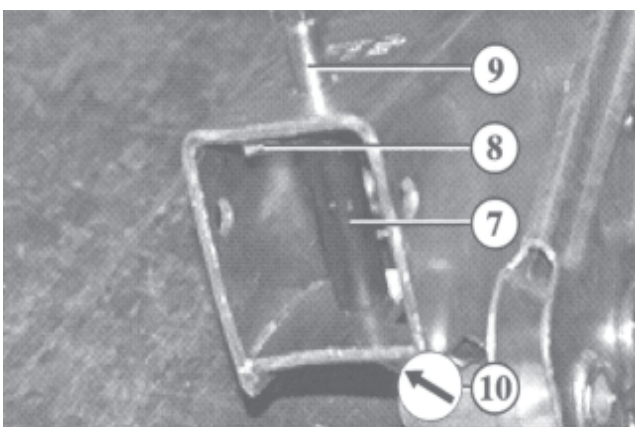
Caution: Injuries can be caused by the handbrake flying up

- Press the front (1) and rear bearing bushes into the housing (2) as far as they will go, from the front and rear respectively
- Drill a 7 mm diameter hole for the grease nipples (3)
- Ream out the bearing bushes to the required fit using a reamer with guide
- Screw in the grease nipples (3)



Different reamers are available (see tools list- Section 7).

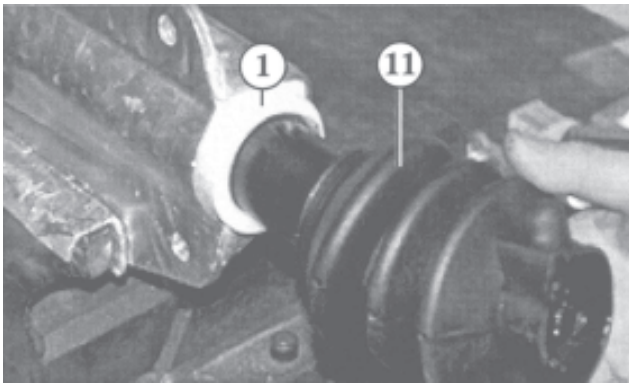
- Insert the drawbar (4) and damper (5) into the overrun device (6) from the rear



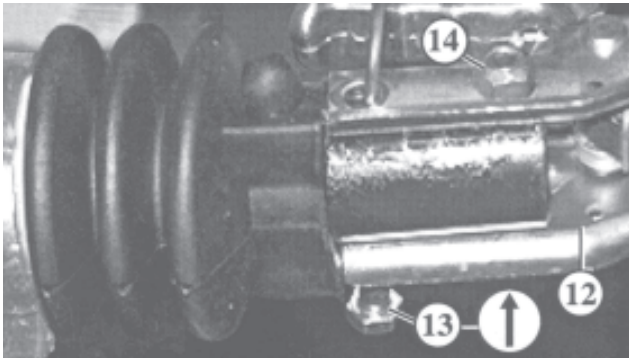
- Secure the damper (7) and stop plate (8)
- Insert the damper retaining bolt (9)
- Fit new self-locking nuts (10) and tighten to 50 Nm



Do not re-use self-locking nuts.



- Fit the bellows (11) onto the bearing bush (1)
- Insert the spacer tube into the drawbar in line with the front attachment bolt



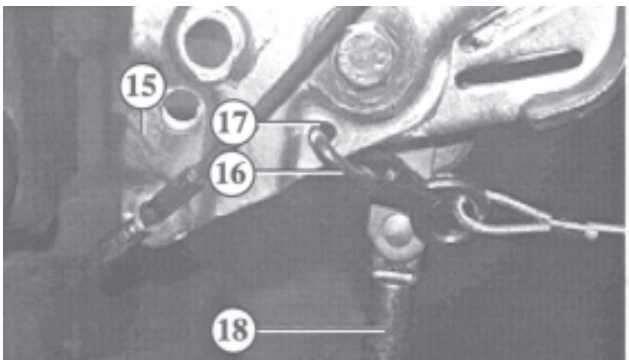
- Position the coupling (12)
- Insert the attachment bolts (13)
- Fit new self-locking nuts (14) and tighten to 86 Nm



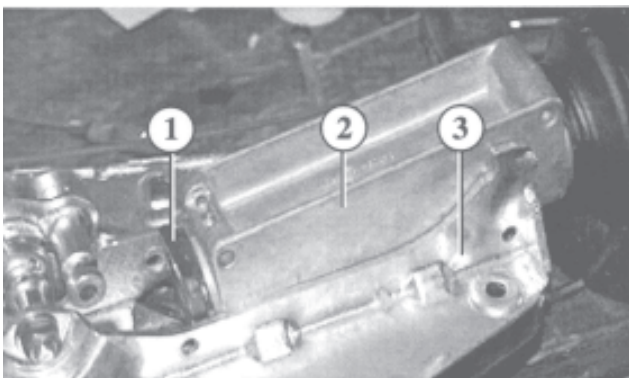
The rear attachment bolt must pass through the front damper eye.



Do not re-use self locking nuts.



- Move the handbrake lever (15) downwards
- Clip the snap hook (16) of the breakaway cable into hole (17)
- Screw the brake rod into the rod end fitting (18) and tighten the locknut
- Adjust the braking system and check for correct operation



Installing the drawbar bearings on the Euro overrun device

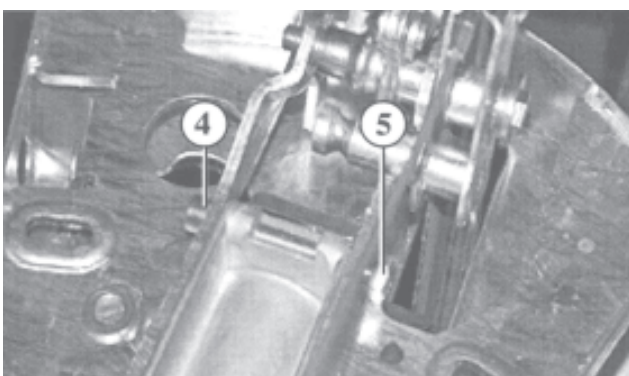


Caution: Injuries can be caused by the handbrake lever flying up



Beware of trapped fingers when installing the spring cylinder.

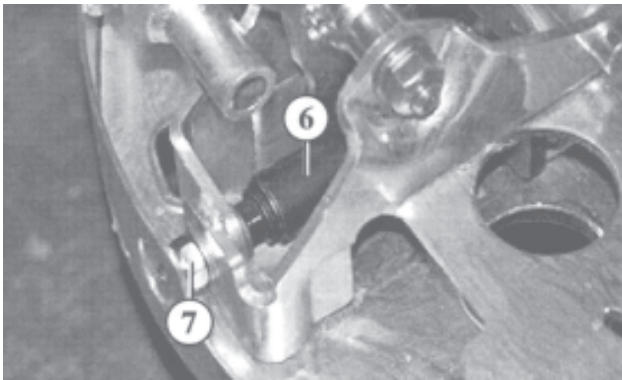
- Push the drawbar (1) into the bearing cartridge (2) from the rear
- Insert the bearing cartridge (2) into the overrun device



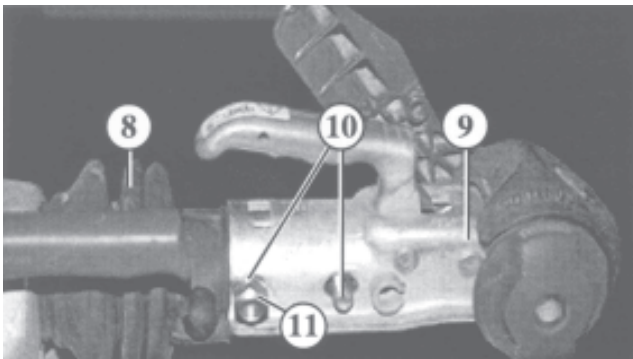
- Insert the attachment bolts (4)
- Fit new self-locking nuts (5) and tighten to 40 Nm +/- 5 Nm
- Check that the drawbar moves freely



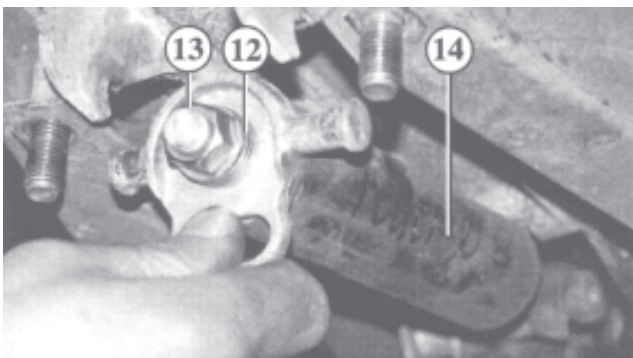
Do not re-use self-locking nuts.



- Insert the damper (6) with damping rubber into the drawbar from the front
- Fit the nut (7) and tighten to 50 Nm



- Fit the bellows (8) onto the bearing cartridge
- Insert the spacer tube into the drawbar in line with the front attachment bolt
- Position the coupling (9)
- Insert the attachment bolts (10)
- Fit new self-locking nuts (11) and tighten to 86 Nm

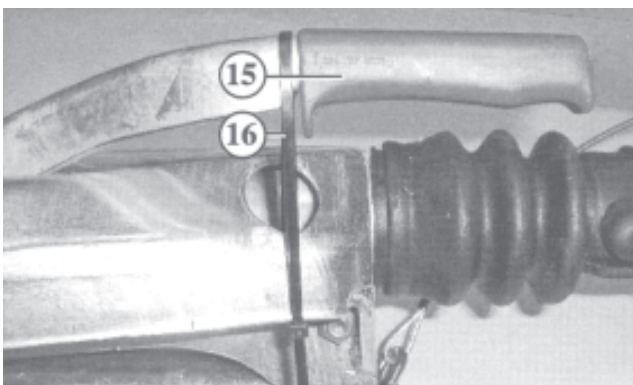


The rear attachment bolt must pass through the front damper eye.

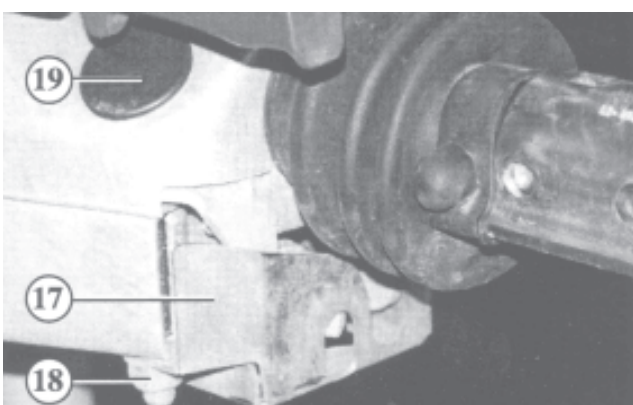


Do not re-use self-locking nuts.

- Position the handbrake lever vertically
- Place the spring cylinder (14) secured with the washers (12) and nut (13) in its mounting and move the handbrake lever downwards



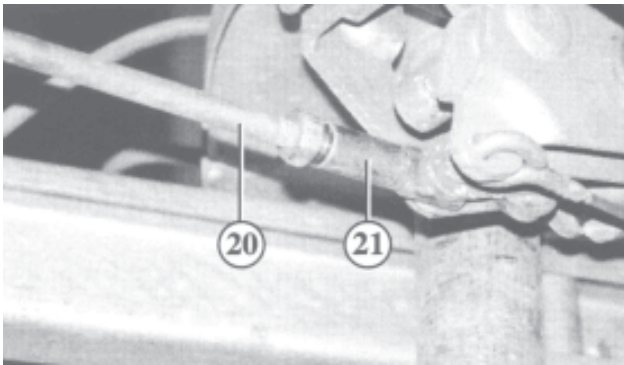
- Secure the handbrake lever (15) with a cable tie (16)
- Remove the nut and washers from the buffer unit



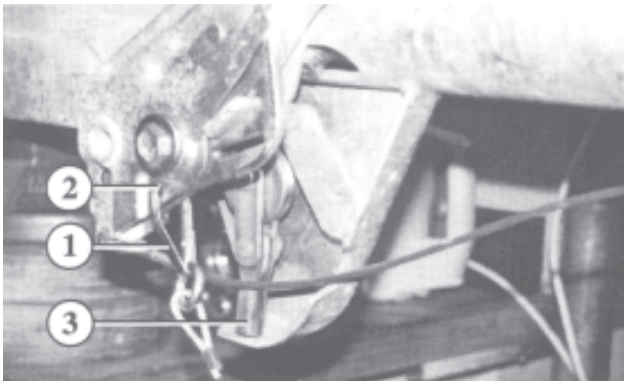
- Fit the cover plate (17)
- Fit new self-locking nuts (18) and tighten to 86 Nm
- Insert plug (19)



Do not re-use self-locking nuts.



- Screw the brake rod (20) into the rod end fitting (21) and tighten the locknut
- Remove the cable tie
- Adjust braking system and check for correct operation



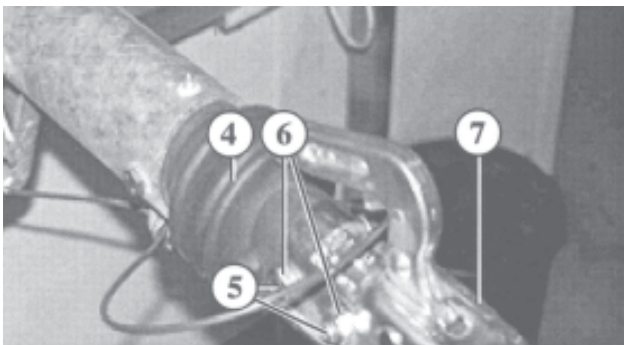
2.3.17 Removing the damper

Removing the damper on the tubular over run device

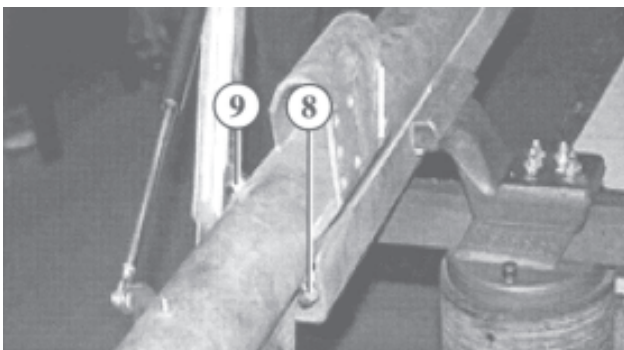


Caution: Injuries can be caused by the handbrake flying up

- Clip the snap hook (1) of the breakaway cable into hole (2).
- Unscrew the brake rod from the rod end fitting (3)



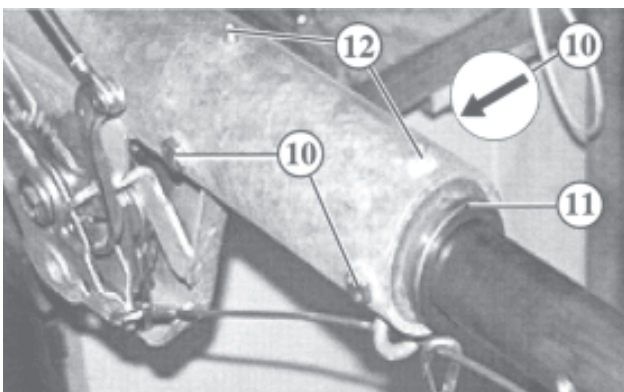
- Pull the bellows (4) off the rear attachment bolt (5)
- Unscrew the nuts (6) of the attachment bolts (5)
- Take out the attachment bolts (5)
- Take off the coupling (7)



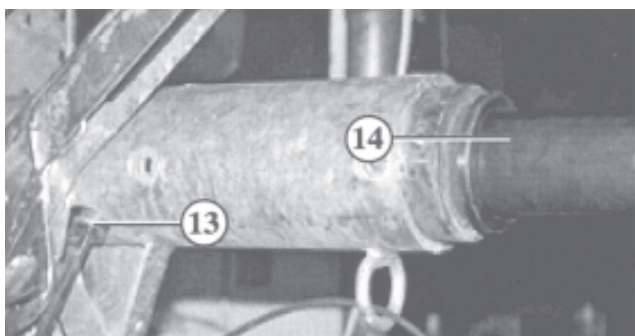
- Unscrew the nut (8) of the damper retaining bolt (9)
- Take out the damper retaining bolt (9)



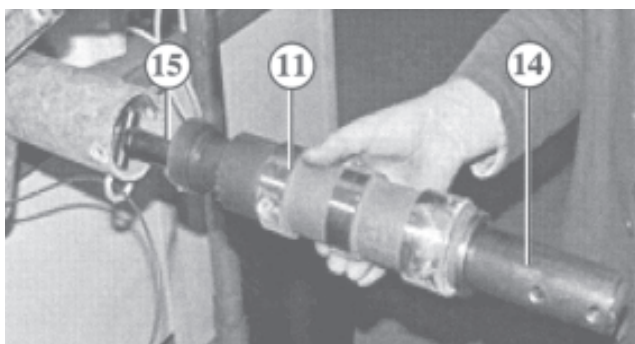
Do not confuse the damper retaining bolt (9) with the handbrake lever pivot bolt.



- Unscrew the retaining bolts (10) of the bearing cartridge (11)
- Unscrew the grease nipples (12)



- Unscrew the locating pin (13) of the drawbar (14)



- Pull out the bearing cartridge (11) with the drawbar (14) and the damper (15)
- Take the damper (15) out of the drawbar (14) backwards

Removing the damper on delta and square overrun devices



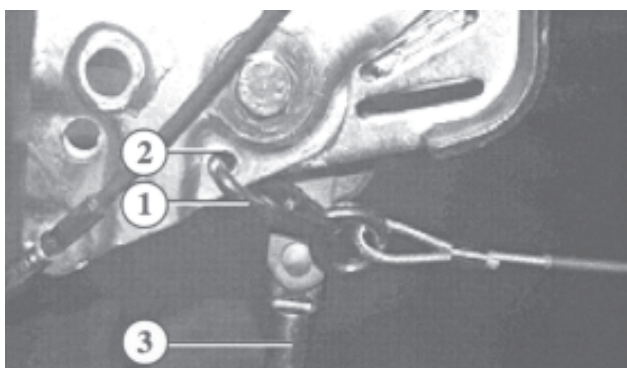
Caution: Injuries can be caused by the handbrake flying up



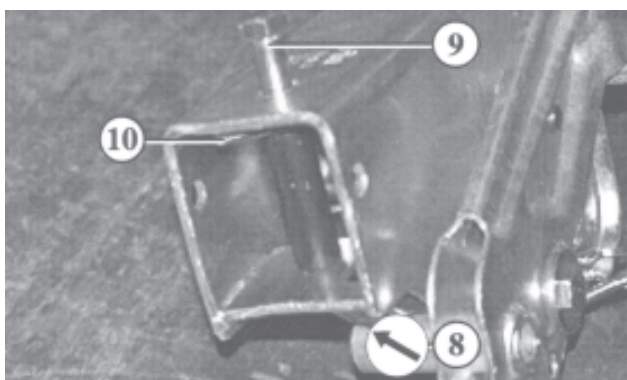
There are two different methods of securing the damper in the drawbar.

A: combined with the coupling bolts

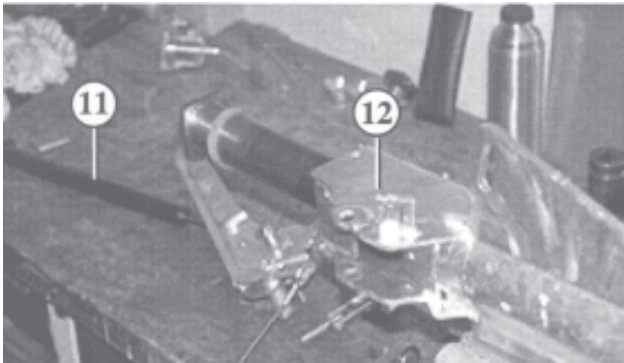
B: separately with clamping sleeves



- Clip the snap hook (1) of the breakaway cable into hole (2)
- Unscrew the brake rod from the rod end fitting (3)



- Pull the bellows (4) off the rear attachment bolt (5)
- Unscrew the nuts (6) of the attachment bolts (5)
- Take out the attachment bolts (5)
- Take off the coupling (7)
- Pull off the bellows (4)
- Unscrew the nut (8) of the damper retaining bolt (9)
- Pull out the damper retaining bolt (9)
- Take out the stop plate (10) of the drawbar

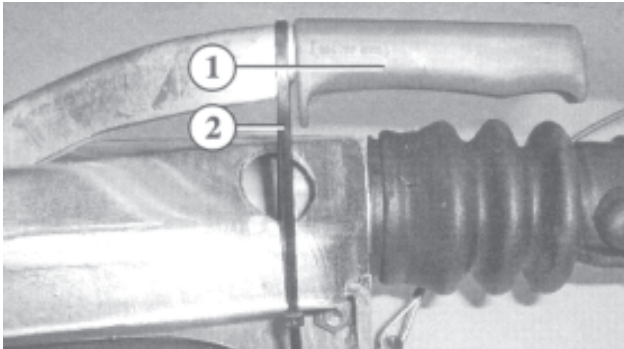


- A:
Pull the damper (11) backwards out of the overrun device (12)
- B:
Move the drawbar with damper backwards and drive out the spring pins.

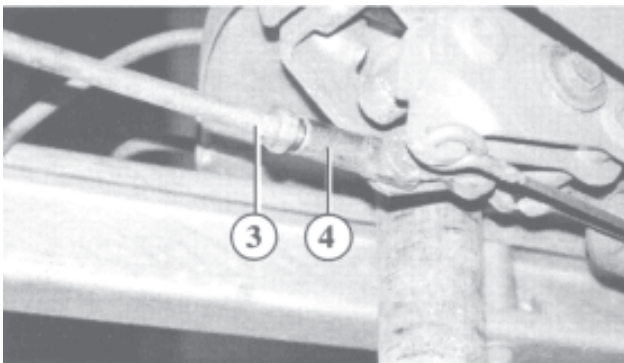
Removing the damper on the Euro overrun device



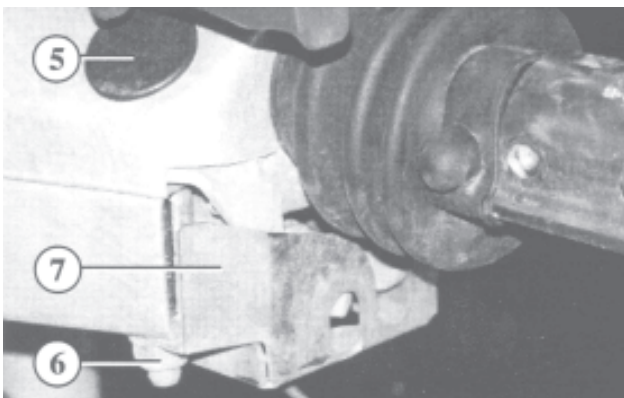
Caution: Injuries can be caused by the handbrake lever flying up.



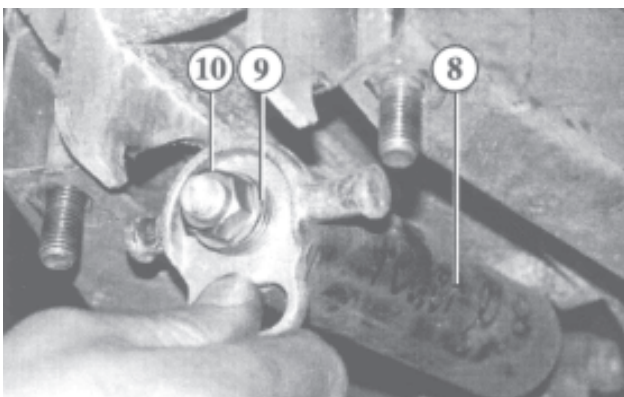
- Secure the handbrake lever (1) with a cable tie (2).



- Unscrew the brake rod (3) from the rod end fitting (4)



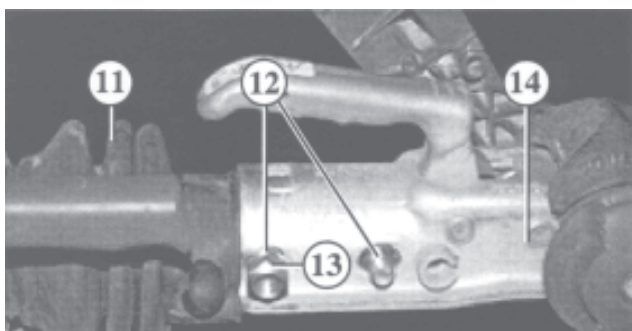
- Remove plug (5)
- Unscrew the nuts (6) and take off the cover plate (7).



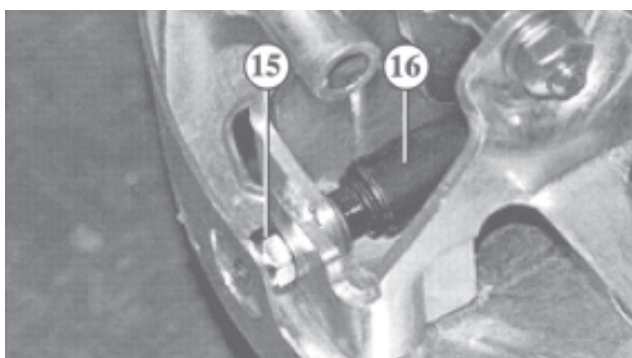
- Secure the spring cylinder (8) with 4 to 5 DIN 125 A13 washers (9) and a DIN 934 M12 nut (10).
- Remove the cable tie.
- Position handbrake lever vertically and remove the spring cylinder (8) from underneath.



When dismantling, the cylinder (8) will drop out.



- Pull the bellows (11) off the rear attachment bolt (12)
- Unscrew the nuts (13) of the attachment bolts (12)
- Take out the attachment bolts (12)
- Take off the coupling (14)



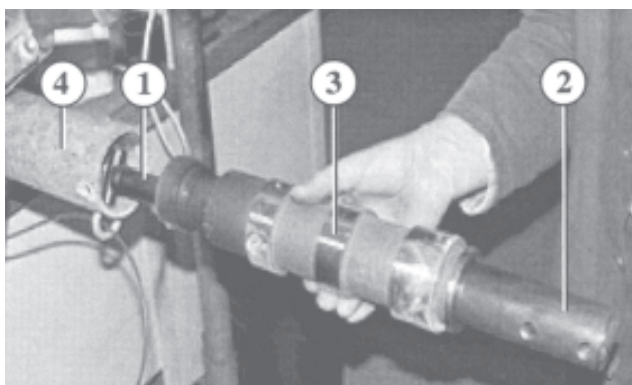
- Unscrew the nut (15)
- Pull the damper (16) frontwards out of the drawbar

2.3.18 Installing the damper

Installing the damper on the tubular overrun device



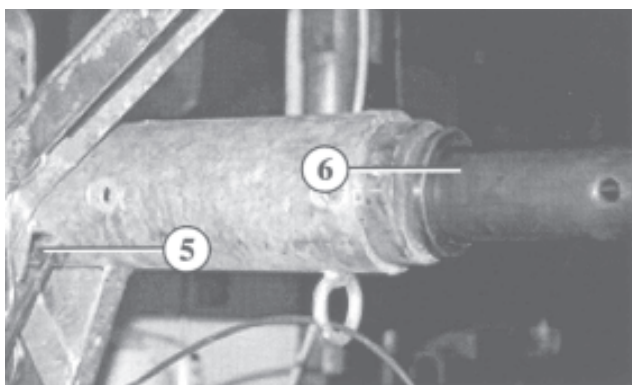
Caution: Injuries can be caused by the handbrake lever flying up.



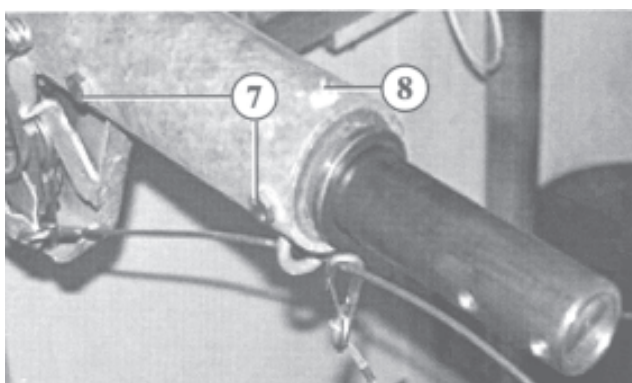
- Insert the damper (1) and drawbar (2) into the bearing cartridge (3)
- Push the bearing cartridge (3) into the housing (4)



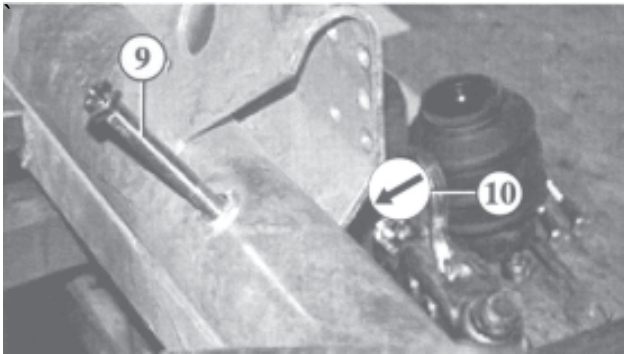
When inserting the bearing cartridge, make sure that the holes are correctly positioned.



- Screw the locating pin (5) into the drawbar (6)



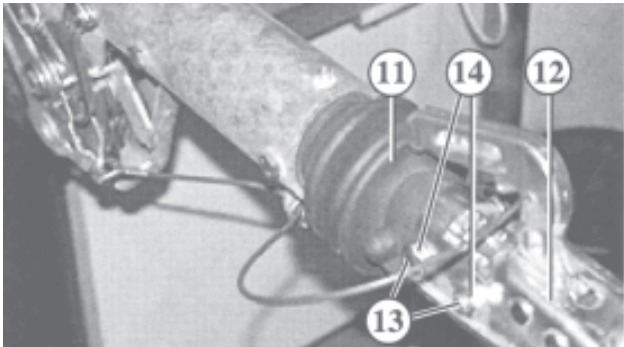
- Insert the retaining bolts (7) and tighten to 50 Nm
- Screw in the grease nipples (8)
- Check that the drawbar moves freely



- Insert the damper retaining screw (9)
- Fit the nut and tighten to 86 Nm



The bolt (9) must pass through the rear damper eye.



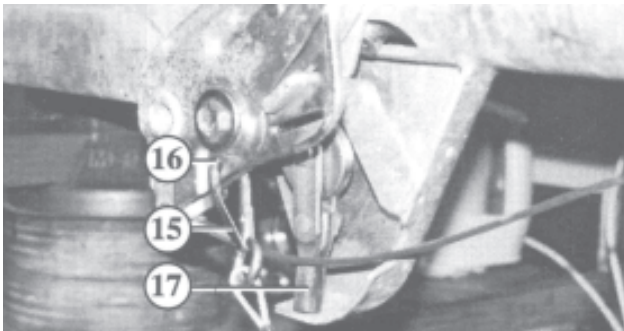
- Fit the bellows (11) onto the bearing cartridge
- Insert the spacer tube into the drawbar in line with the front attachment bolt
- Position the coupling (12)
- Insert the attachment bolts (13)
- Fit new self-locking nuts (14) and tighten to 86 Nm



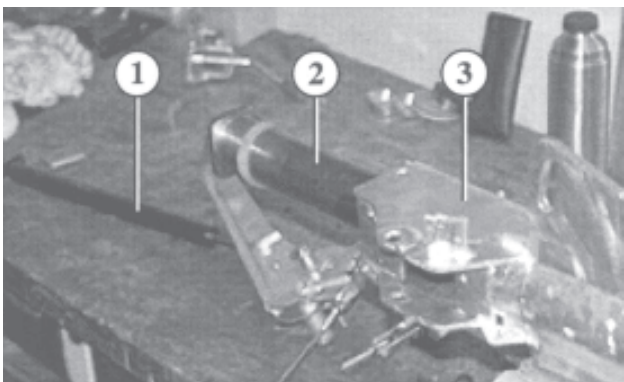
The rear attachment bolt must pass through the front damper eye.



Do not re-use self locking nuts.



- Clip the snap hook (15) of the breakaway cable into hole (16)
- Screw the brake rod into the rod end fitting (17) and tighten the locknut
- Unclip the snap hook (15) of the breakaway cable
- Adjust the braking system and check for correct operation

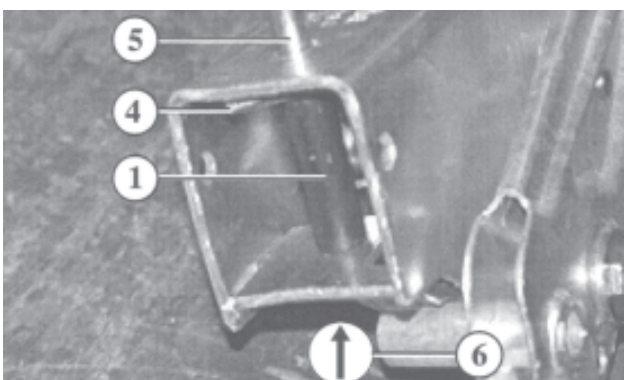


Installing the damper on delta and square overrun devices



Caution: Injuries can be caused by the handbrake lever flying up.

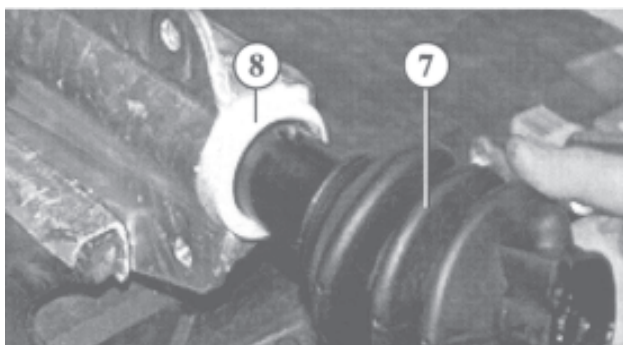
- Insert the damper (1) and drawbar (2) into the housing from the rear



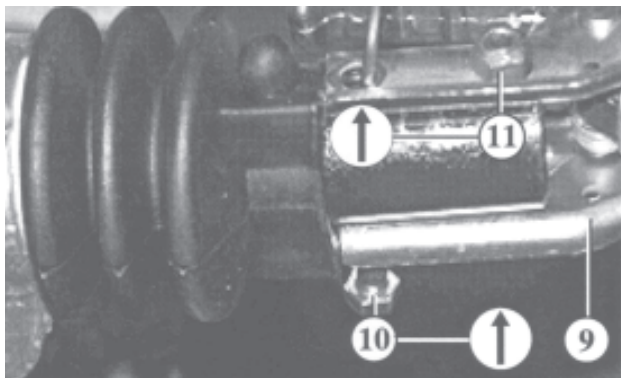
- Line up the damper (1) and stop plate (4)
- Insert the damper retaining bolt (5)
- Fit a new self-locking nut (6) and tighten to 86 Nm



Do not re-use self-locking nuts.



- Fit the bellows (7) onto the bearing bush
- Insert the spacer tube into the drawbar in line with the front attachment bolt



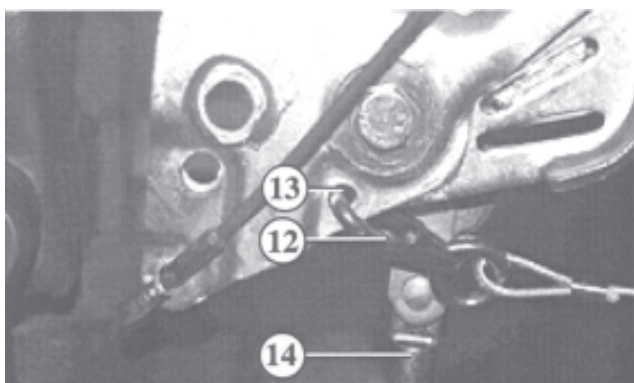
- Fit the coupling (9)
- Insert the attachment bolt (10)
- Fit new self-locking nuts (11) and tighten to 86 Nm



The rear attachment screw must pass through the front damper eye.



Do not re-use self-locking nuts.



- Clip the snap hook (12) of the breakaway cable into hole (13)
- Unscrew the brake rod from the rod end fitting (14)
- Unclip the snap hook (12) of the breakaway cable
- Adjust the braking system and check for correct operation

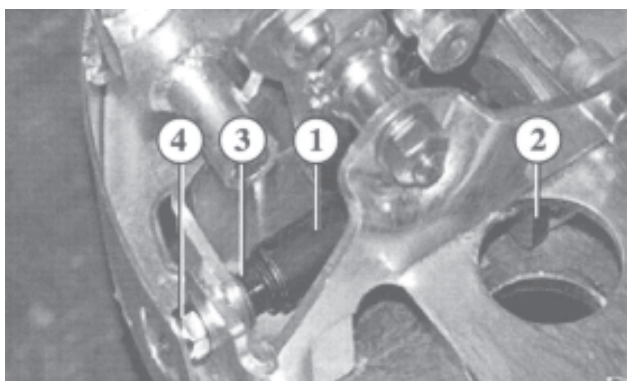
Installing the damper on the Euro over run device



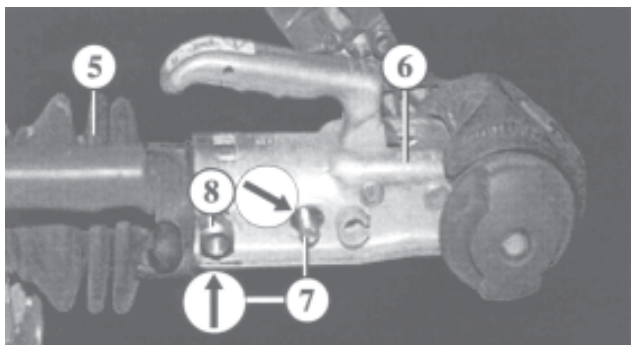
Caution: Injuries can be caused by the handbrake lever flying up



Beware of trapped fingers when installing the spring cylinder.



- Insert the damper (1) with damping rubber into the drawbar (2) from the front
- Insert the damper screw (3) through the hole in the housing
- Fit the nut (4) and tighten to 50 Nm



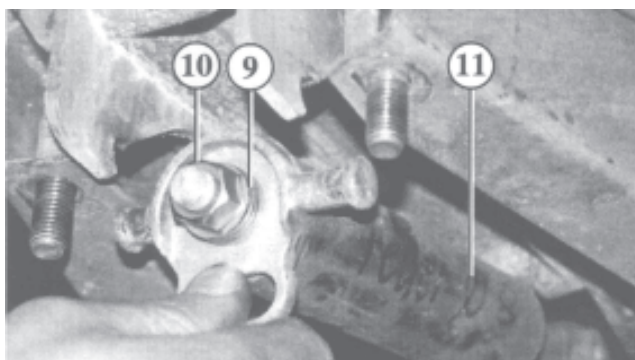
- Fit the bellows (5) onto the bearing cartridge
- Insert the spacer tube into the drawbar in line with the front attachment bolts
- Position the coupling (6)
- Insert the attachment bolts (7)
- Fit new self-locking nuts (8) and tighten to 86 Nm



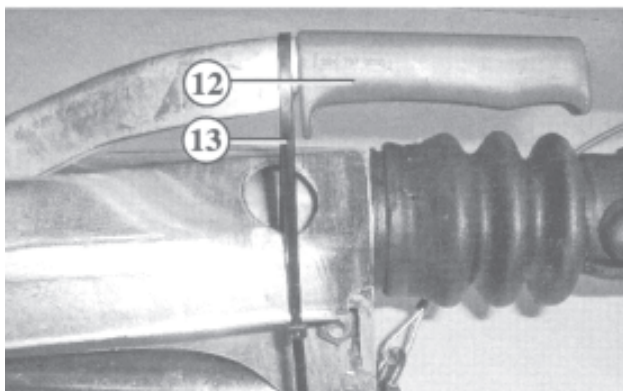
The rear attachment bolts must pass through the front damper eye.



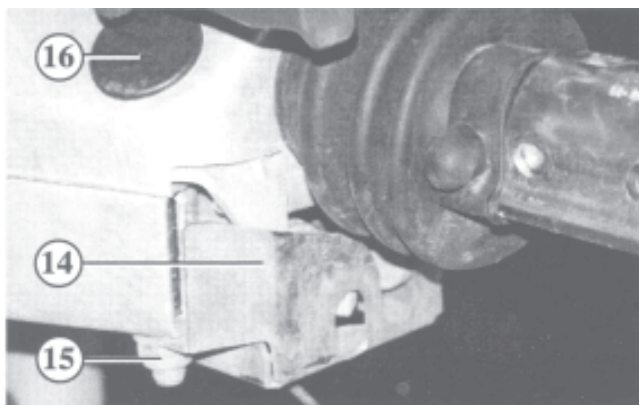
Do not re-use self locking nuts.



- Position the handbrake lever vertically.
- Place the spring cylinder (11) secured with the washers (9) and nut (10) in its mounting and move the handbrake lever downwards.



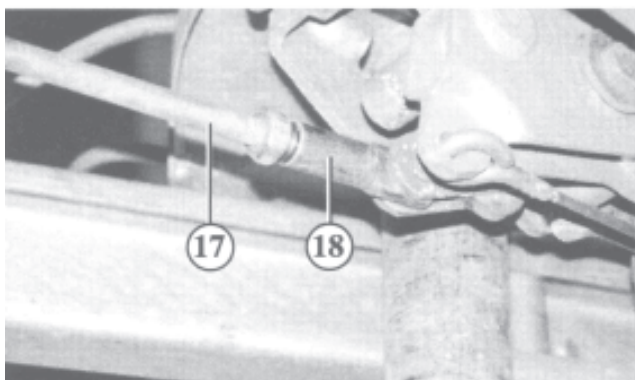
- Secure the handbrake lever (12) with a cable tie (13)
- Remove the nut and washers from the spring cylinder.



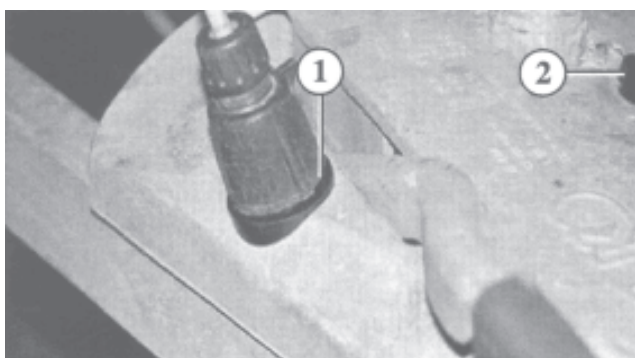
- Fit the cover plate (14)
- Fit new self-locking nuts (15) and tighten to 86 Nm
- Insert plug (16)



Do not re-use self-locking nuts.

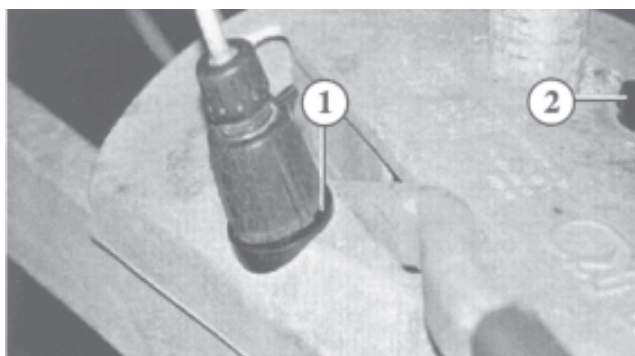


- Screw the brake rod (17) to the rod end fitting (18) and tighten the locknut.
- Remove the cable tie



2.3.19 Removing the connector holder on the Euro overrun device

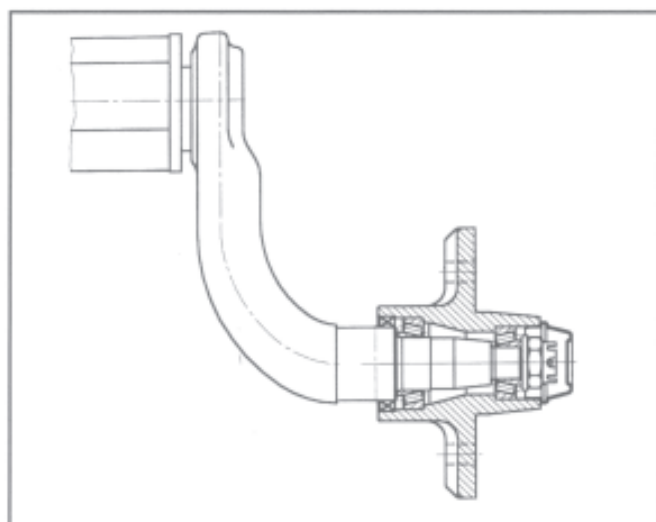
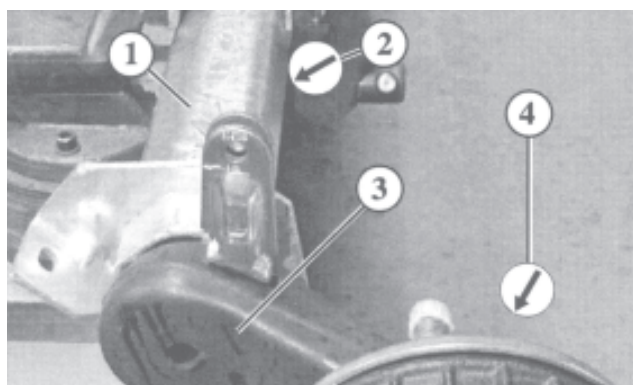
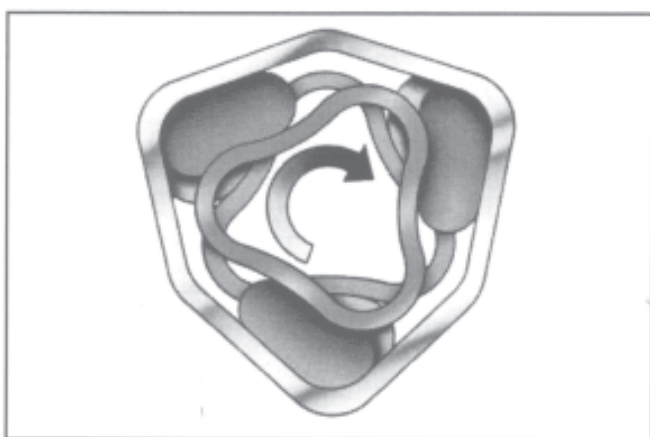
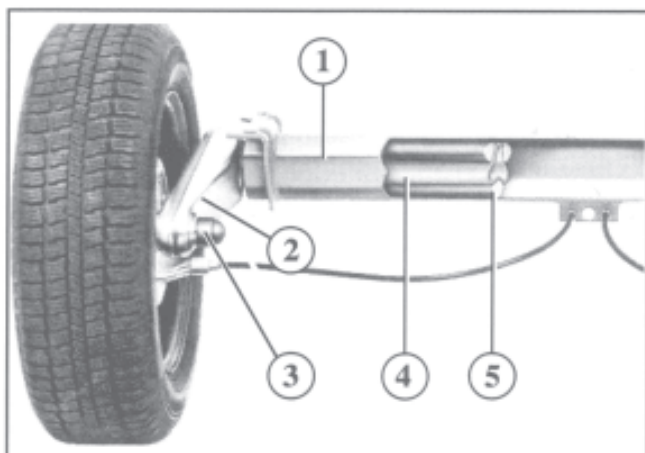
- Pull the connector holder for the 7 way (1) and 13 way (2) connectors out of the housing.



2.3.20 Installing the connector holder on the Euro overrun device

- Plug the connector holder for the 7 way (1) and 13 way (2) connectors into the housing.

3 Axles and brakes



3.1 Function and construction of the axles

3.1.1 Function

Each wheel has an independent suspension system in the axle body (1), so that individual wheel suspension is provided.

The swinging arms (2) connect the stub axle (3) to the three-sided inner tube (4) in the axle body.

When the vehicle is loaded, the three-sided inner tubes are twisted relative to the six-sided outer tube.

The rubber suspension units (5) are deformed when suspension movement occurs and provide a high degree of self-damping.

Schematic view of the suspension load in the AL-KO six-sided rubber suspension axle.

3.1.2 Construction

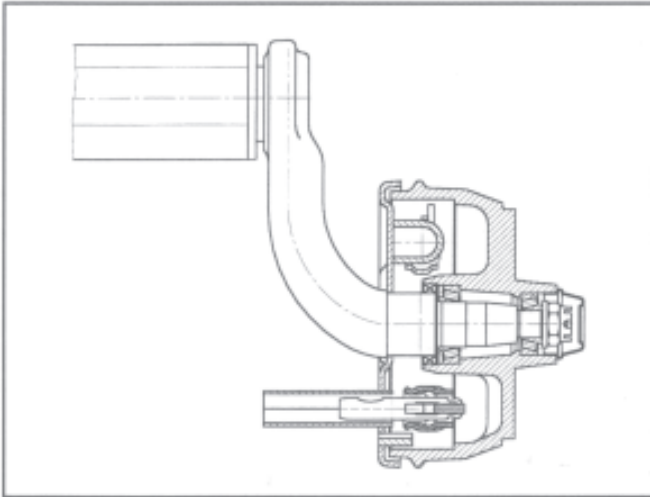
The axle consists of a number of assemblies:

- 1 Six-sided outer axle body
- 2 Three sided inner tube (not visible), individually for each wheel
- 3 Swinging arm
- 4 Axle for mounting the backplate and brake drum

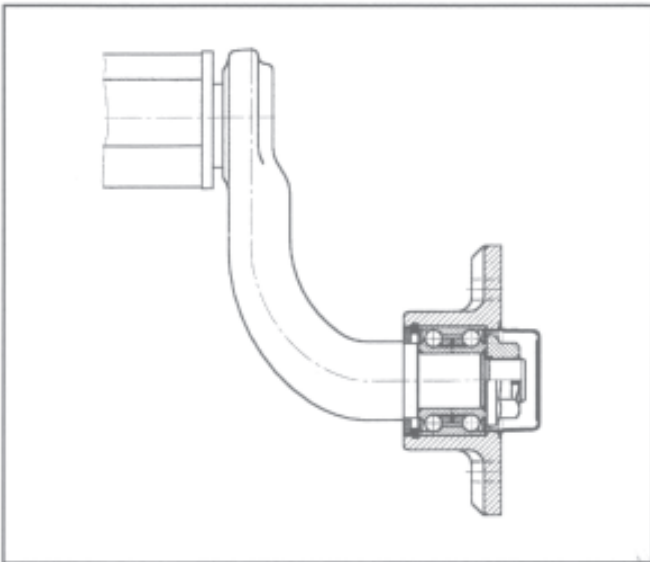
3.1.3 Different types of axle

The AL-KO axle range comprises six different types.

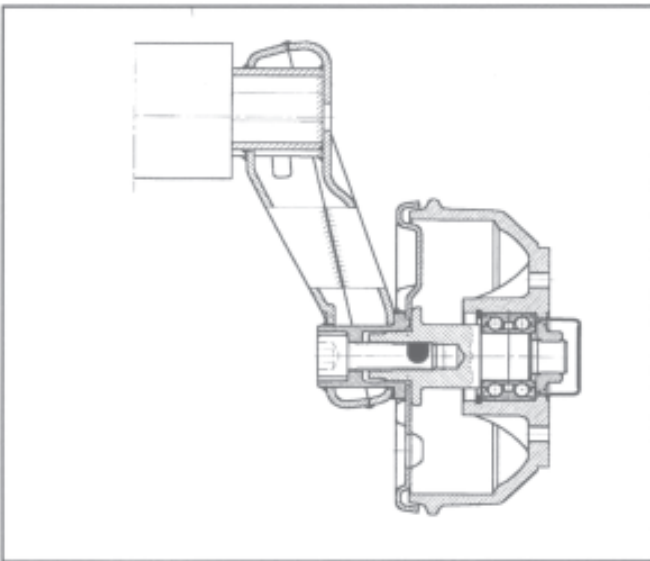
AL-KO standard axle (unbraked)



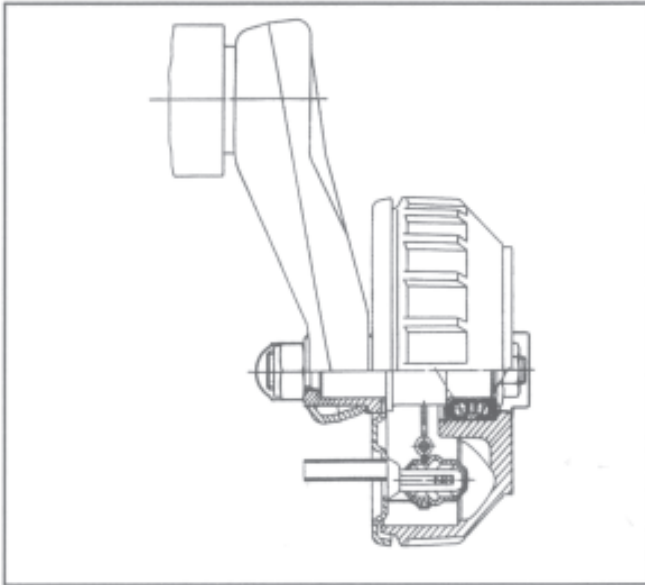
AL-KO standard axle (braked)



AL-KO compact axle (unbraked)

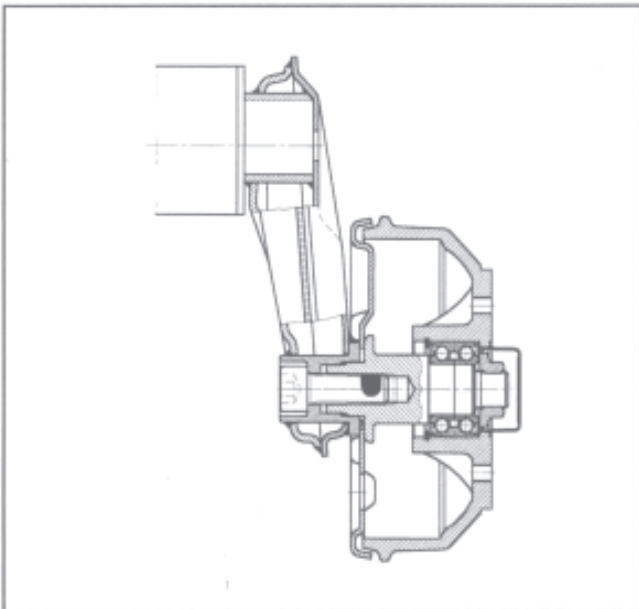


AL-KO compact axle (braked)



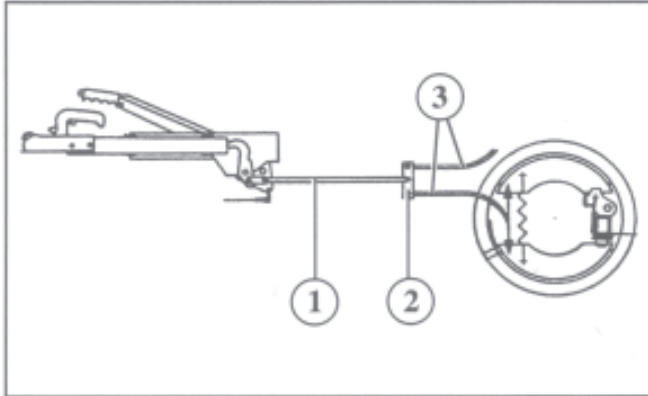
AL-KO Euro-Plus axle (braked)

- Stub axle secured with collar nut



AL-KO Euro-Plus 45° (braked)

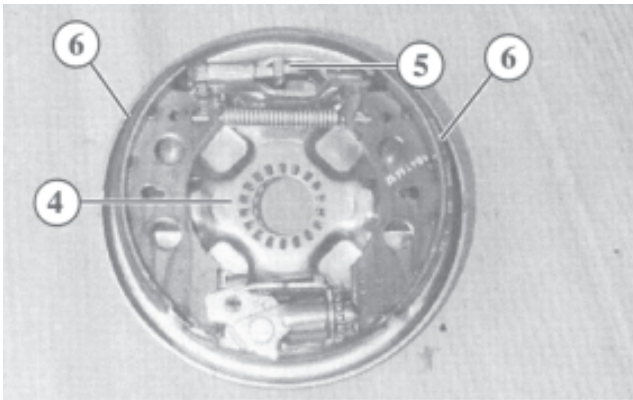
- Stub axle secured with socket head screw



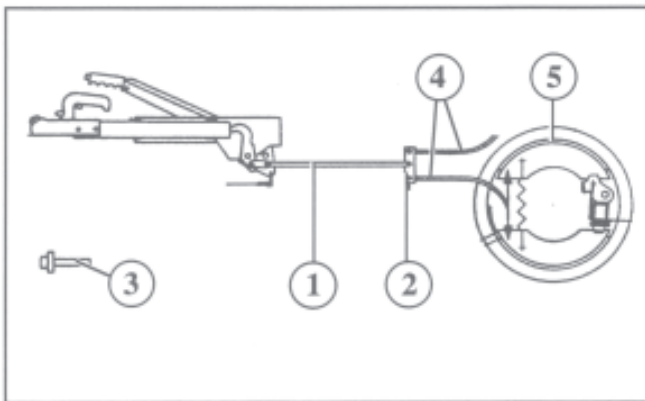
3.2 Function and construction of the wheel brake

3.2.1 Function

The braking of the towing vehicle pulls on the brake rod (1). The equaliser (2) passes on the pulling force to the Bowden cables (3) of the wheel brakes.



The backplate (4) is rigidly fitted or welded to the swinging arm and does not rotate. When the brake is applied via the Bowden cables, the expander (5) presses the brake shoes (6) against the brake drum. The vehicle is braked.

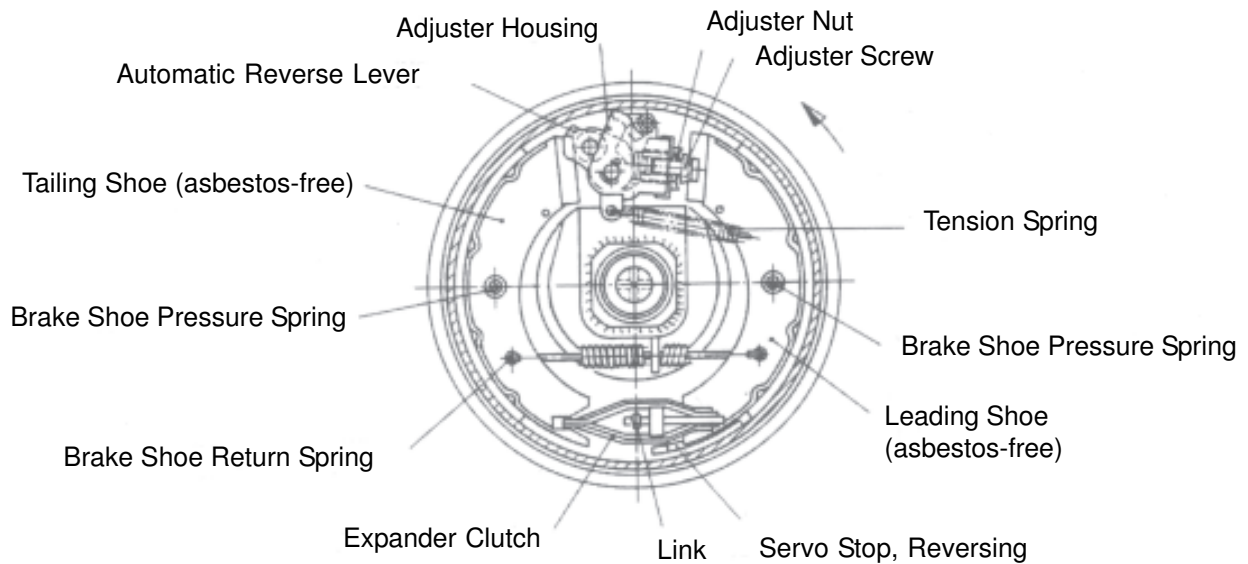
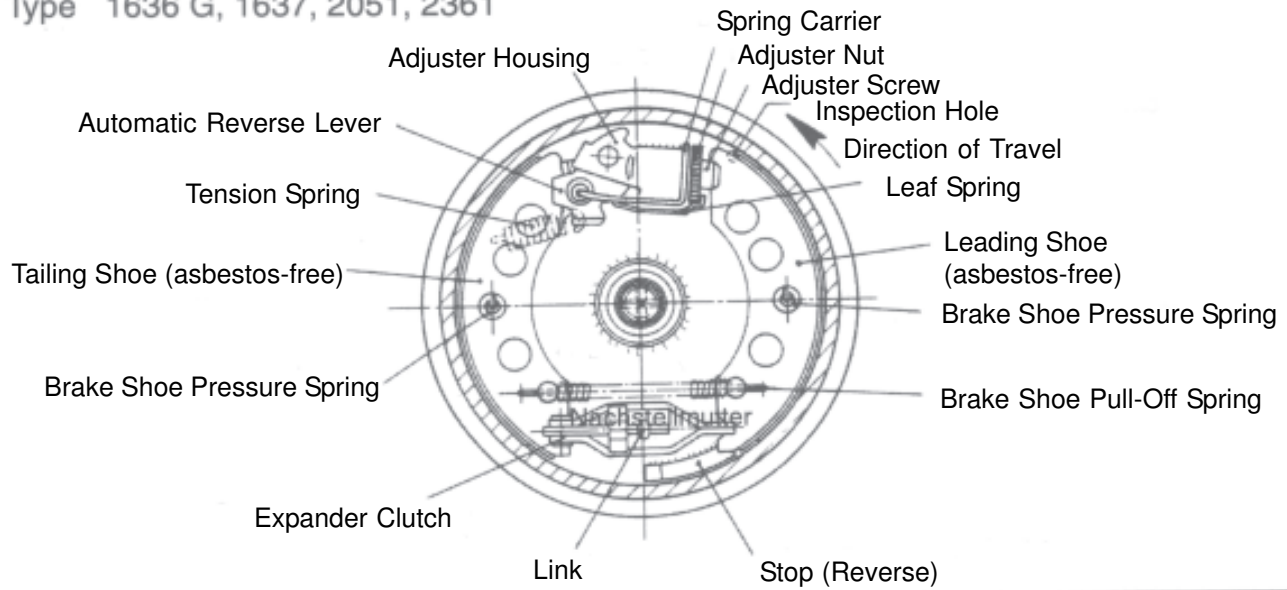


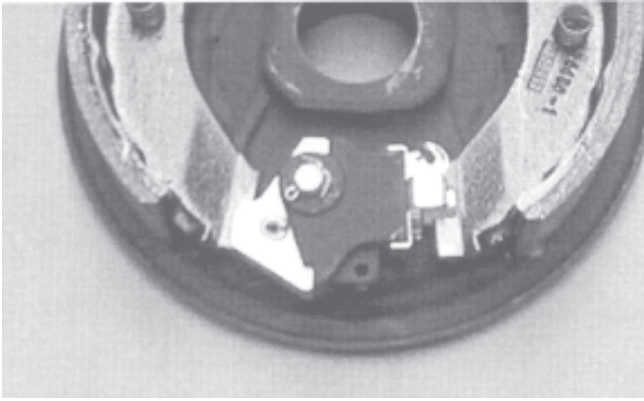
3.2.2 Construction

The wheel brake system consists of a number of assemblies:

- 1 Brake rod
- 2 Equaliser
- 3 Brake rod steady (recommended extra)
- 4 Bowden cable
- 5 Wheel brake

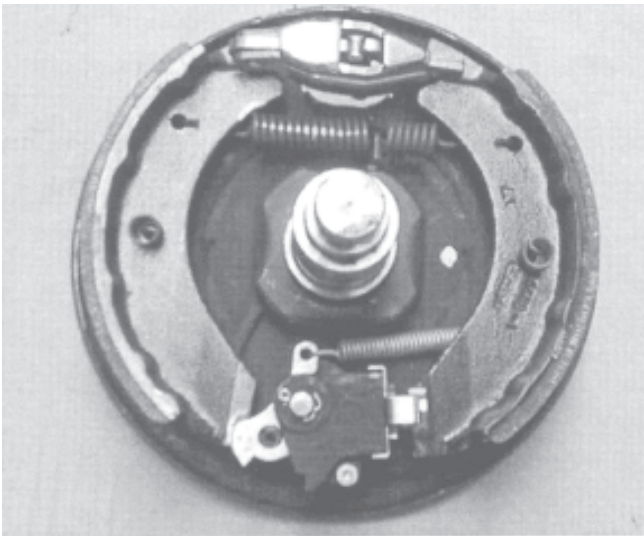
Type 1636 G, 1637, 2051, 2361





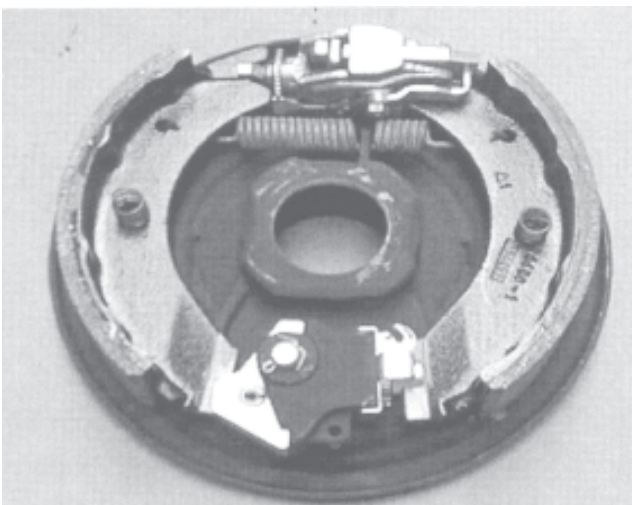
Wheel brake 3081 / 3081 AR

On trailers with stationary or air braking, the reversing function is immobilised.



Dismantling wheel brake 3081

This work is described in the section
“Dismantling the wheel brake”.



Dismantling wheel brake 3081 AR

This work is described in the section
“Dismantling the wheel brake”.

3.3 Maintenance

3.3.1 Maintenance intervals

Initial inspection after 1500 km or 6 months

- Check braking system adjustments
- If necessary, re-adjust the braking system
- Check end play in the wheel hub bearings on standard axles
- On standard axles, lubricate the bearings



On boat trailers which are driven into the water, re-lubrication must be carried out once a year. This does not apply to waterproof hubs.

Maintenance after 10,000 or 15,000 km or every 12 months

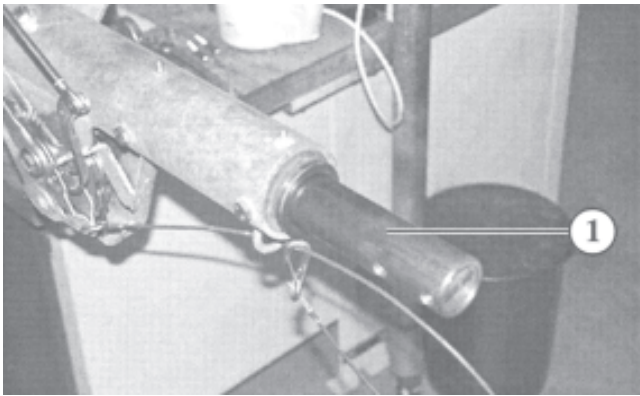
- Adjust the braking system (wheel brakes)
- Check brake lining wear through the inspection hole in the backplate.



Where the pull rod overrun travel is more than 60%, more frequent adjustment is required. This is due to heavy loads (using as a trailer or frequent travel in mountainous country).

Maintenance after 30,000 km or every 24 months

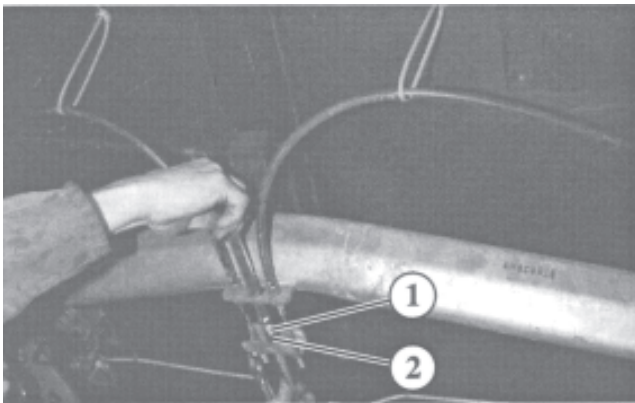
- Release the wheel brake
- Check brake lining wear
- If necessary, replace the brake linings
- Check the internal components of the wheel brake
- If necessary, replace weak return springs
- Grease sliding surfaces of adjuster nuts, automatic reverse lever pivots and expander lever pivots
- Re-adjust the braking system



3.3.2 Maintenance work

Before carrying out maintenance work, always:

- Lift the trailer with a vehicle hoist
- Pull out the drawbar (1) of the overrun device as far as it will go
- Release the handbrake fully (move down wards)



Checking braking system adjustment

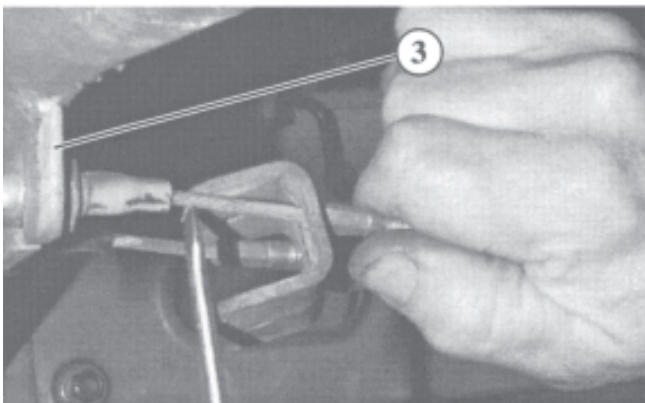
- Lift the trailer
- Pull on the handbrake to the first notch

With the gas strut version,
hold the lever at the first notch by hand.

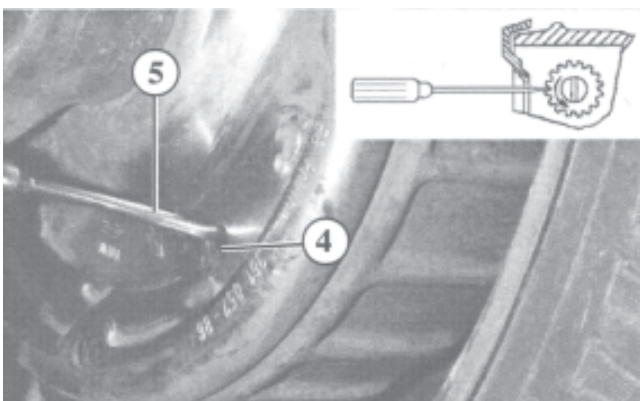
- Turn the wheels in the direction of travel
- Check whether braking resistance is uniform
- If necessary, adjust the braking system

Adjusting the braking system

- Slacken off the brake rod completely at the equaliser
- Loosen the hexagon nut (1)
- Loosen the ball nut (2)
- Check play in the Bowden cable at the axle abutment (3):
 - about 5 mm



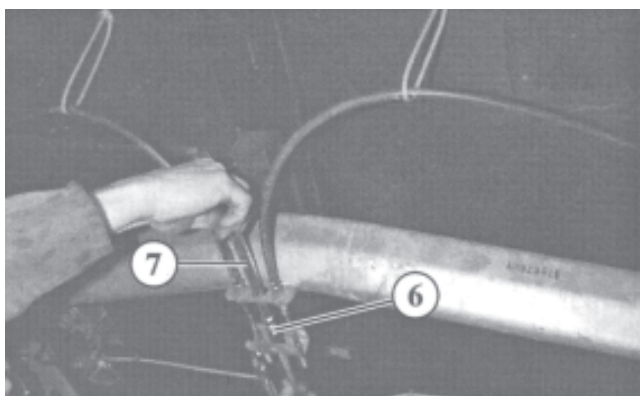
The play in the Bowden cables should as far as possible be equal for brakes on the wheels of an axle.



- Remove the blanking plug from the adjustment hole (4)
- Using a screwdriver (5), rotate the adjuster nut



An arrow is stamped on the backplate next to the adjustment hole. Turning in the direction of the arrow adjusts the brake up, turning in the opposite direction slackens the brake off



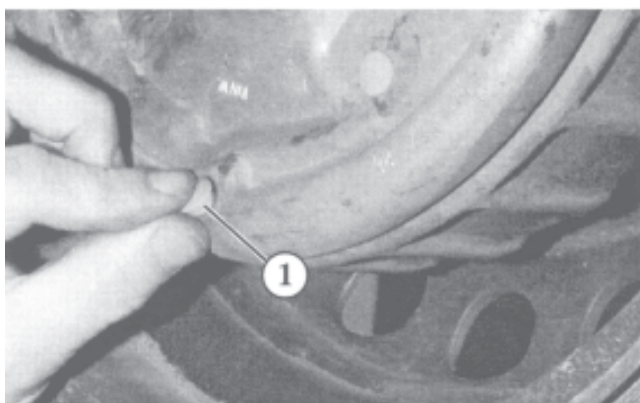
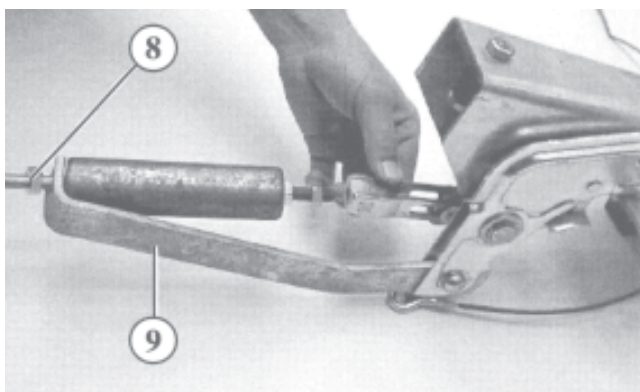
- Grease the seating surface of the ball nut (6)
- Connect up the brake rod on the equaliser with the ball nut, but do not tighten yet
- Apply the handbrake hard a number of times to settle the components of the braking system
- Tighten the ball nut until the Bowden inner cables are pre-tensioned by 1 – 2 mm
- Lock the ball nut with the hexagon nut.



Movement of the brake rod while travelling may cause unwanted application of the brake. To avoid this, the fitting of a brake rod steady (7) is recommended.



On versions with a spring cylinder: tighten the M10 self-locking hexagon nut only far enough to leave about 1 mm clearance for the spring cylinder between the nut (8) and support (9).



Checking brake lining wear through the inspection hole in the backplate

- Remove the blanking plug from the inspection hole (1)
- Check brake lining wear
- If necessary, renew the brake linings



Renew the brake shoes if there is less than 2 mm thickness remaining.

3.3.3 Lubrication

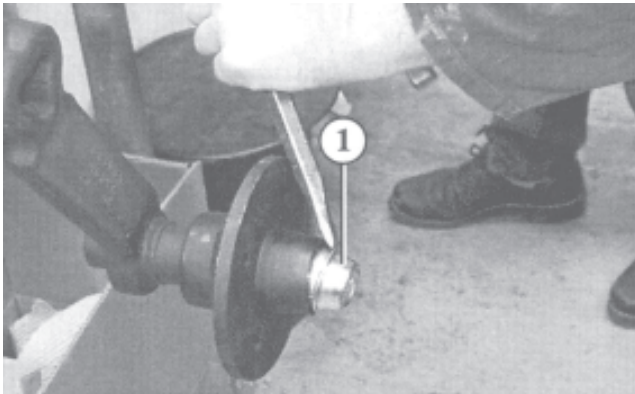
Lubricating the standard axle

The end play on the wheel hub bearings must be checked after 1500 km or 6 months.



On boat trailers which are driven into the water, re-lubrication must be carried out once a year. This does not apply to water proof hubs.

- Take off the hub cap (1) and bearing cap

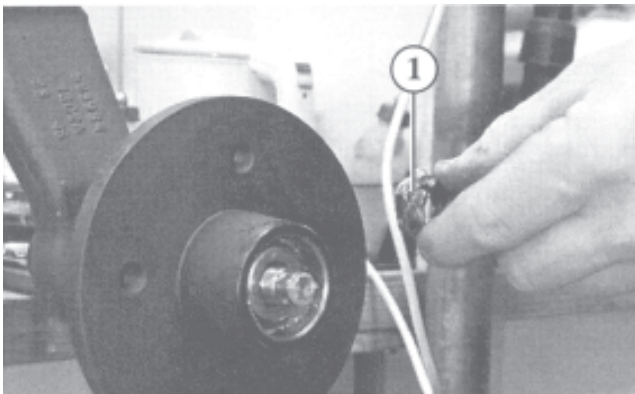


- Remove the split pin from the castellated nut

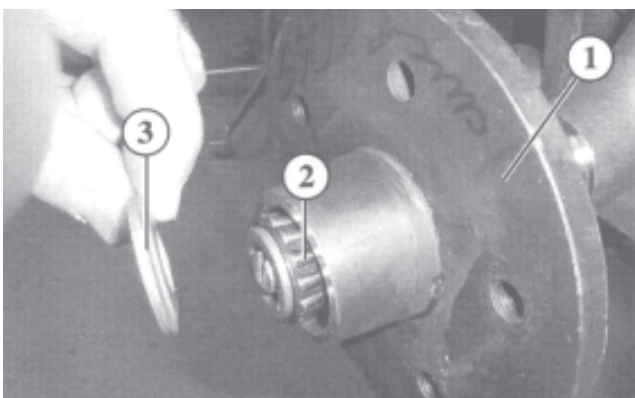


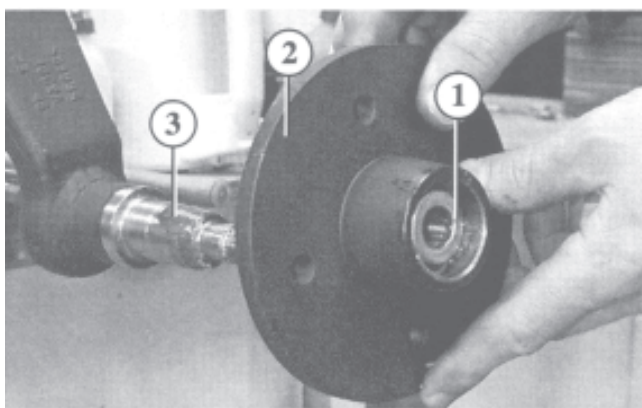
If only the end play is to be adjusted, tighten the castellated nut to 50 Nm (see description below)

- Unscrew and remove the castellated nut (1)



- Pull off the wheel hub together with the taper roller bearing (2) inside it, and also the DIN washer (3)
- Pull out the taper roller bearing and clean



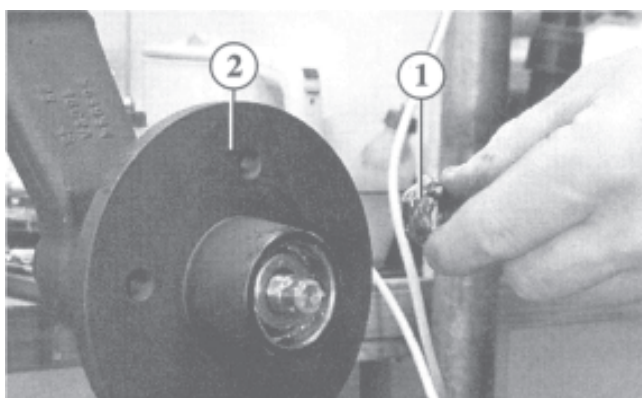


- Insert the greased taper roller bearing (1) and DIN washer into the wheel hub (2).

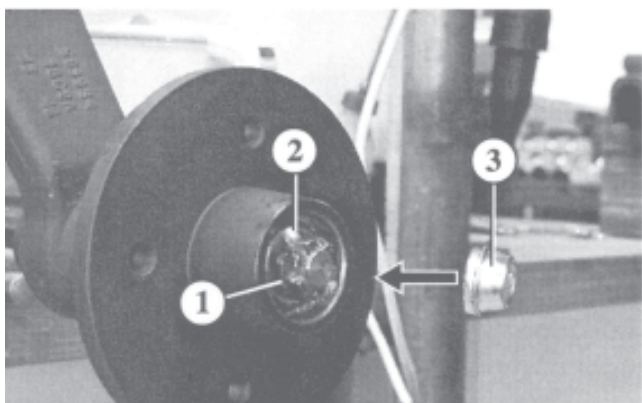


For lubricating the bearing, a multi-purpose grease to DIN 51825 KTA 3K4 is to be used.

- Fit the wheel hub and bearing onto the stub axle (3)



- Fit the castellated nut (1)
- Tighten the castellated nut to 50 Nm, at the same time rotating the hub (2), until resistance can be felt (use a torque wrench)



- Back off the castellated nut (1) by 30 degrees and insert the split pin (2)



End play of 0.05 mm is permitted.



Overtightening the bearings causes bearing damage

- Fit the bearing cap and hub cap (3)

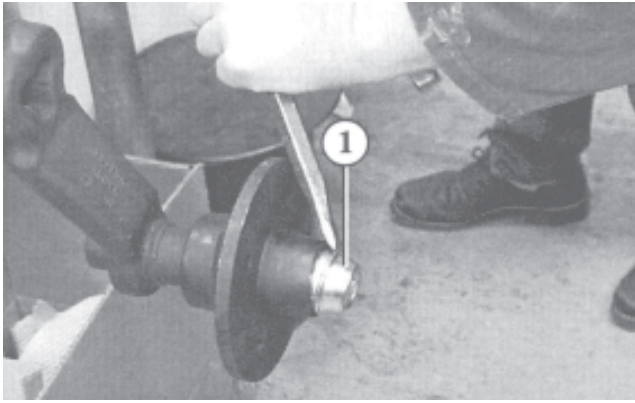
3.3.4 Lubrication

Lubricating the standard axle with collar nut

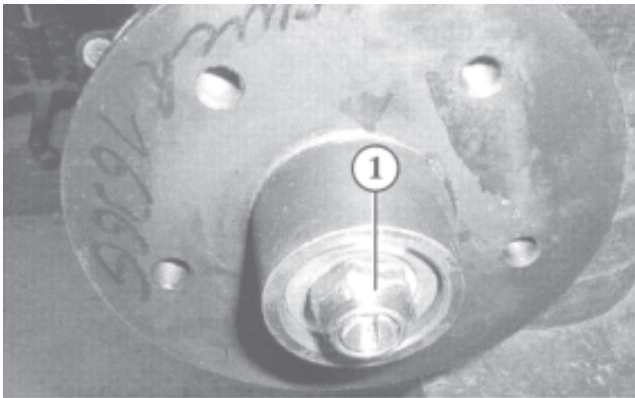
The end play on the wheel hub bearings must be checked after 1500 km or 6 months.



On boat trailers which are driven into the water, re-lubrication must be carried out once a year. This does not apply to waterproof hubs.

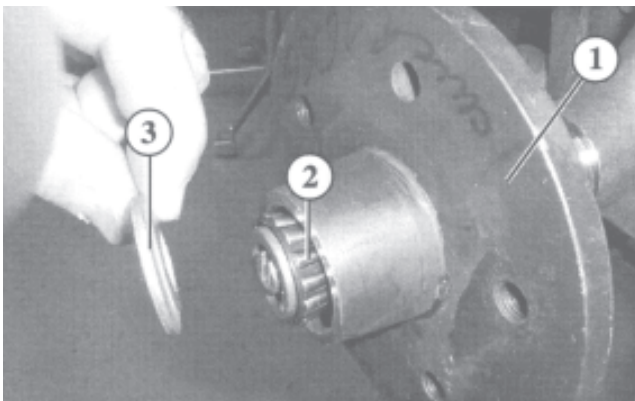


- Take off the hub cap (1) and bearing cap

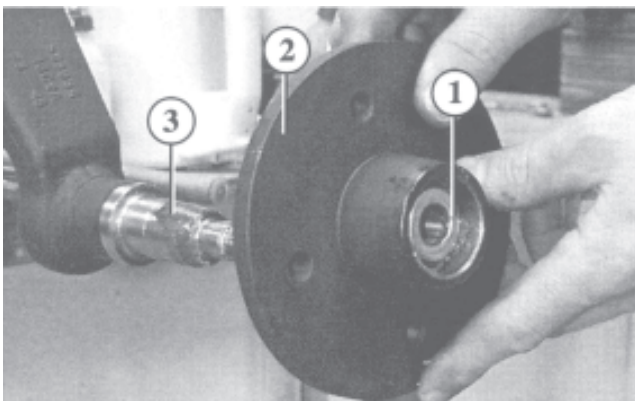


If only the end play is to be adjusted, tighten the castellated nut to 50 Nm (see description below).

- Unscrew and remove the collar nut (1)



- Pull off the wheel hub together with the taper roller bearing (2) inside it, and also the DIN washer (3)
- Pull out the taper roller bearing and clean

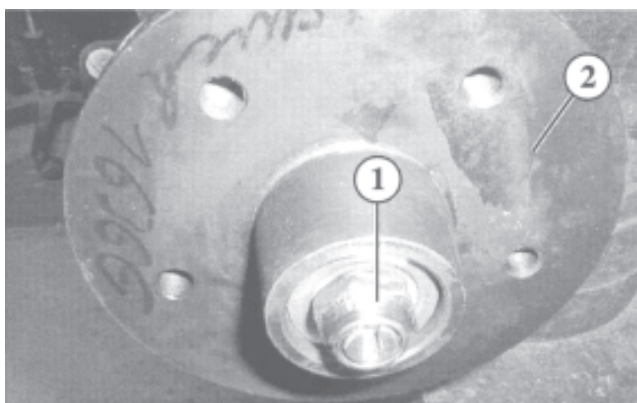


- Insert the greased taper roller bearing (1) and DIN washer into the wheel hub (2).

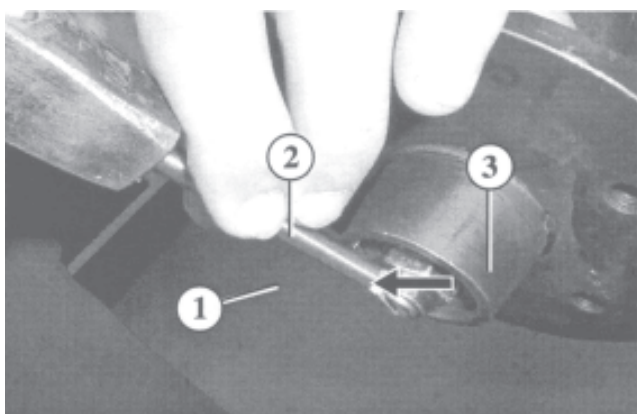


For lubricating the bearing, a multi-purpose grease to DIN 51825 KTA 3K4 is to be used.

- Fit the wheel hub and bearing onto the stub axle (3)



- Fit a new collar nut (1)
- Tighten the collar nut to 50 Nm, at the same time rotating the hub (2), until resistance can be felt (use a torque wrench)



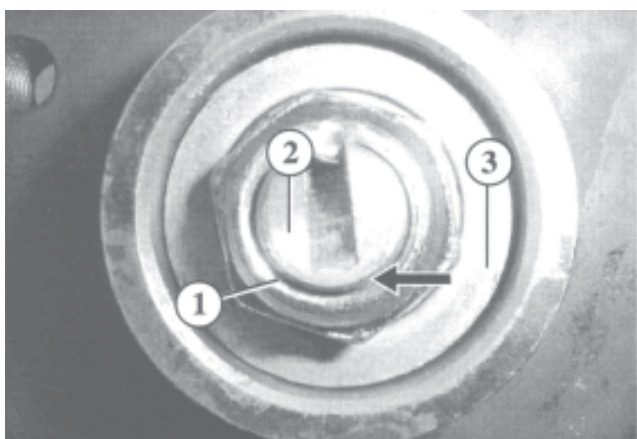
- Back off the collar nut (1) 30 degrees and lock using the special tool (2) (→ see list of tools). Stake the collar of the nut into the groove on the stub axle.



End play of 0.05 mm is permitted.



The collar of the nut must not be sheared.



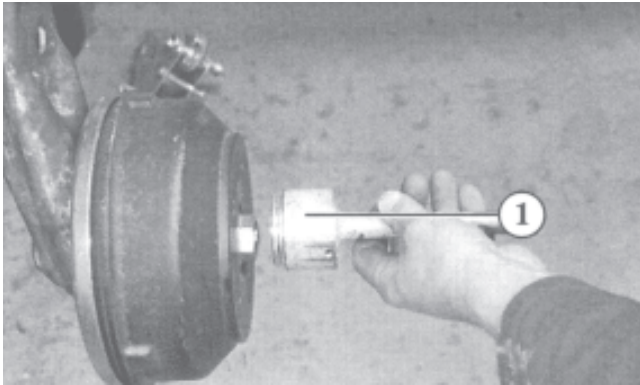
Overtightening the bearings causes bearing damage.

- Fit the bearing cap and hub cap (3)

3.4 Repair

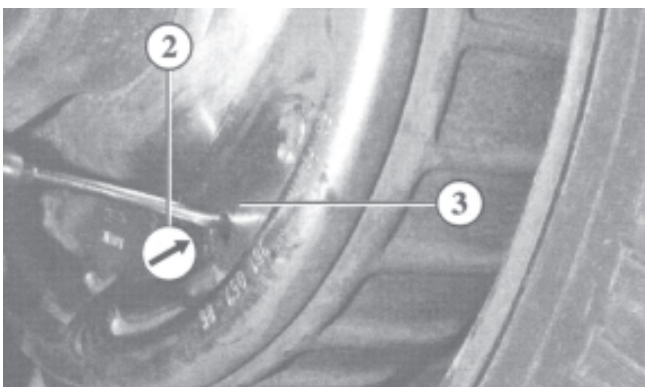
3.4.1 Removing the brake drum

- Lift the trailer with a vehicle hoist
- Unbolt the wheel
- Remove the dust cap using the shaped tool (1, see list of tools)



For safety reasons (danger of injury) and to avoid component damage, we recommend the use of the special tool.

- Unscrew the flange nut
- Turn the brake drum slightly by hand and pull off



If the brake drum will not pull off, turn the brake shoe adjuster screw (2) in the opposite direction to the arrow. An arrow (3) is stamped on the backplate next to the adjustment hole.

- Renew worn brake drums with scoring or severe corrosion.



Brake drums must not be skimmed.

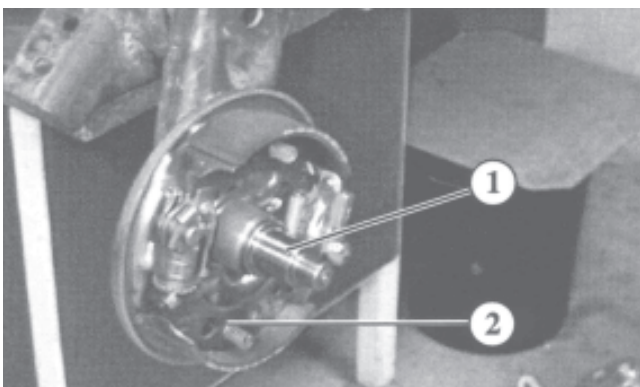
3.4.2 Installing the brake drum

- Renew worn brake drums with scoring or severe corrosion

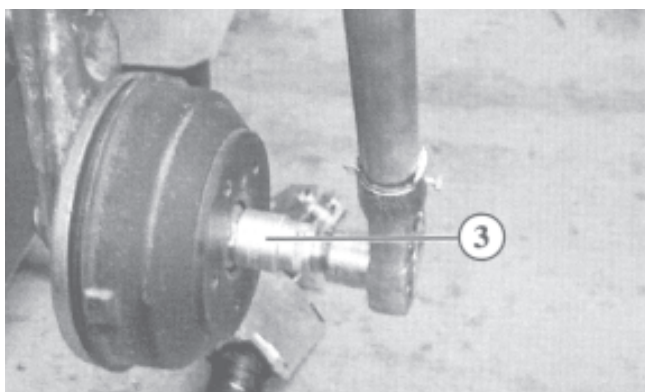


Brake drums must not be skimmed.

- Fit the brake drum onto the stub axle (1) and wheel brake (2)



There must be no load on the axle when tightening the flange nut.



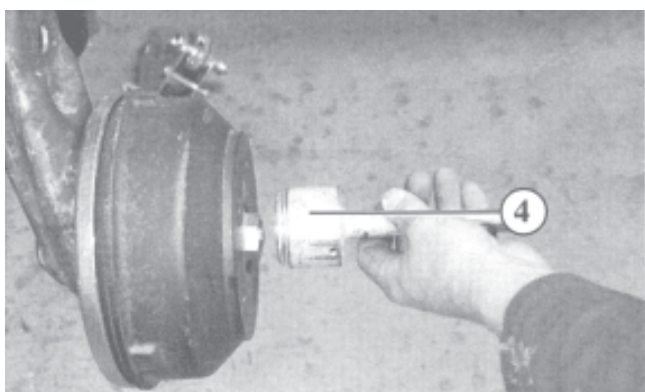
- Tighten the new flange nut to a torque of 280 - 300 Nm (3)



Do not re-use self-locking nuts.



Use new nuts.



- Drive on the dust cap using the shaped tool (4, see list of tools)
- Bolt on the wheel
- Re-adjust the braking system

NOTE: SECTIONS 3.4.3 AND 3.4.4 ARE FOR INFORMATION ONLY - THESE PROCEDURES MUST ONLY BE CARRIED OUT AT THE AL-KO FACTORY.

3.4.3 Removing the stub axle

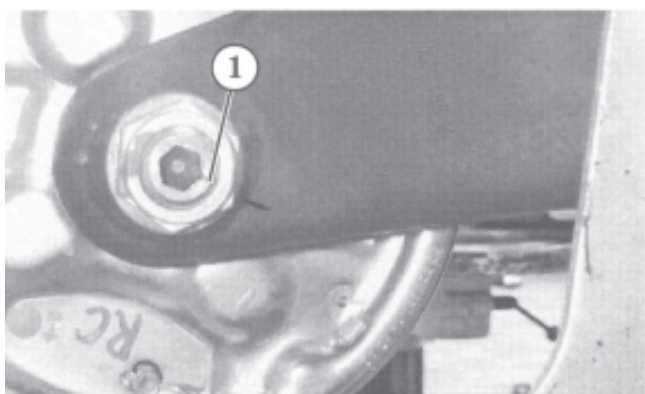
- Remove the brake drum
- Remove the protective cap on the swinging arm side using a suitable tool.



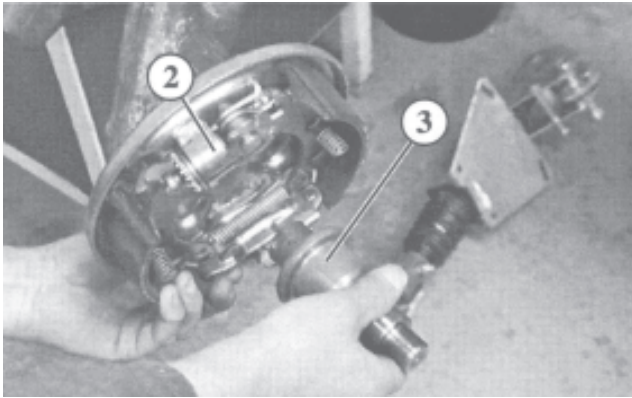
When re-fitting the stub axle, the position of the stub axle indicated by the mark (1) must be kept exactly the same, as otherwise the toe-in will have to be re-adjusted.



When replacing the stub axle, it is recommended that the toe-in should be checked.



- Transfer the mark on the stub axle to the swinging arm, using a suitable marker.
- Where the stub axle is secured with a collar nut:
- The mark (1) is located on the swinging arm side
- On the Euro-Plus axle with socket head screw:
- The mark is located on the brake drum side and must be carefully transferred to the swinging arm side



- Unscrew the nut or socket head screw
 - Where the stub axle is secured with a collar nut:
- Unscrew the nut, preventing the stub axle from turning using a shortened Allen key (see AL-KO list of tools)
- On the Euro-Plus axle with socket head screw:
- Unscrew the socket head screw

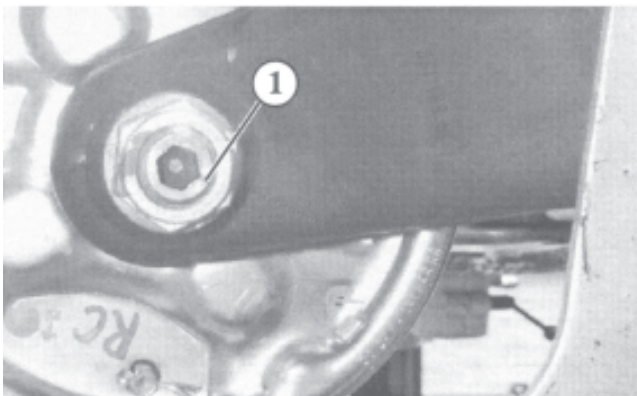


Dismantling releases the backplate (2) and stub axle (3).

3.4.4 Installing the stub axle



When re-fitting the stub axle, the position of the stub axle indicated by the mark (1) must be kept exactly the same, as otherwise the toe-in will have to be re-adjusted.



When replacing the stub axle, it is recommended that the toe-in should be checked.



There must be no load on the axle when tightening the flange nut.

- Secure the stub axle:
 - Where the stub axle is secured with a collar nut:
- Tighten a new collar nut to the specified torque:

On the 1637/2051: 500 – 550 Nm

On the 2361: 700 – 750 Nm

Prevent the stub axle from turning using a shortened Allen key (see AL-KO list of tools).

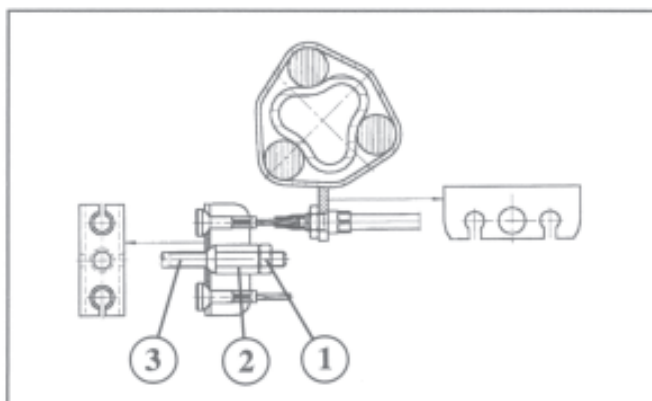
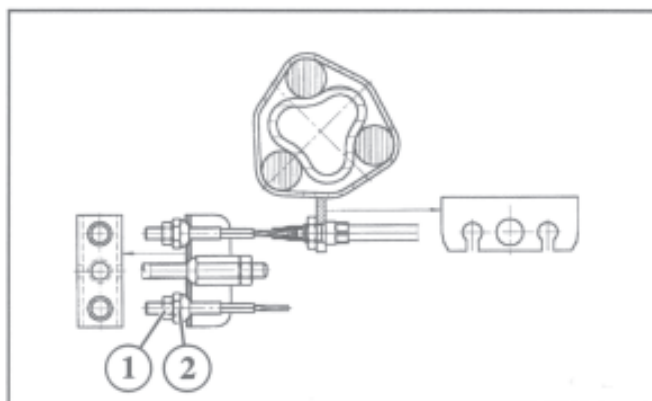


Do not re-use self-locking nuts.



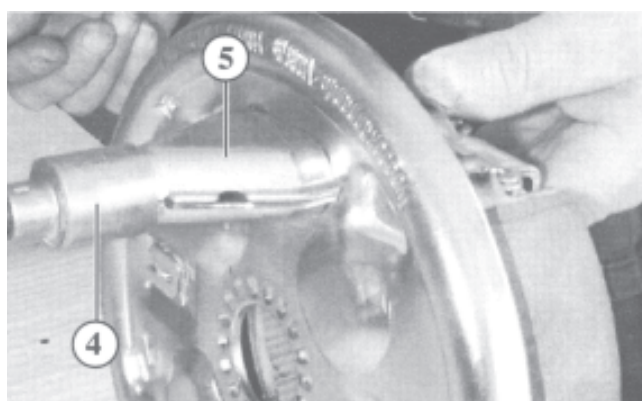
If the stub axle is rotated when tightening the nut, the toe-in must be re-adjusted.

- On the Euro-Plus axle with socket head screw:
- Tighten the socket head screw to a torque of 360 – 380 Nm
- After tightening, apply fresh locking paint
- Fit the protective cap on the swinging arm side

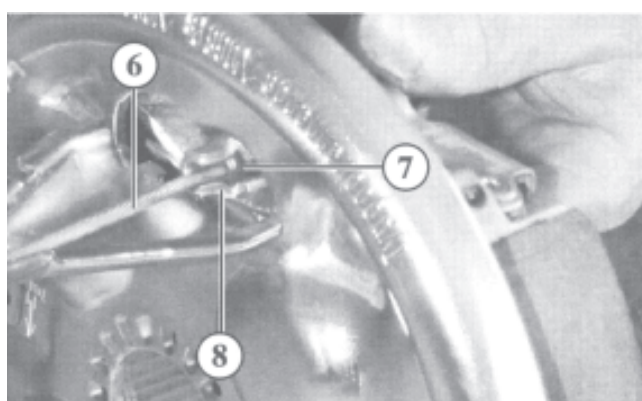


3.4.5 Removing the Euro wheel brake assembly (not on standard axles)

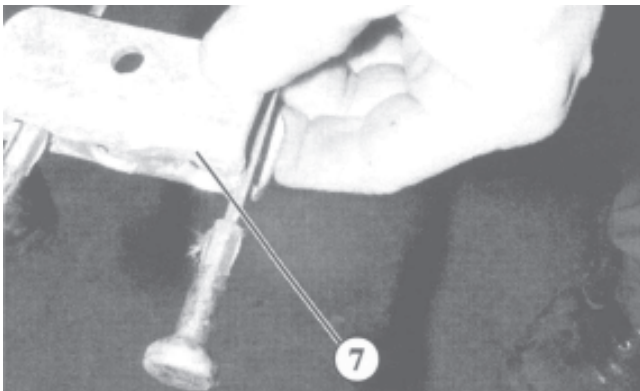
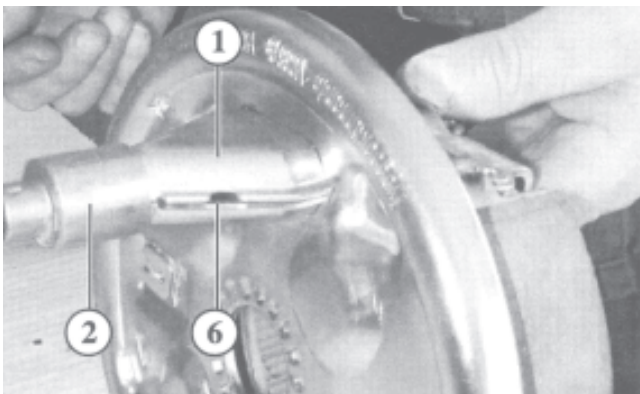
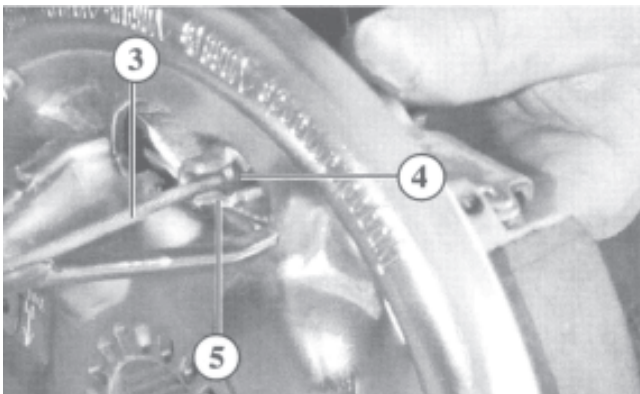
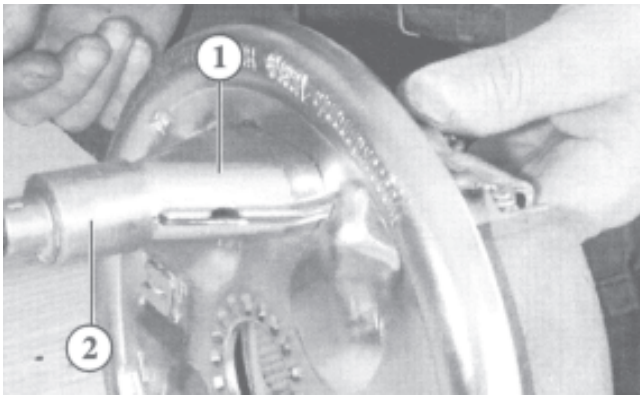
- Remove brake drum (see 3.4.1)
- Remove stub axle (see 3.4.3)
- Normal Bowden cable:
 - If necessary, slacken the hexagon nuts (1) and ball nut (2) on the Bowden cable
- Quick-fitting Bowden cable:
 - Unhook the Bowden cables from the equaliser
 - Slacken the hexagon nut (1) and ball nut (2) on the brake rod



- Push back the Bowden cable end bush (4)
- Lift off upper part (5) of the Bowden cable abutment
- Take the upper part out of the opening in the backplate



- Push the Bowden cable (6) into the backplate so that the nipple (7) can be released from the attachment eye (8)
- Pull out the Bowden cable



3.4.6 Installing the Euro wheel brake

- If necessary, fit the individual parts to the backplate (for instructions see "Fitting the wheel brake", 3.4.6).

Inserting the Bowden cable

- Take off the top part of the Bowden cable abutment



Make sure that the Bowden cable end sleeve is fitted the right way round.

- Hook the nipple (4) of a genuine AL-KO Bowden cable (3, with stamped AL-KO marking) into the attachment eye (5) of the expander.
- Pull back the Bowden cable so that the nipple slides into the correct position.



Bowden cables with excess cable length must not be fitted into this attachment eye. Removal of the excess cable is not permitted.

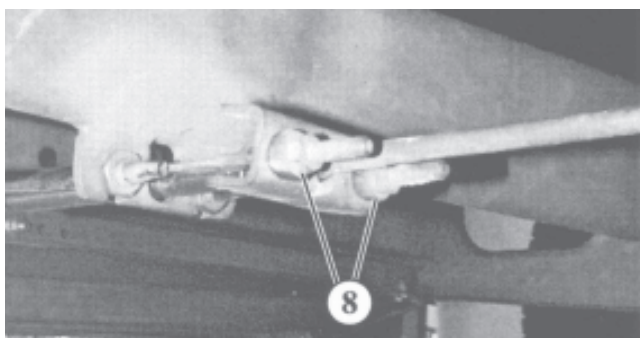
- Check visually that the Bowden cable has seated correctly in the attachment eye.

- Push the upper part (1) of the Bowden cable abutment into the opening in the backplate
- Place the upper part to fit exactly over the welded-on lower part (6)

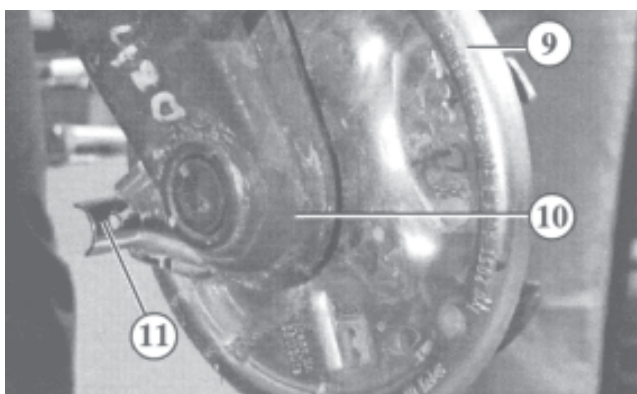


After fitting the Bowden cable end sleeve, check again that the Bowden cable end fitting is correctly seated in the attachment eye.

- Hook the Bowden cables with the ball nipple (quick-fitting Bowden cables) onto the equaliser (7)
- Tighten the hexagon nut and ball nut on the brake rod
- Screw the equaliser tight on the abutment



- Adjust the ball nuts (8) and lock with the hexagon nuts
- Screw the equaliser tight on the abutment



- Fit the backplate (9) to the swinging arm (10)

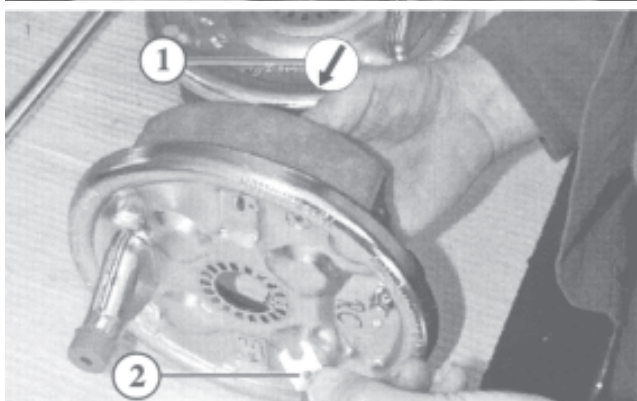
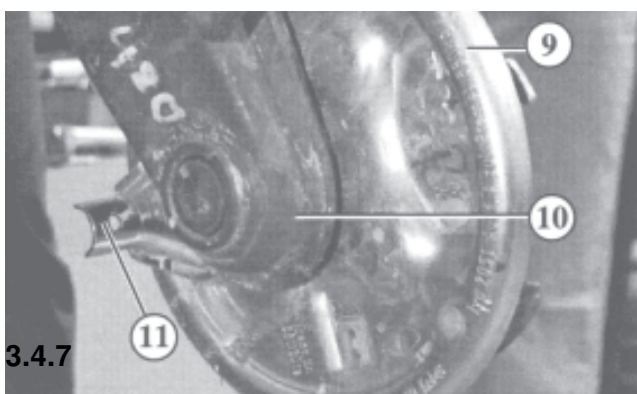


Fit the backplate so that the Bowden cable abutment is positioned as close as possible to the swinging arm.

- Install the stub axle



Check where the Bowden cable comes out. Is the cable on top or underneath?

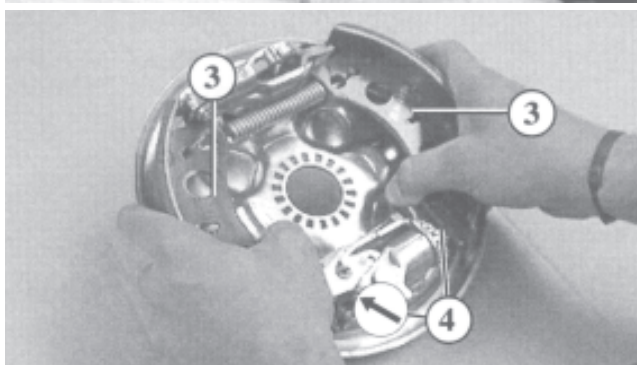


3.4.7 Dismantling the wheel brake

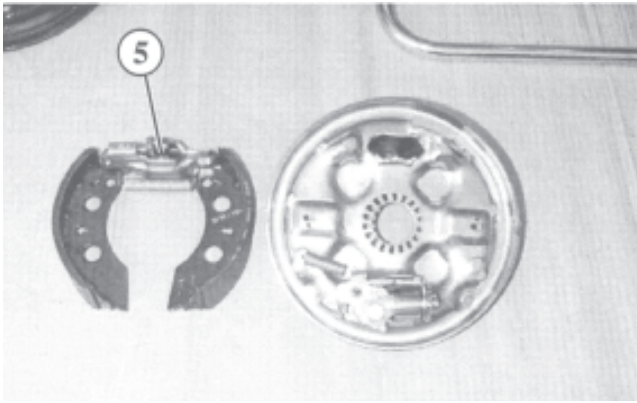
- Press the brake shoe steady spring (1) towards the backplate.

The pressure on the brake shoe steady spring releases the cover plate (2) on the outside of the backplate.

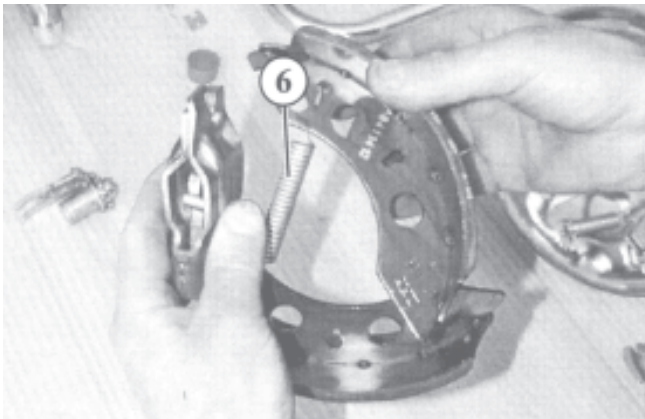
- Remove the cover plate
- Repeat the procedure on the second brake shoe



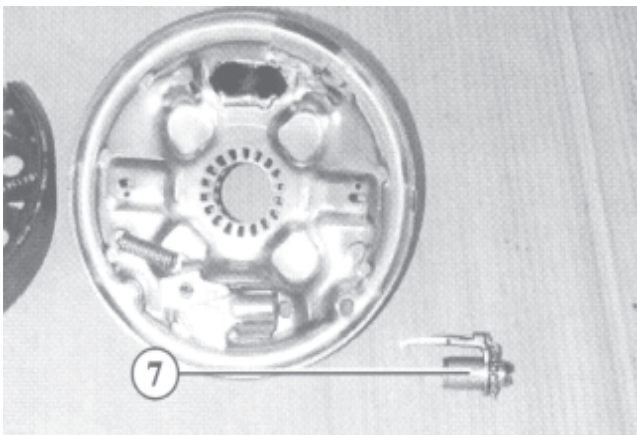
- Spread both brake shoes (3) outwards at the adjuster housing, and disengage from the slots (4)



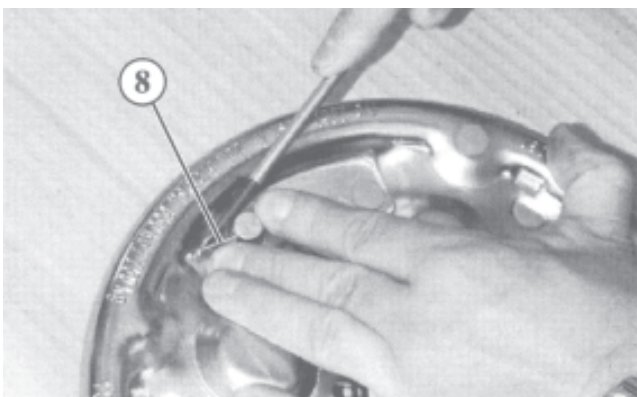
- Take off the brake shoes with expander lever and return spring (5)



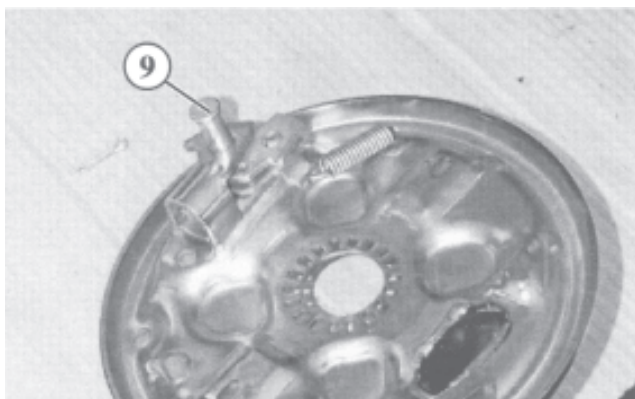
- Separate the brake shoes by unhooking the tension spring (6) and expander lever



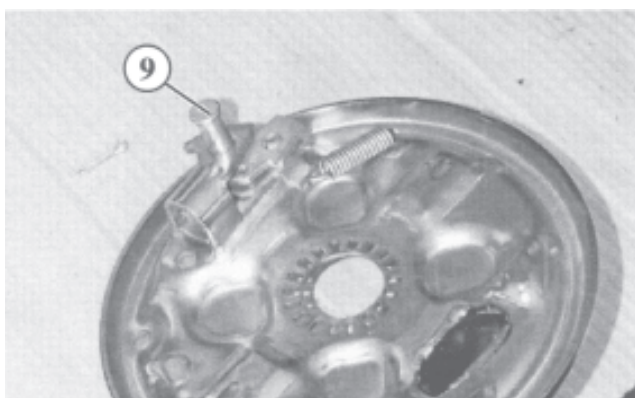
- Take the adjuster (7) out of the adjuster housing



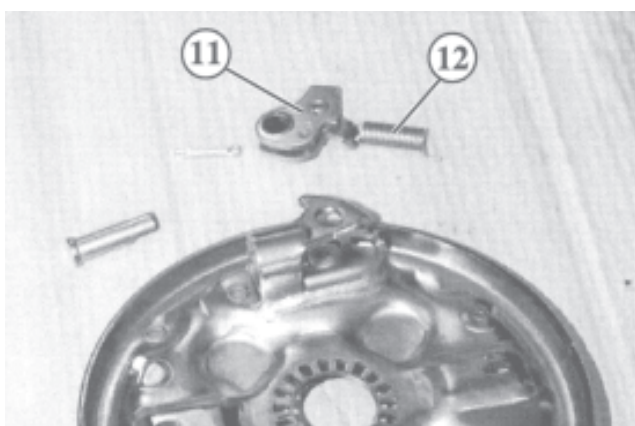
- Press together and remove the split pin (8) on the automatic reverse lever pivot bolt on the outside of the backplate



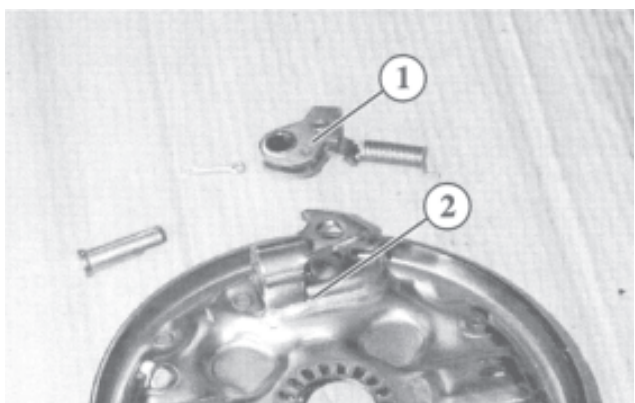
- Take out the pivot bolt (9) of the automatic reverse lever towards the inside



- On the 1636 G wheel brake, the pivot bolt for the automatic reverse lever is riveted
- Drive the pivot bolt (10) inwards with a punch



- Take out the automatic reverse lever (11) and tension spring (12)

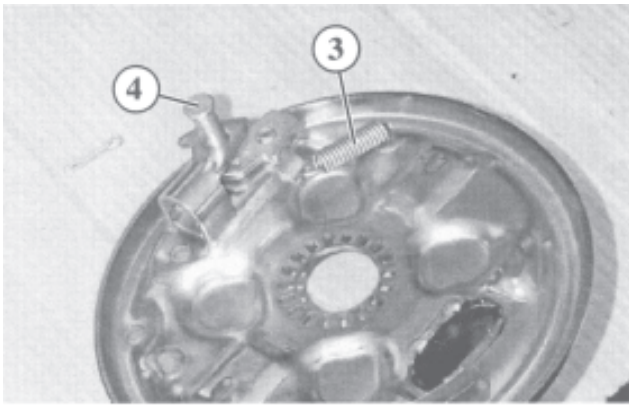


3.4.8 Fitting the wheel brake

- Assemble the parts for the wheel brake



The automatic reverse lever (1) and backplate (2) are different for left and right wheel brakes



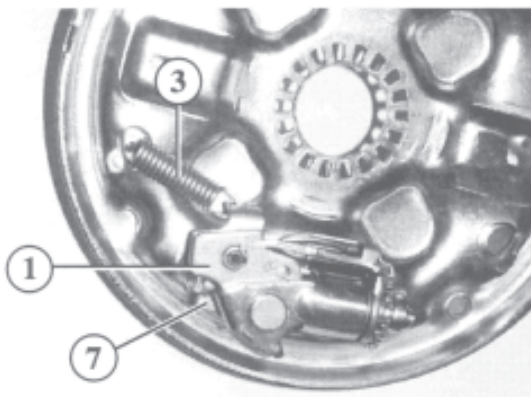
- Hook a new tension spring (3) into the backplate by the square end of the spring
- Check that the automatic reverse lever moves freely
- If the automatic reverse lever is stiff, lubricate the pivot
- Replace corroded automatic reverse levers together with the pivot bolt
- Hook the automatic reverse lever into the hooked eye on the spring
- Insert the pivot bolt (4)



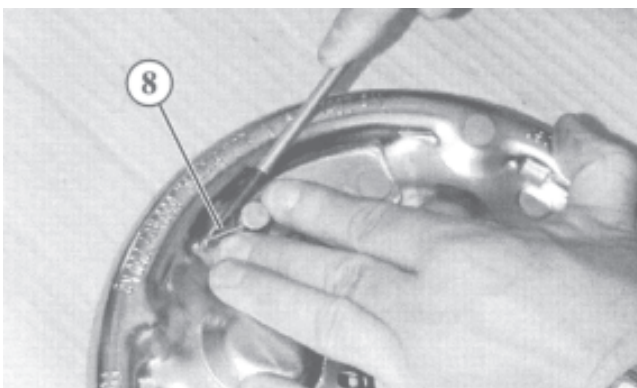
The automatic reverse lever is under tension between the tension spring and pivot bolt.



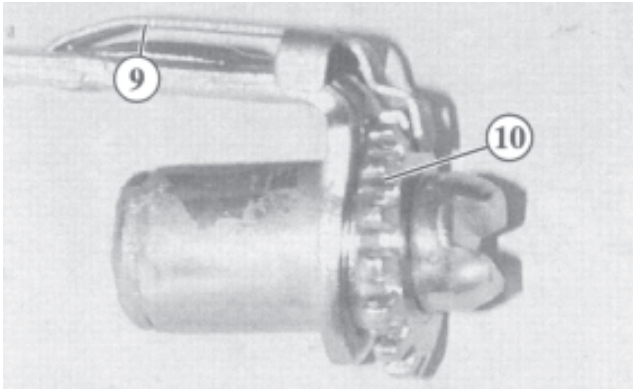
When fitting the 1636 G wheel brake, the riveted pivot bolt (5) of the automatic reverse lever is replaced with the standard pivot bolt (6).



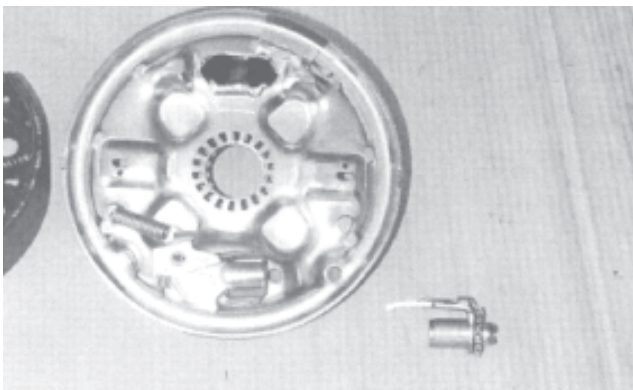
- The automatic reverse lever (1) must be against the stop of the adjuster housing (7)
- If the automatic reverse lever is not against the stop of the adjuster housing, the tension spring (3) must be renewed.



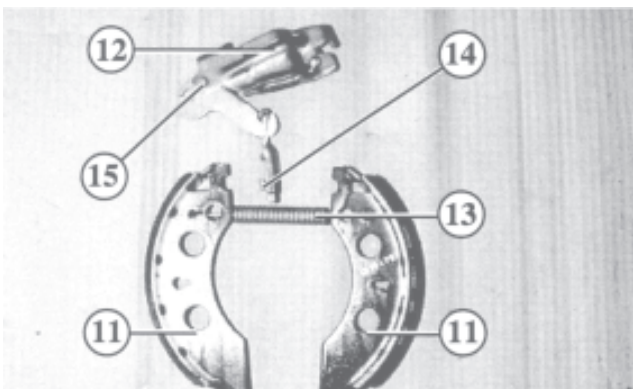
- Insert and bend over the split pin (8) securing the pivot bolt



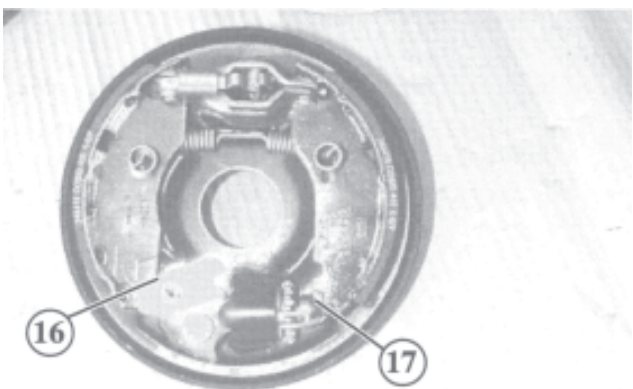
- Check the leaf spring (9) on the adjuster device for tension
- Check that the leaf spring engages sufficiently in the adjuster nut (10)
- Replace weak leaf springs
- Check that the adjuster nut turns freely
- Lubricate stiff adjuster nuts
- Replace rusted up adjuster screws together with the adjuster nuts



- Grease the adjuster nuts and adjuster device
- Fit the adjuster device into the adjuster housing



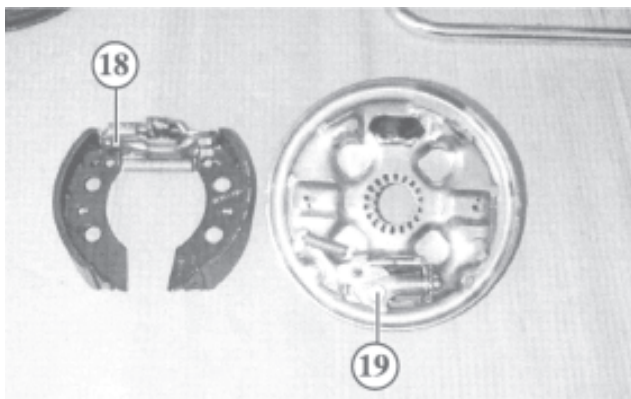
- Assemble the appropriate brake shoes (11), expander (12) and new tension spring (13)
- Before installing the expander lever:
 - Check that the expander moves freely
 - Lubricate stiff expander lever pivots
 - Replace expanders with rusted up pivots
- Installation position for the expander lever:
 - The open side of the attachment eye (14) for the Bowden cable must face towards the pivoting point (15) of the expander lever
- Installation position of the tension spring:
 - The eyes of the tension spring must face outwards in the installed position



On type 1637, the brake shoes are different on the left and right sides. Note the stamped markings (16, 17) when fitting.



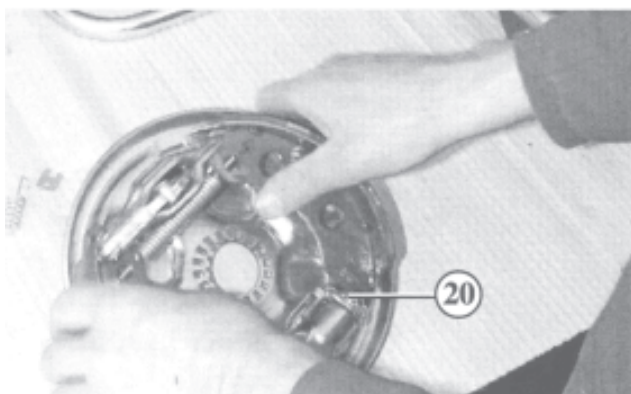
If the brake shoes are fitted on the wrong side on this type, the brake will not operate.



- Ensure that the expander lever and automatic reverse lever are correctly positioned: the pivoting point of the expander lever (18) must be fitted on the same side as the pivot bolt of the automatic reverse lever (19)



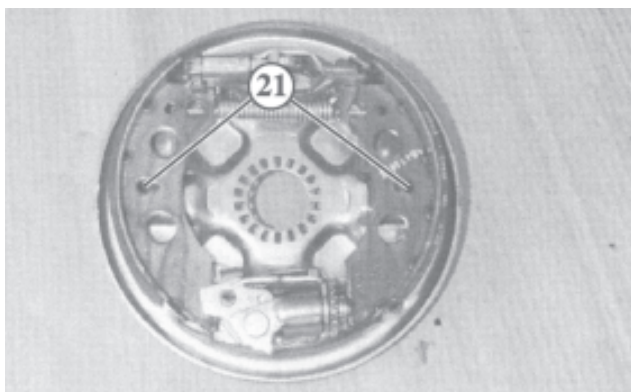
Failure to comply with this alters the brake shoe travel and impairs braking action.



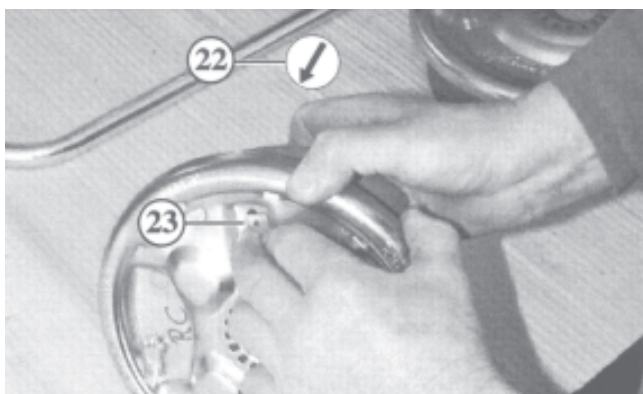
- Place the assembly of brake shoes, expander and tension spring onto the backplate.



Spread the brake shoes outwards and engage in the slots (20) on the automatic reverse lever.



- Pass the brake shoe steady spring clips through the openings (21) in the brake shoes



- To secure, press the brake shoe steady spring (22) towards the backplate
- Push in a new cover plate (23) (the plate may be omitted in the compact axle service)
- Repeat the procedure on the second brake shoe

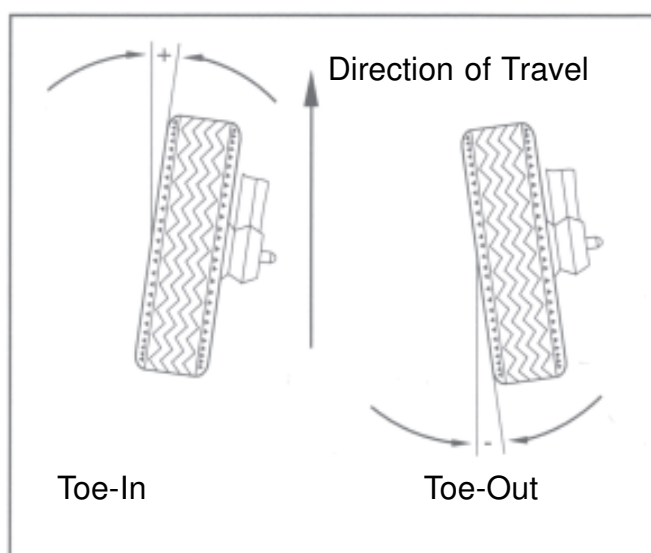
IMPORTANT NOTE: SECTION 3.4.9 IS FOR INFORMATION ONLY. ALTERATION TO THE AXLE GEOMETRY MUST ONLY BE COMPLETED AT THE AL-KO FACTORY.

3.4.9 Measuring and adjusting toe-in

Definition

Schematic view of toe-in:

The toe-in setting gives the axles tyre wear values comparable with those of passenger cars. The axles must therefore be installed with toe-in.



Standard factory toe-in setting $30' \pm 10'$

Range of adjustment

The range of toe-in adjustment is $30'$ (0.5°) on either side.

No adjustment is possible on the:

- standard axle
- compact axle



If the toe-in is out of tolerance on the standard or compact axle, the axle, swinging arm or stub axle are damaged and must be repaired at the manufacturer's works.

Continuous adjustment is possible on the:

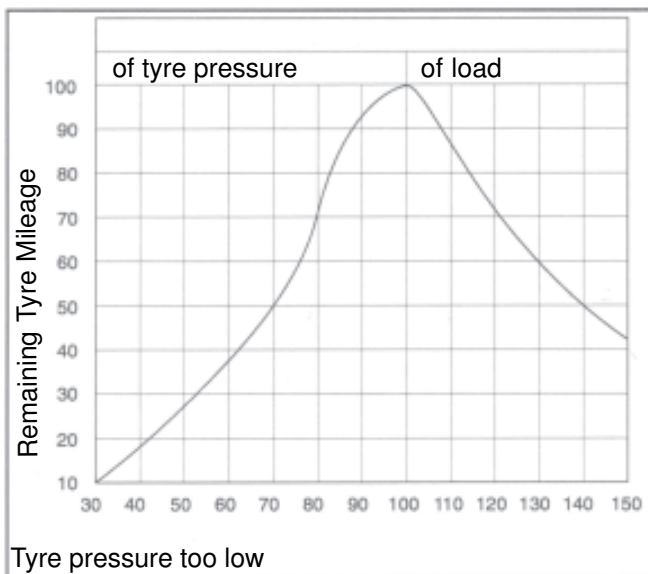
- Euro-Plus axle (stub axle secured with a collar nut)

Adjustments in steps is possible on the:

- Euro-Plus-45° axle (stub axle secured with a socket head screw)



If the range of adjustment of $30'$ is not sufficient, the axle, swinging arm or stub axle are damaged and must be repaired at the manufacturer's works. In this case, the complete axle must be removed and sent to the manufacturer. It will be completely repaired at AL-KO.

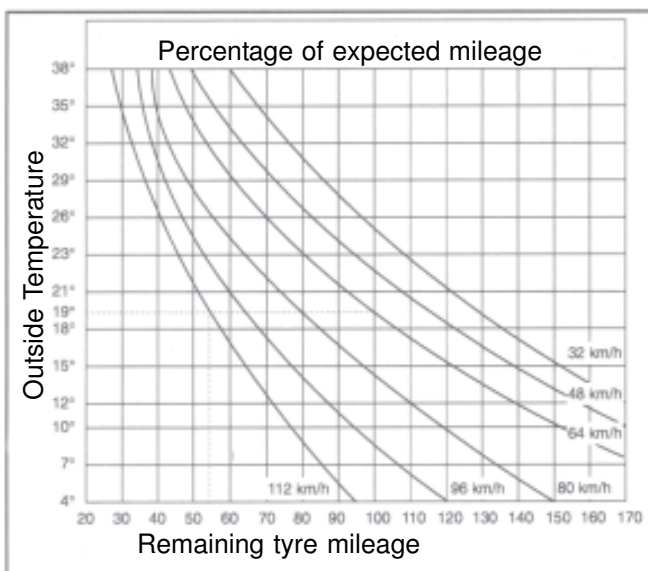


Reasons for increased tyre wear

If the toe-in setting is not as specified, increased tyre wear may occur.

Low tyre pressure or overloading of the trailer are the most frequent reasons for increased tyre wear.

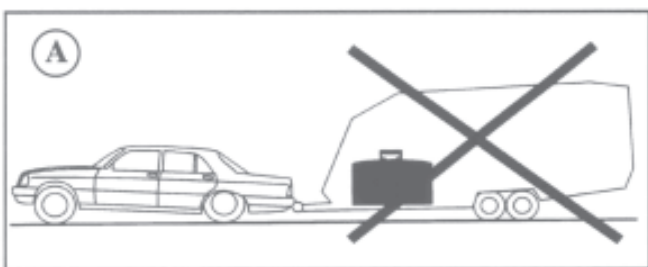
The figure shows the remaining mileage, the highest value being reached at optimum tyre pressure (100%). If overloading of the vehicle is avoided, optimum tyre mileage may also be



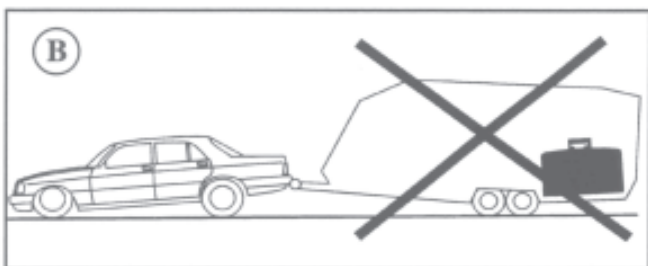
Excessive speed and high temperature also contribute to increased tyre wear.



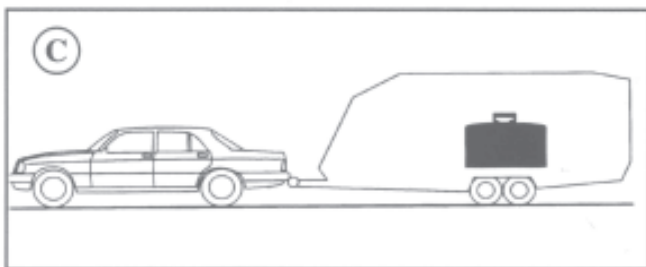
The point of normal tyre wear (100%) is specified at an average speed of 64 km/h and an average temperature of 19° C.



Increased tyre wear also occurs with incorrect loading. An increased drawbar load is incorrect (figure A).



Tail-heavy loading of the trailer with negative drawbar load (figure B) also generates increased tyre wear.



The correct condition is to load the trailer centrally as far as possible, making full use of the permissible drawbar load (figure C).

Preparations for measuring toe-in

- Determine the axle type and permitted axle load from the type plate on the axle
- Establish the permitted total weight of the vehicle
- Weigh the vehicle



Vehicle weight must not exceed the permitted total weight.

- Adjust the tyre pressures to the specified values
- Move the vehicle 2-3 m forwards or simulate the movement on a rolling road
- Measure the toe-in



For measuring the toe-in, the wheels of the vehicle must be loaded.

$$\%G_A = \frac{\text{Vehicle Weight (Kg - Weighed)}}{\text{Permitted Axle Load as per type plate}} \times 100$$

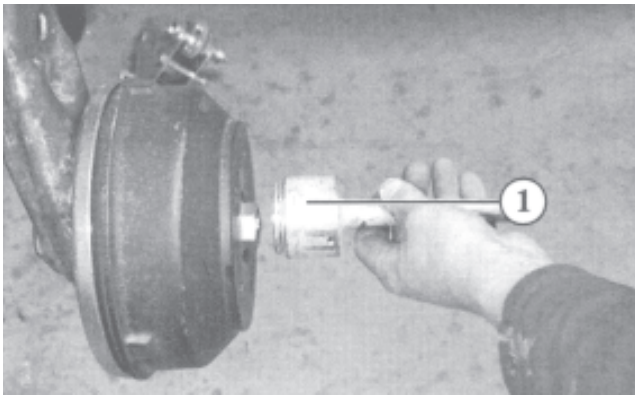
- On straight axles, toe-in should be 10' – 30' independent of axle load.
- On delta axles, calculate the toe-in settings from the table on the next page.
- Calculate the numerical value for %GA using the formula opposite

%GA	Toe-In [] = '
70	0 - 15
80	0 - 15
90	0 - 20
100	5 - 25

- Read off the correct toe-in value for delta axles from the table opposite
- If the measured toe-in differs from the toe-in to be set, the toe-in must be re-adjusted



On axles manufactured before 1993, the toe-in is 30' ± 15'.

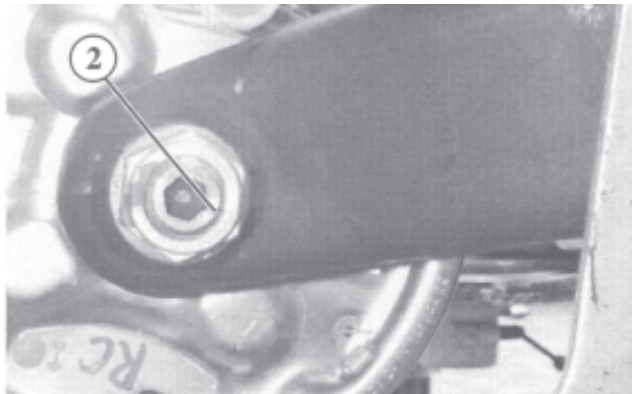


Preparations for adjusting toe-in

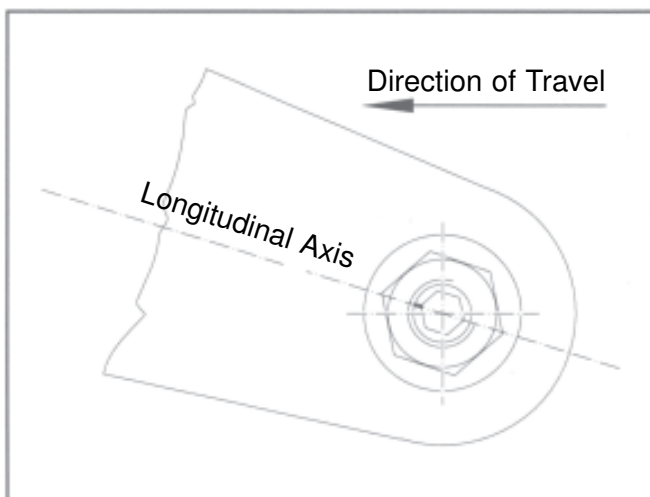
- Lift the trailer with a vehicle hoist
- Unbolt the wheel
- Remove the dust cap with the shaped tool (1, see list of tools)



For safety reasons (danger of injury) and to avoid component damage, we recommend the use of the special tool.



- If corroded, clean up the threaded pin and end face
- Establish the position of the notch on the stub axle
 - Where the stub axle is secured with a collar nut:
- The notch (2) is located on the swinging arm side
 - On the Euro-Plus axle with socket head screw:
- The notch is located on the brake drum side and must be carefully transferred to the swinging arm side.
- On the basis of the notch position, estimate whether the possible adjustment available is enough to set the required toe-in



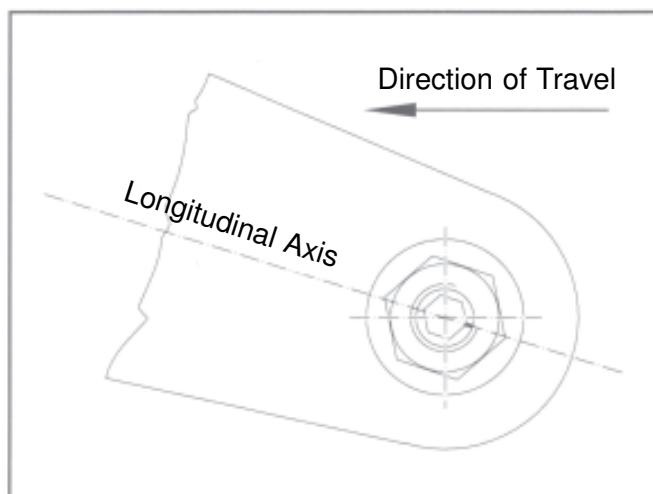
Possible adjustment available



If the range of adjustment is not enough to set the required toe-in, repair can be carried out at the manufacturer's works

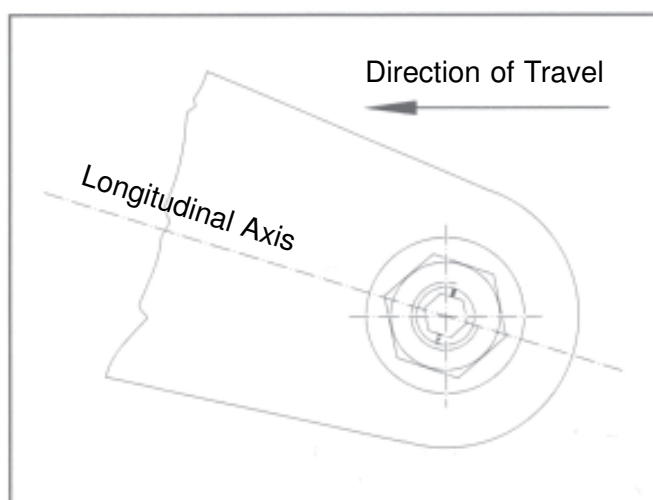
Notch on the swinging arm centreline, front

The toe-in is already at its maximum possible value. It can only be adjusted by a maximum of 1° in a negative direction. Further adjustment in the direction of positive tracking is not possible.



Notch on the swinging arm centreline, rear

The toe-in is already at its minimum possible value (possibly even toe-out). It can only be adjusted by a maximum of 1° in a positive direction. Further adjustment in the direction of negative tracking is not possible.



Notch at right angles to the swinging arm centreline

The toe-in can be adjusted by not more than $30'$ (corresponding to 0.5°) in either direction. With different notch positions, there are corresponding differences in the range of adjustment.

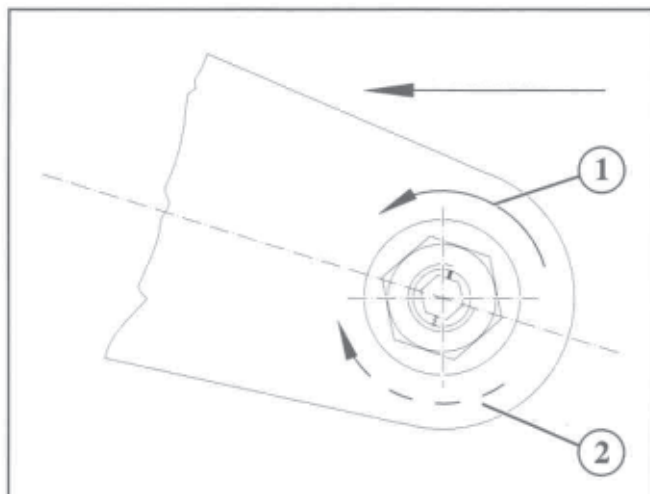
Loosening the stub axle fastening

- Where the stub axle is secured with a collar nut:
 - Unscrew the flange nut, preventing the stub axle from turning using a shortened Allen key (see AL-KO list of tools)
 - Screw on a new flange nut (do not tighten)



Do not re-use self-locking nuts.

- Adjust the toe-in by rotating the stub axle
- On the Euro-Plus axle with socket head screw:
 - Loosen the socket head screw and unscrew about 10-15 mm. Pull out the stub axle past the spanner face on the toothed bush
 - Adjust the toe-in by rotating the stub axle. On the Euro-Plus axle with socket head screw, this can only be done in 60° steps
 - Re-use the old socket head screw while setting the toe-in



Rotating the stub axle

Where toe-in is too little:

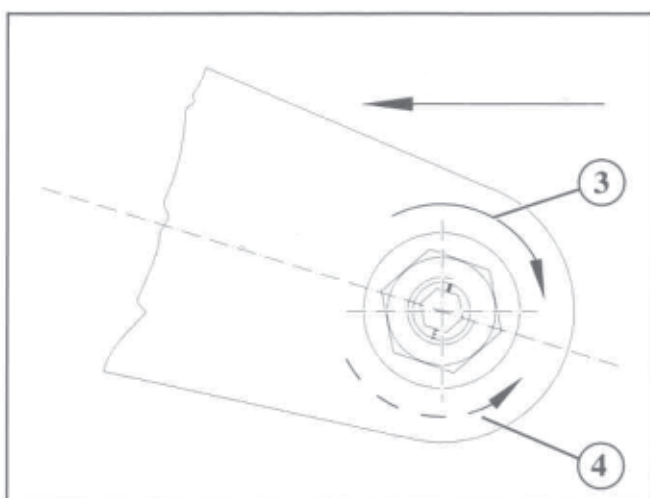
- Turn the stub axle notch in the direction of the axle body



If the notch is above the lengthwise axis of the swinging arm, rotate in the direction of the continuous arrow (1). If the notch is below, rotate in the direction of the dashed arrow (2).



Regardless of the direction of rotation of the stub axle, the notch must not go beyond the lengthwise axis of the swinging arm, as this could cause undesirable changes in camber.



Where toe-in is too much:

- Turn the stub axle notch in the direction of the end of the swinging arm



If the notch is above the lengthwise axis of the swinging arm, rotate in the direction of the continuous arrow (3). If the notch is below, rotate in the direction of the dashed arrow (4).



Regardless of the direction of rotation of the stub axle, the notch must not go beyond the lengthwise axis of the swinging arm, as this could cause undesirable changes in camber.

- Check that the toe-in setting is correct

Securing the stub axle after adjusting toe-in



Install the stub axle rotated to the correct position.



For tightening the nut or socket head screw, there must be no load on the axle.

- Where the stub axle is secured with a collar nut:

Tighten the new flange nut to a torque of 600 – 650 Nm, preventing the stub axle from turning using a shortened Allen key (see ALKO list of tools)



If the stub axle is rotated when tightening the nut, toe-in adjustment must be repeated.

- On the Euro-Plus axle with socket head screw:
 - After checking that the toe-in setting is correct, loosen the old socket head screw
 - To secure the stub axle, use a new socket head screw with plastic locking device
 - Tighten the new socket head screw to a torque of 360 - 380 Nm

3.4.10 Fitting dampers

- Select dampers to suit the appropriate weight class (see table)

Weight range for AL-KO Octagon axle dampers

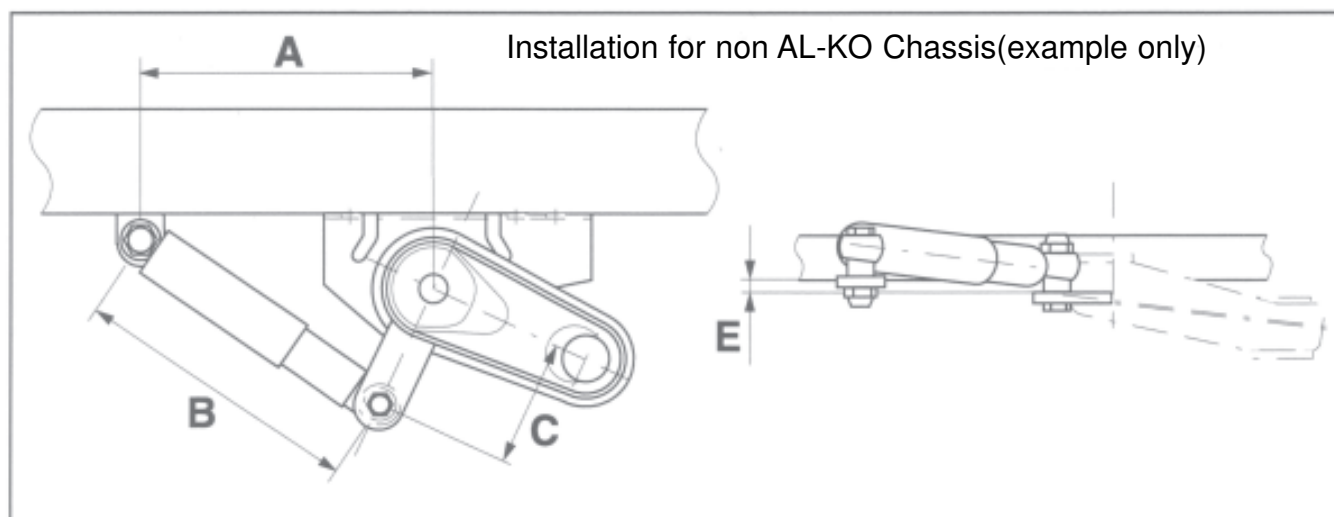
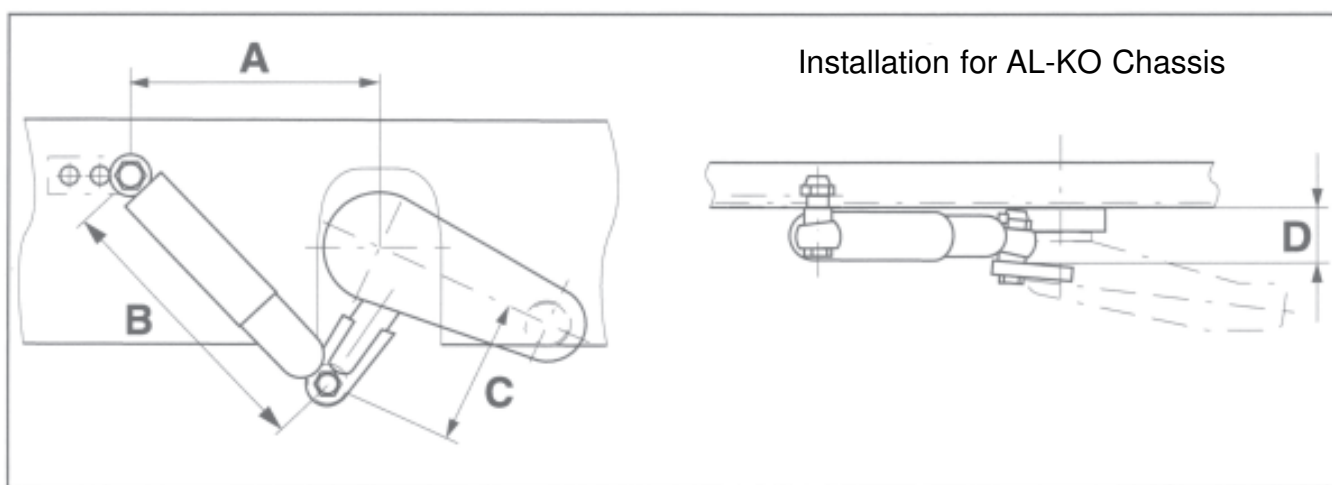
Total weight				
Order no.	Colour	Single axle	Tandem axle	Hinge fitting eyes
244 084	green	up to 900	up to 1600	yes
244 085	blue	900 to 1300	1600 to 2500	yes
244 086	red	1300 to 1800	2500 to 3500	yes
244 087	black	1800 to 4000	3500 to 7500	no
282 259	black	up to 1500	up to 3000	yes

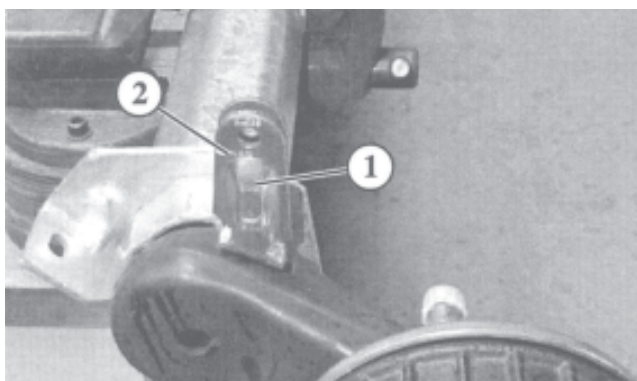
- Look up suitable damper mountings and retainers to suit weight class and frame design (see table)

Suitable for types			Euro axle system: damper mounting, plug-in, swing arm	Damper mounted in welded version per swing arm	Non AL-KO chassis: mounting for welding to frame
Single axle	Tandem axle	Colour	Order no.	Order no.	Order no.
up to 900	up to 1600	green	244 088	—	208.631.02.02
900 to 1300	1600 to 2500	blue	244 088	-	208.631.02.02
1300 to 1800	2500 to 3500	red	-	258.631.02.02	208.631.02.02
1800 to 4000	3500 to 7500	black	-	258.631.02.02	208.631.02.02

- Determine installation dimensions according to the table
- The installation dimensions refer to the following drawings.

Installation dimensions for types			Installation dimensions with no load on axle				
Single axle	Tandem axle	Colour	A	B	C	D	E
up to 900	up to 1600	green	265/270	min. 255	125	52 to 75	25 to 50
900 to 1300	1600 to 2500	blue	235	min. 255	125	52 to 77	25 to 50
1300 to 1800	2500 to 3500	red	265	min. 255	125	52 to 75	25 to 50
1800 to 4000	3500 to 7500	black	265	min. 255	125	52 to 75	25 to 50
up to 1500	up to 3000	black	235/265	min. 255	125	52 to 75	25 to 50





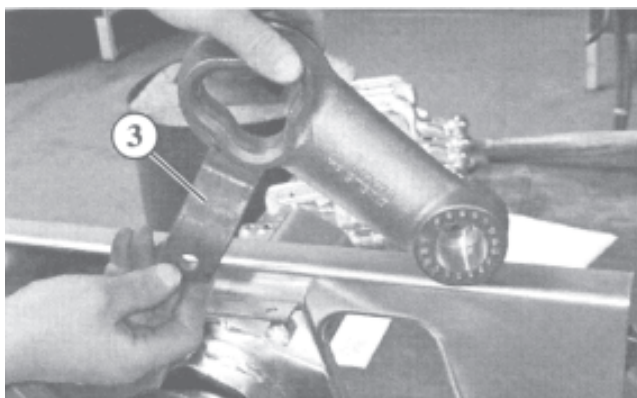
- Remove square plugs from the swinging arm using a suitable tool
- Insert the damper mounting (1) into the slotted hole on the swinging arm



Fit the damper mounting so that the arrow marking (2) faces in the direction of travel.



Incorrect fitting will destroy the damper mountings and dampers.





- Press the half-shells of the damper mounting (1) together. If necessary, use pliers
- On forged swinging arms:
- Weld the damper mounting lugs (3) to the swinging arm



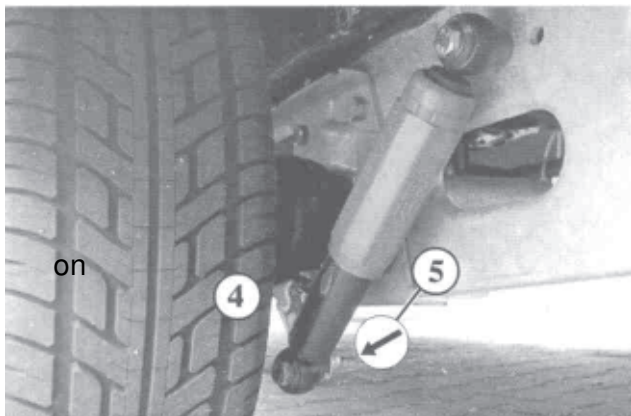
Depending on the frame design, the damper screw is fitted on the out side or inside of the damper mounting. Check with table opposite.



Caution. The distance between the tyres and damper components must not be less than 16 mm. Failure to observe this may cause accidents.

Axle Type	Attachment
Straight	inside
Delta Delta SI-N 10/12 Chassis with  section	outside
Delta Delta SI 850 Delta SI-N 10/12 Delta SI 14 Chassis with  section	outside ¹

¹ Note: Maximum permissible wheel size is
6J x 14 ET 38 with 185/70 R14 tyres or
6J x 15 ET 30 with 206/65 R15 tyres



- Fit the damper screw (4) on the correct side (shown here: inside fitting) of the damper mounting
- Loosely screw on the self-locking nut (5).



Correct installation position for dampers: Cylinder tube at the bottom the damper mounting, coloured shroud tube at the top on the frame.



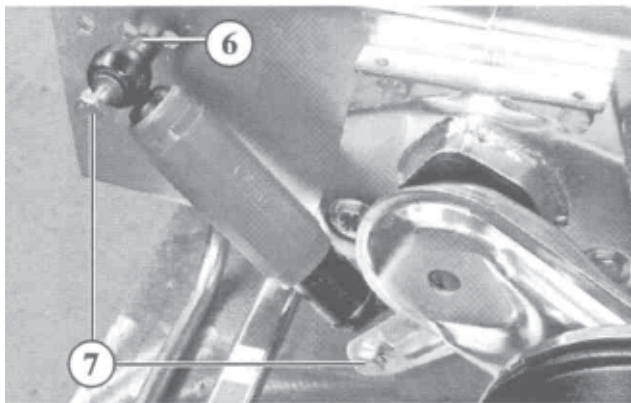
Incorrect fitting will destroy the damper mountings and dampers.



The screw head must always be fitted on the tyre side.



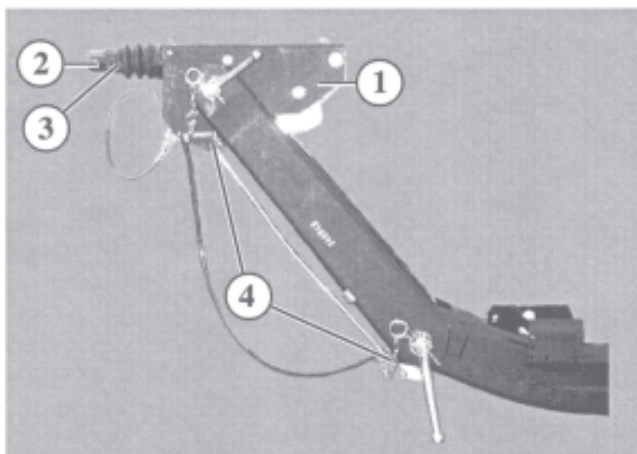
Safety distance between the attachment screw and tyre: 15 mm minimum.



Fitting the damper to the vehicle frame

- Compress the damper completely
- Extend the damper again by 20 mm
- Offer up the damper screw to the frame (6) and pass through the nearest hole
- Fit the chassis reinforcement
 - On the AL-KO system chassis:
- Use the reinforcing plate
 - On non-AL-KO chassis:
- Weld on mounting plates to suit specified installation dimensions
- Loosely screw on the self-locking nut, do not tighten yet
- Align the damper and damper mounting
- Tighten the self-locking nuts on the frame and damper mounting to 86 Nm
- In each case, use the screw head (7) to prevent it rotating

4 Height Adjustable overrun device with towing hitch



4.1 Function and construction of the Height Adjustable Overrun

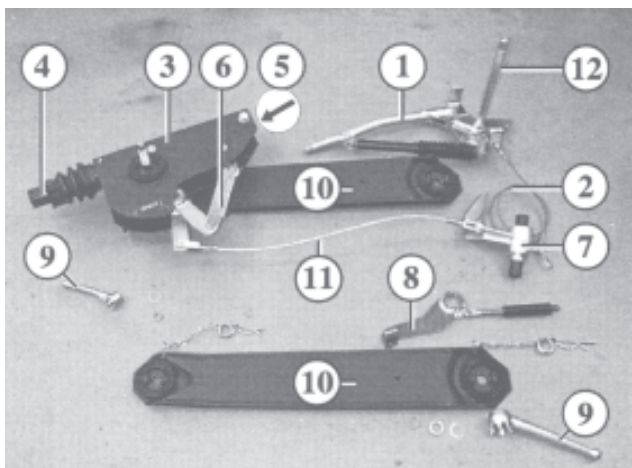
4.1.1 Function

The overrun device (1) may be described as the control unit for the overrun braking system. Braking by the towing vehicle generates a towbar force at the coupling point (2). When the operating threshold is exceeded, the drawbar (3) is pushed in. This causes the wheel brakes (5) to operate via the linkage system (4).

4.1.2 Construction

The overrun device consists of a number of assemblies:

- 1 Handbrake system
- 2 Breakaway cable
- 3 Housing
- 4 Drawbar
- 5 Damper (fitted internally)
- 6 Overrun lever, upper
- 7 Overrun lever, lower
- 8 Adjustment aid with gas strut
- 9 Locking bar
- 10 Height adjustment arms
- 11 Linkage cable
- 12 Pivot bolt



4.2 Maintenance

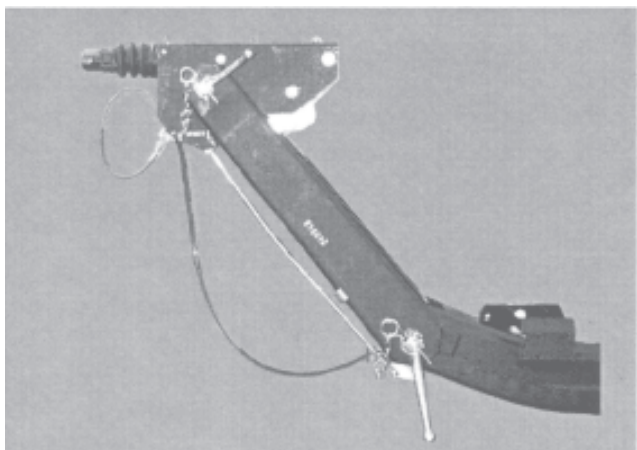
4.2.1 Checking the functions

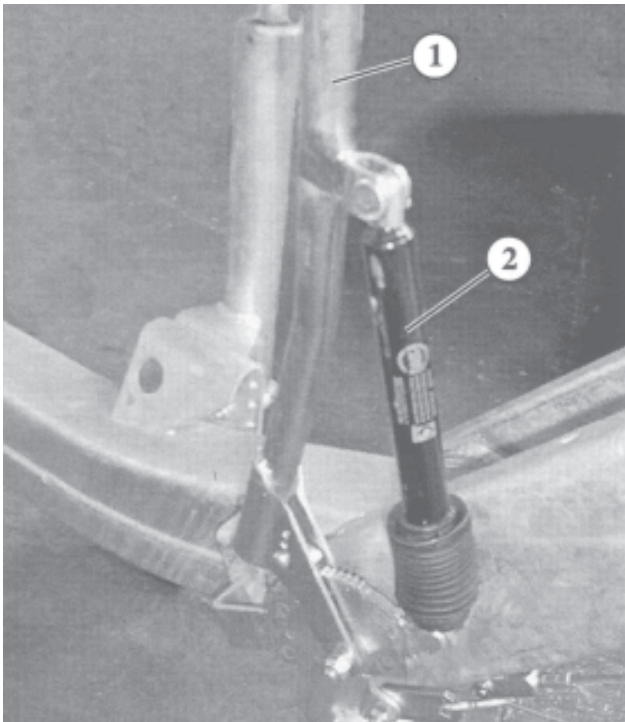


With all work undertaken on the variable height overrun device, make sure at the conclusion of the work that the overrun device and towbar are parallel with each other. Otherwise the braking system will not work.



With all work on the height adjustable overrun device, the trailer must be secured with wheel chocks to prevent movement.



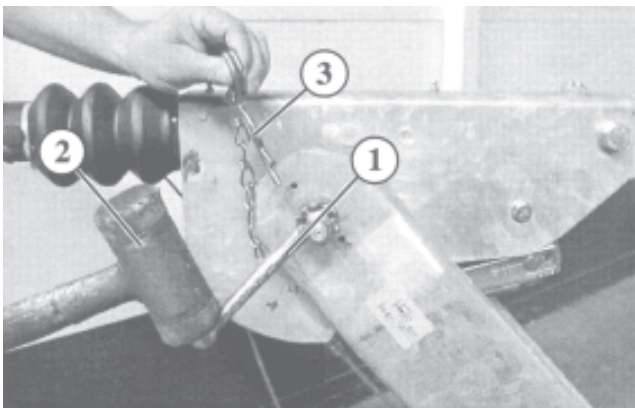


Handbrake

- Pull the handbrake lever (1) on and check that it moves freely
- Check the condition of the gas strut

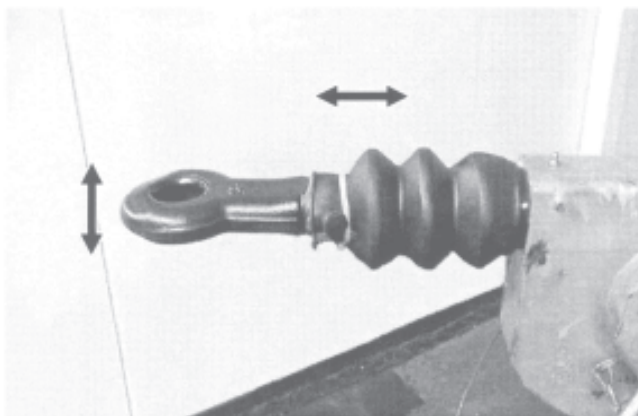


The condition of the gas strut can be checked by visually inspecting for leaks. Fluid leakage means reduced effectiveness.



Serrated locking rings

- The serrated locking rings must lock together without any play
- Tighten the locking bar and hammer tight with a plastic or rubber hammer (2)
- Insert the spring clip (3)



Drawbar bearings

- Pull the drawbar out as far as the stop
- Press the drawbar up and down. Play must be not more than ± 1.5 mm

Overrun device damper

- Test by moving the damper in and out. Replace if there are oil leaks, or reduced effectiveness or if air has been drawn in

Adjustment aid

- Check the condition of the gas strut

Overrun and coupling attachment screws

- Check all attachment screws of the overrun device and coupling for tightness. (Ensure the correct tightening torque)

Breakaway cable

- Check the ring of the breakaway cable on the handbrake lever
- Check the condition of the cable guide
- Check the condition of the snap hook
- Check the condition of the cable

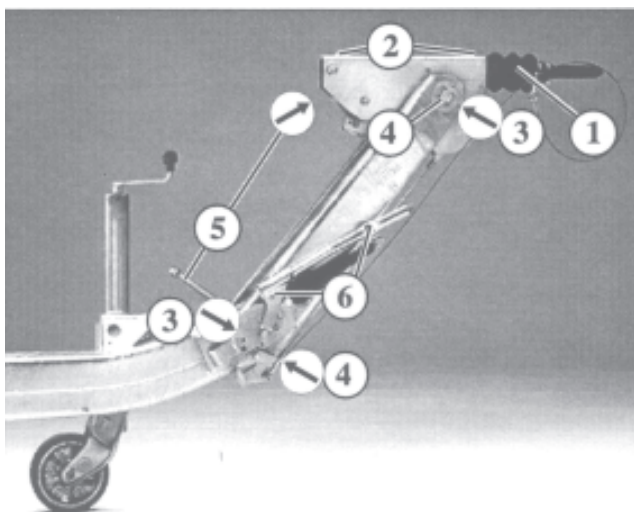
Jockey wheel (attachment / mounting) and locking bar

- Check that these move freely and are undamaged

4.2.2 Lubrication

Lubrication intervals

Every 10,000-15,000 km or 6 months, grease or oil sliding and swivelling points of the height adjustable overrun device.

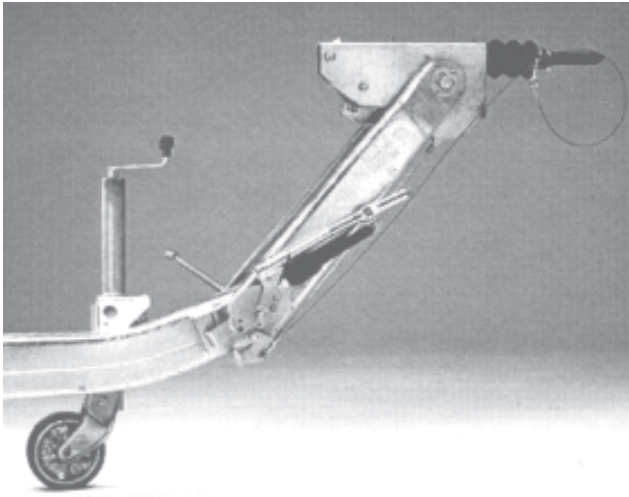


Lubrication points

- 1 Grease the drawbar in the area of the bellows.
- 2 Grease the bearing bush through the grease nipples on the housing.
- 3 Grease the serrated locking ring joints.
- 4 Grease the pivot bolts of the overrun and handbrake levers through the grease nipples.
- 5 Oil the locking bar.
- 6 Oil the joints of the gas strut in the handbrake lever.

Lubricant type: Multi-purpose grease to DIN 51825 KTA 3K4

Lubricant type: Multi-purpose grease to DIN 51502 KPF 2C (for serrated locking ring joint)



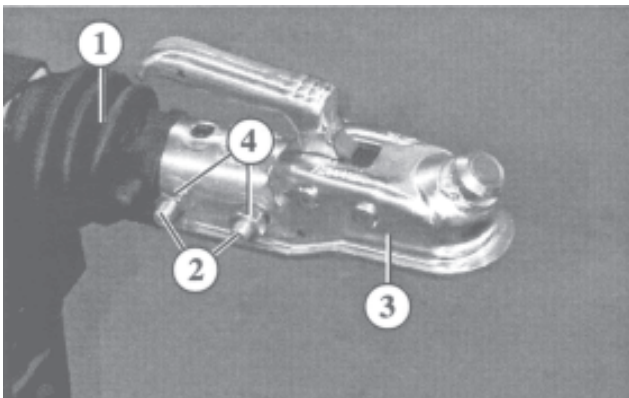
4.3 Repair



With all work undertaken on the height adjustable overrun device, make sure at the conclusion of the work that the overrun device and towbar are parallel with each other. Otherwise the braking system will not work.

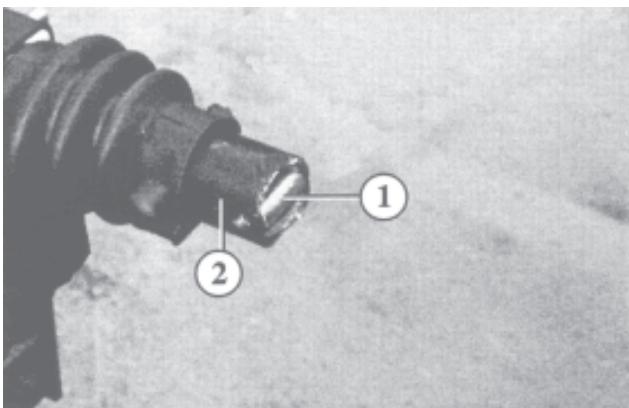


With all work on the height adjustable overrun device, the trailer must be secured with wheel chocks to prevent movement.



4.3.1 Removing the ball coupling

- Pull the bellows (1) off the rear attachment screw (2) of the coupling (3)
- Unscrew the nuts (4) of the attachment screws (2)
- Drive out the rear attachment screw (2)
- Drive out the front attachment screw (2). (Remember the spacer tube)
- Take off the coupling (3)



4.3.2 Installing the ball coupling

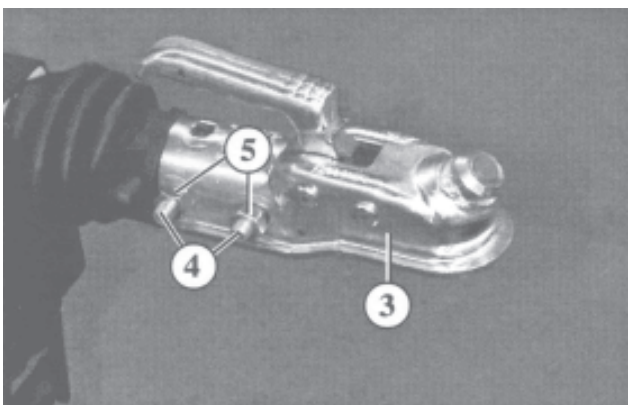
- Insert the spacer tube (1) into the drawbar (2) in line with the front attachment screw
- Fit the coupling (3)
- Insert the attachment screws (4)
- Fit new self-locking nuts (5) and tighten to 86 Nm
- Check operation of the damper by moving the drawbar in and out

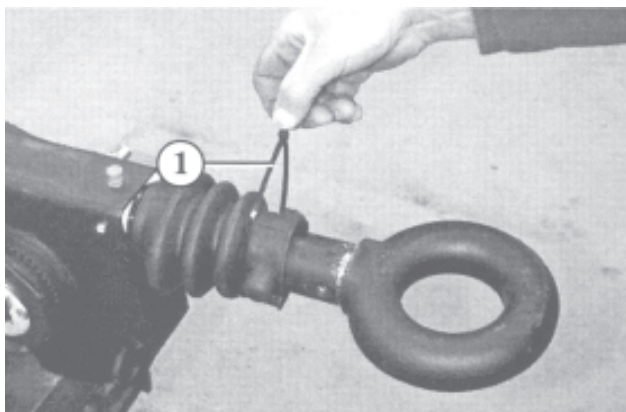


Always fit the horizontal screws through from the left side, viewed in the direction of travel.



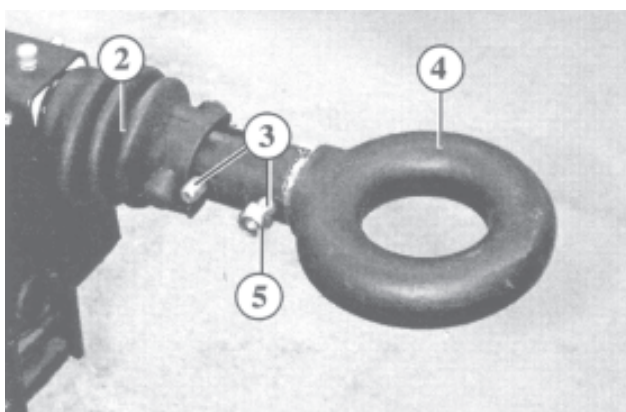
Do not re-use self-locking nuts



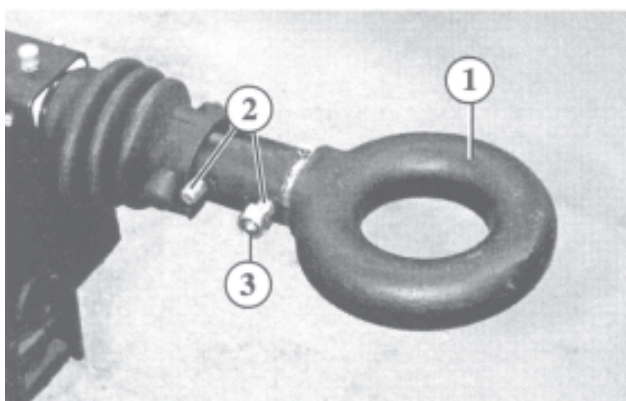


4.3.3 Removing the towing eye

- Remove the cable tie (1) securing the bellows



- Pull the bellows (2) off the rear attachment screw (3) of the towing eye (4)
- Unscrew the nuts (5) of the attachment screws (3)
- Drive out the rear attachment screw (3)
- Drive out the front attachment screw (3). (Remember the spacer tube)
- Take off the towing eye (4)



4.3.4 Installing the towing eye

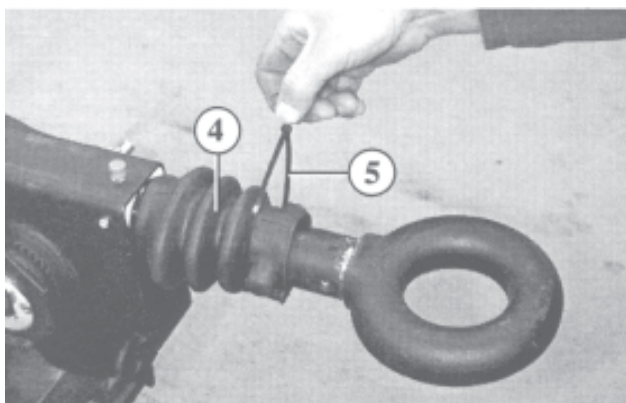
- Fit the towing eye (1)
- Insert the attachment screws (2)
- Fit new self-locking nuts (3) and tighten to 86 Nm
- Check operation of the damper by moving the drawbar in and out



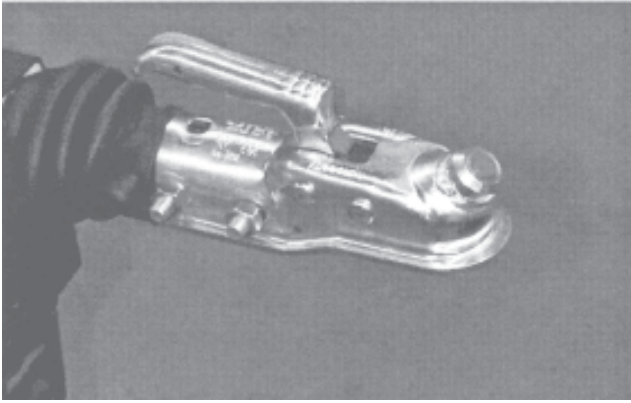
Always fit the horizontal screws through from the left side, viewed in the direction of travel.



Do not re-use self-locking nuts.



- Push the bellows (4) over the rear attachment screw
- Secure the bellows with the cable tie (5)
- Check operation of the damper by moving the drawbar in and out



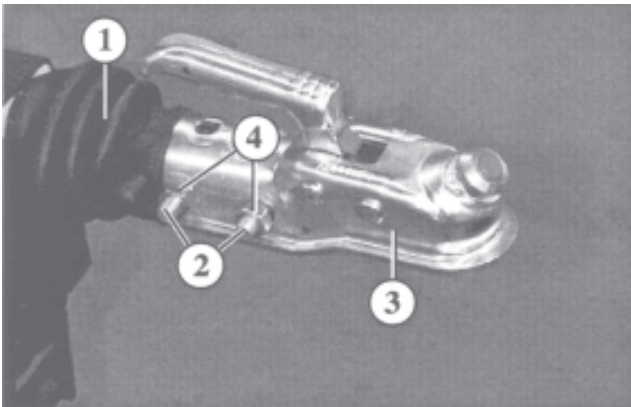
4.3.5 Removing the bellows

This work is described in the section
“Removing the ball coupling or towing eye”.



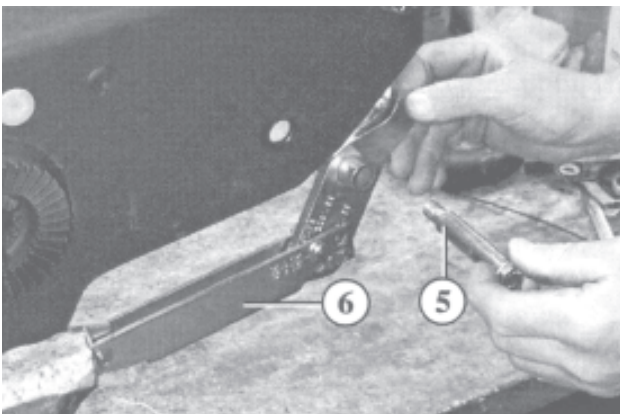
4.3.6 Installing the bellows

This work is described in the section
“Installing the ball coupling or towing eye”.

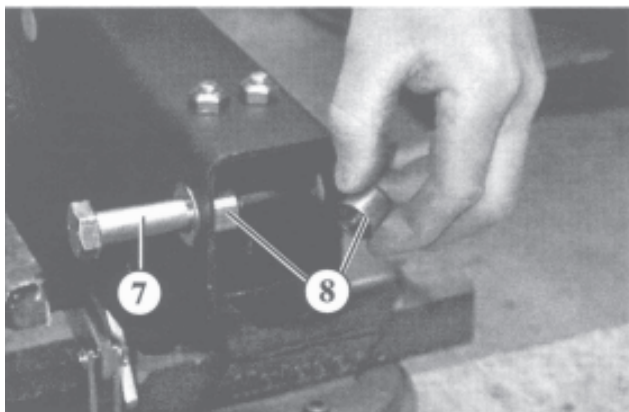


4.3.7 Removing the drawbar bearings

- Pull the bellows (1) off the rear attachment screw (2) of the coupling (3)
- Unscrew the nuts (4) of the attachment screws (2)
- Drive out the rear attachment screw (2)
- Drive out the front attachment screw. (Remember the spacer tube)
- Take off the coupling (3)
- Pull the bellows off the drawbar bearings



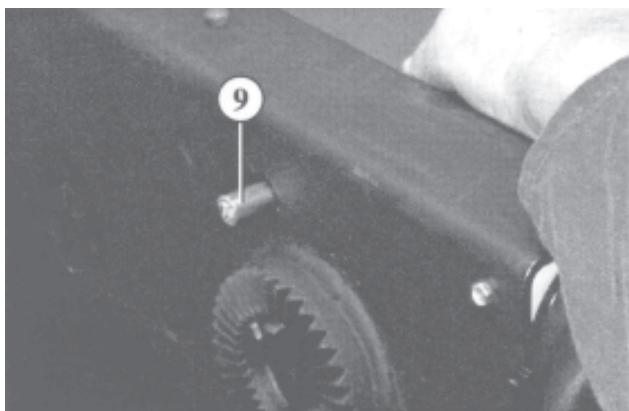
- Loosen the rear attachment screw (5) of the overrun lever and take off the nut
- Pull out the attachment screw and take out the upper overrun lever (6)



- Loosen and remove the nut of the damper mounting bolt
- Pull out the damper mounting bolt (7) and remove the distance pieces (8)



On type 101 VB, 161 VB and 351 VB overruns, the damper mounting bolt is installed vertically.



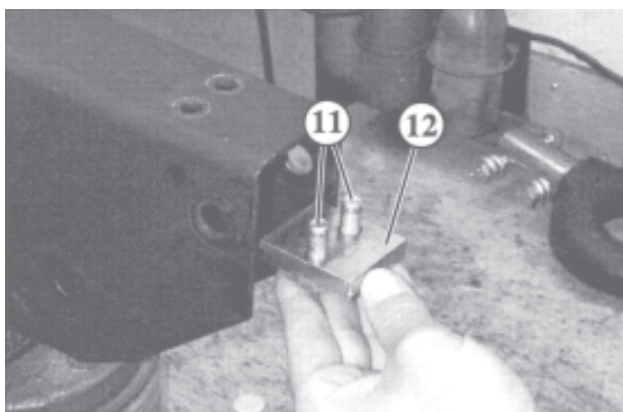
- Remove the protective cap from the hole in the housing
- Position the spring pin of the damper in front of the hole by means of the draw bar
- Drive out the spring pin (9) with a punch



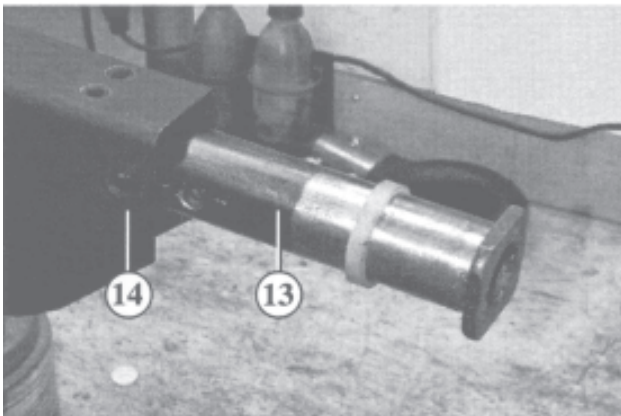
On type 101 VB overruns, the damper is secured with the coupling attachment screws.



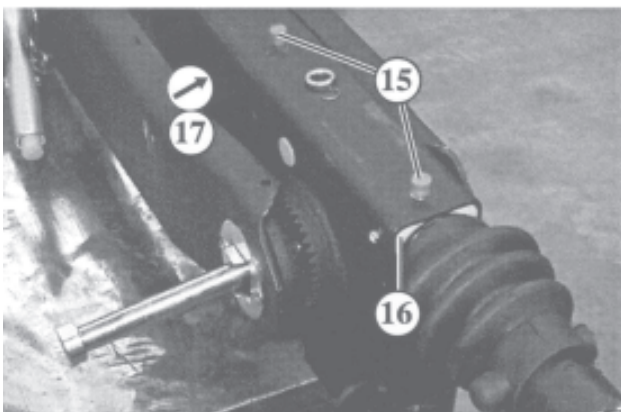
- Pull out the damper (10) rearwards



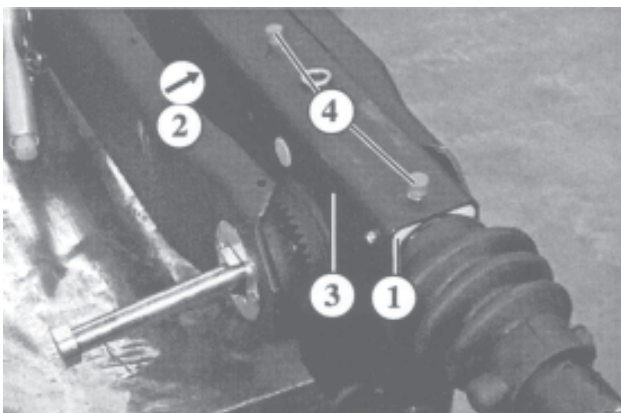
- Loosen and unscrew the nuts of the screws (11)



- Pull the drawbar (13) backwards out of the overrun device (14)



- Unscrew the grease nipples (15)
- Drive out the front (16) and rear (17) bearing bushes from the back and front respectively using a tube or extractor

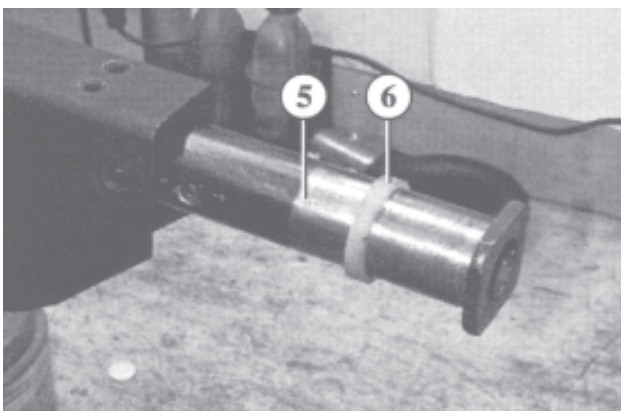


4.3.8 Installing the drawbar bearings

- Press the front (1) and rear (2) bearing bushes into the housing (3) as far as they will go, from the front and rear respectively
- Drill 7 mm diameter holes for the grease nipples (4)
- Ream out the bearing bushes to the required fit using a reamer with guide
- Screw in the grease nipples



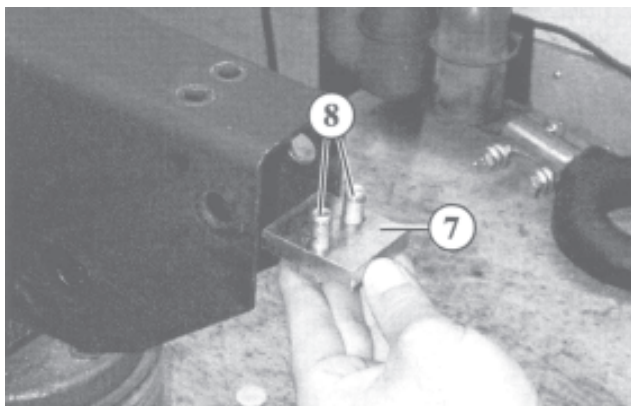
Different reamers are available (see tools list).



- Insert the drawbar (5) into the overrun device from the rear
- Check the damping rubber (6) for damage



Replace the damping rubber (6) if damaged.



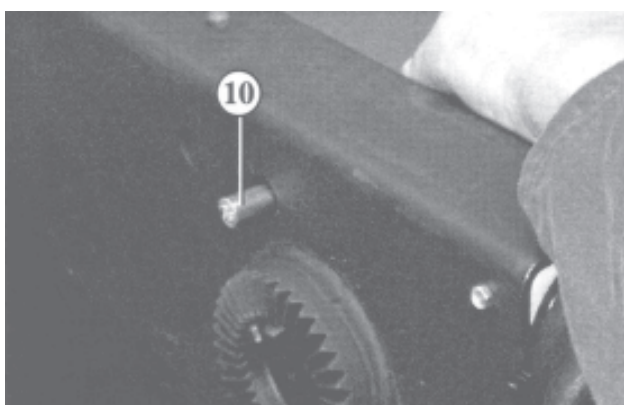
- Insert the stop plate (7) with two screws (8)
- Fit and tighten new self-locking nuts.



Do not re-use self-locking nuts.



- Insert the damper (9) into the overrun device from the rear

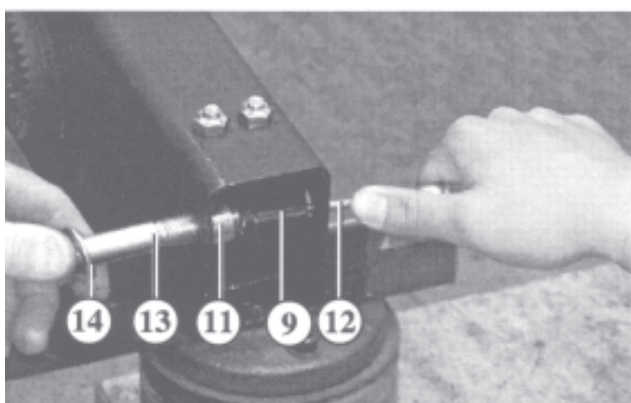


- Position the hole in the draw bar and the damper eye at the hole in the housing
- Drive in the spring pin (10) using a punch



On type 101 VB overruns, the damper is secured with the coupling attachment screws.

- Press the protective cap into the hole in the housing



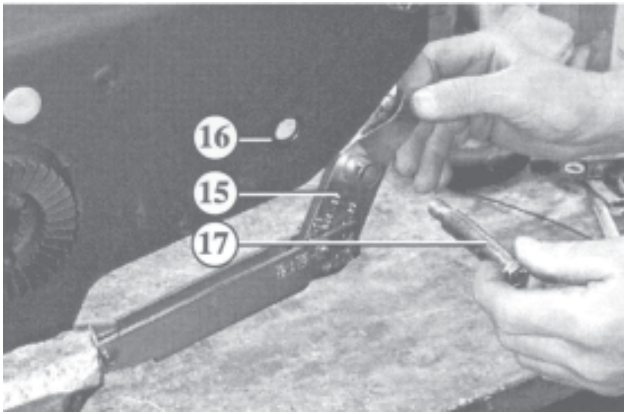
- Locate the damper (9) and distance pieces (11) with a screwdriver (12)
- Insert the damper mounting bolt (13) with washer (14)
- Fit and tighten new self-locking nuts



On type 101 VB, 161 VB and 351 VB overruns, the damper mounting bolt is installed vertically.



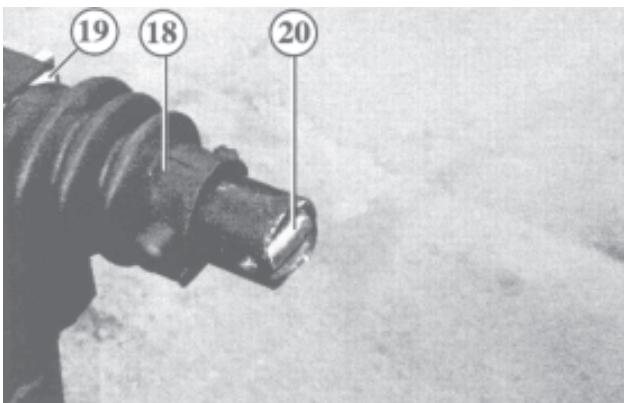
Do not re-use self-locking nuts.



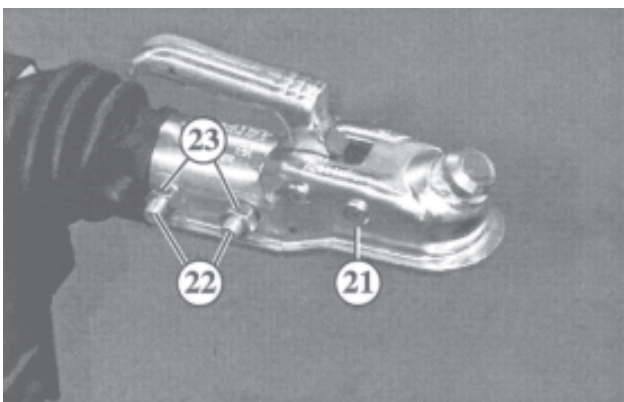
- Insert the upper overrun lever (15) into the housing (16)
- Insert the attachment screw (17)
- Fit new self-locking nuts and tighten



Do not re-use self-locking nuts.



- Fit the bellows (18) onto the bearing bush (19)
- Insert the spacer tube (20) into the drawbar in line with the front attachment screw



- Fit the coupling (21)
- Insert the attachment screws (22)
- Fit new self-locking nuts (23) and tighten to 86 Nm
- Check operation of the damper by moving the drawbar in and out



Always fit the horizontal screws through from the left side, viewed in the direction of travel.



Do not re-use self-locking nuts.

4.3.9 Removing the damper

This work is described in the section "Removing the drawbar bearings".

4.3.10 Installing the damper

This work is described in the section "Installing the drawbar bearings".

4.3.11 Removing the stop

This work is described in the section "Removing the drawbar bearings".

4.3.12 Installing the stop

This work is described in the section “Installing the drawbar bearings”.

4.3.13 Removing the damping rubber

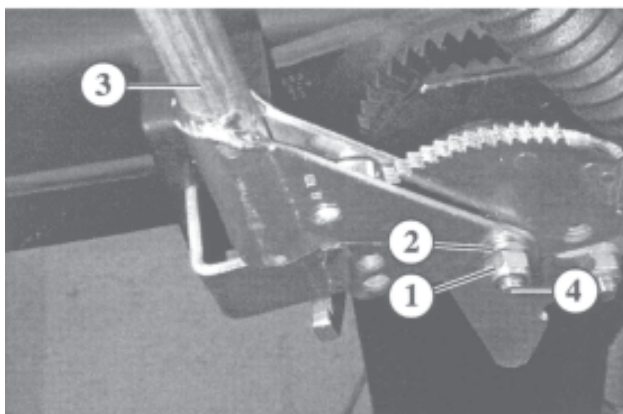
This work is described in the section “Removing the drawbar bearings”.

4.3.14 Installing the damping rubber

This work is described in the section “Installing the drawbar bearings”.

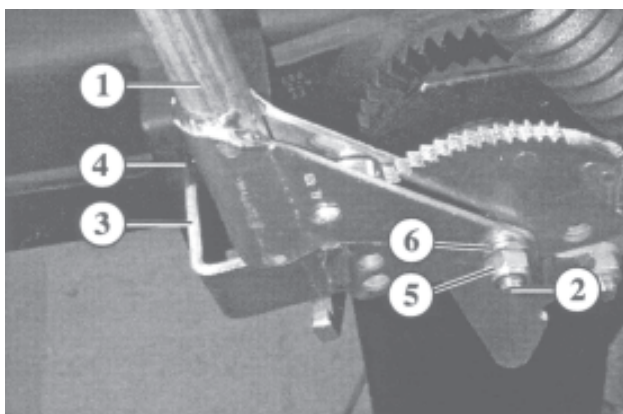
4.3.15 Removing the handbrake

- Unscrew the nut (1) of the attachment screw and remove together with the washer (2)
- Remove the handbrake lever (3) from the pivot bolt (4)



4.3.16 Installing the handbrake lever

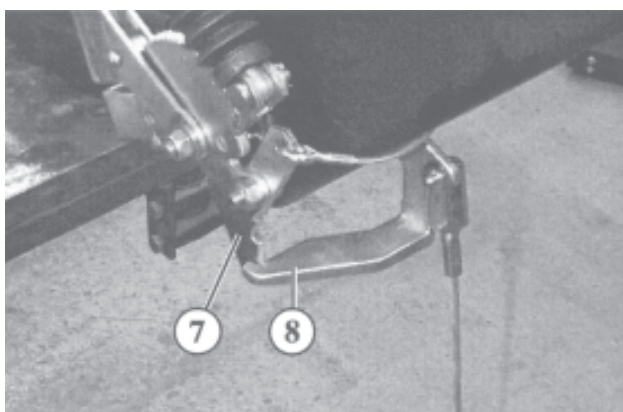
- Fit the handbrake lever (1) onto the pivot bolt (2)
- Insert the securing bracket (3) into the slot (4) on the housing
- Fit and tighten the self-locking nut (5) with washer (6)

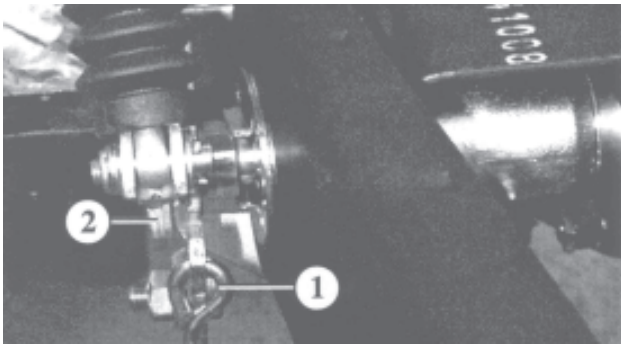


Do not re-use self-locking nuts.



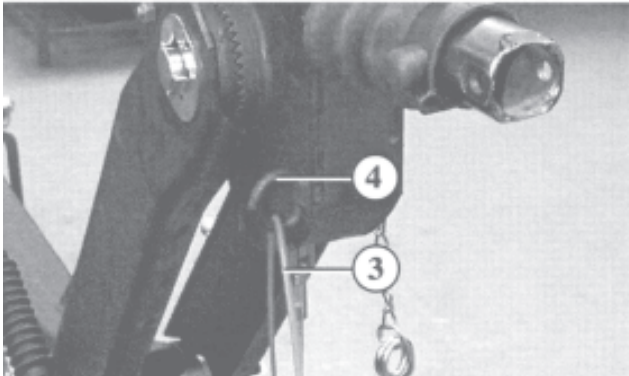
The handbrake lever (7) must be located behind the carrier (8) of the overrun lever.



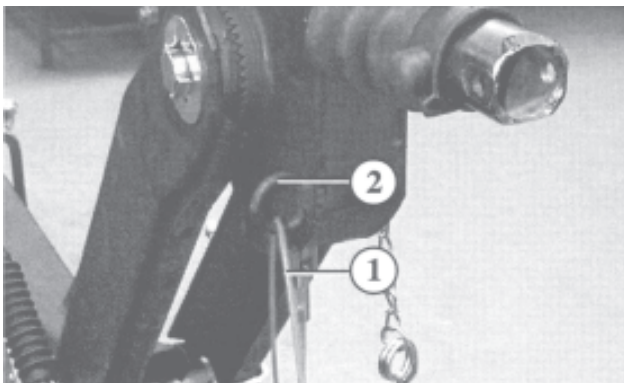


4.3.17 Removing the breakaway cable

- Open the breakaway eye (1) on the brake lever (2) with two pairs of pliers and unhook

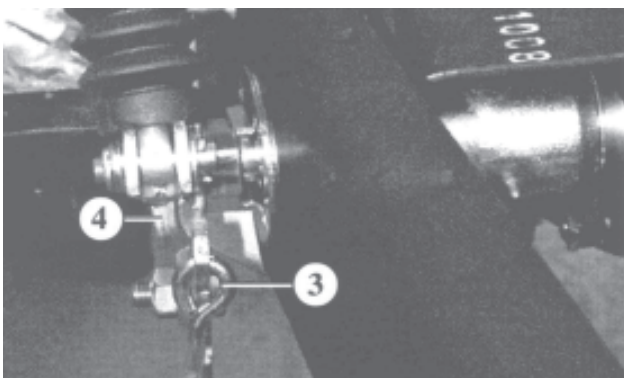


- Pull the breakaway cable (3) out through the guide eye (4)



4.3.18 Installing the breakaway cable

- Pull the breakaway cable (1) through the guide eye (2)



- Hook the breakaway ring (3) onto the brake lever (4) and press together with pliers



The breakaway eye (3) must be completely closed.



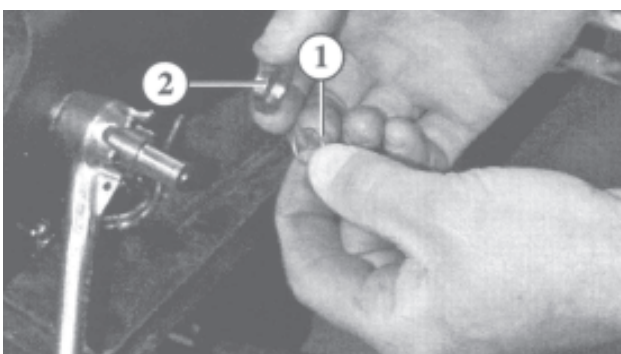
The breakaway ring used in older models can be replaced with the new breakaway eye.

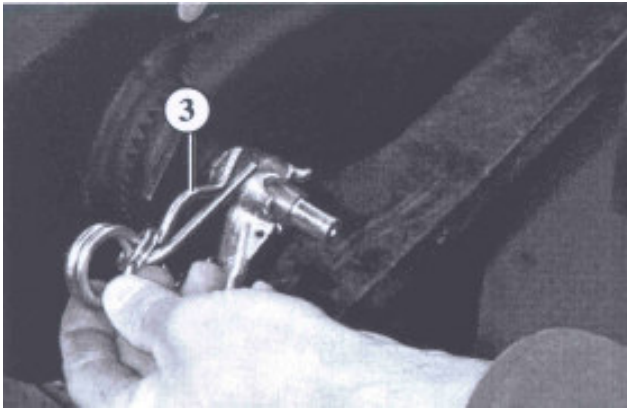
4.3.19 Removing the overrun lever, upper



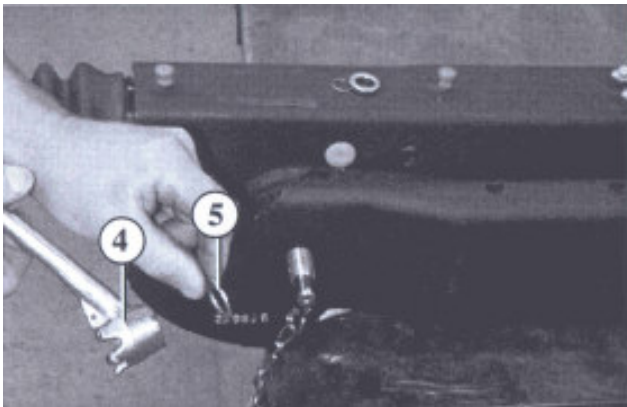
Before loosening the locking bar, the overrun device and height adjustment arms must be secured against falling.

- Remove the retaining ring (1) and shaped washer (2) of the locking bar

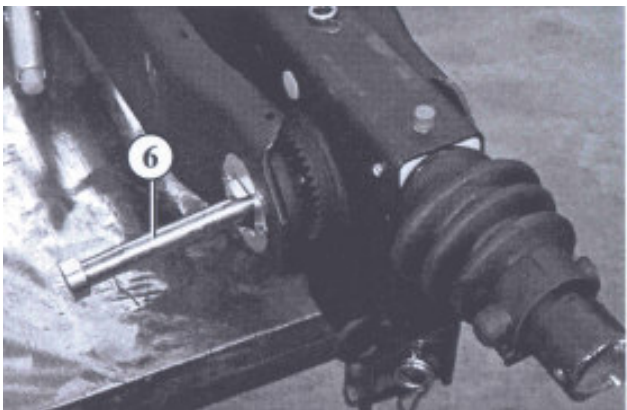




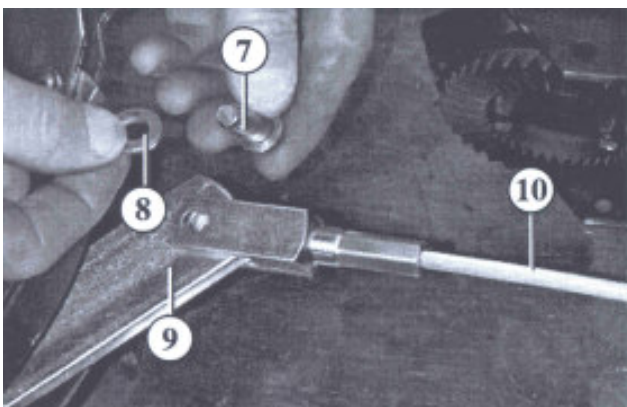
- Pull out the spring clip (3)



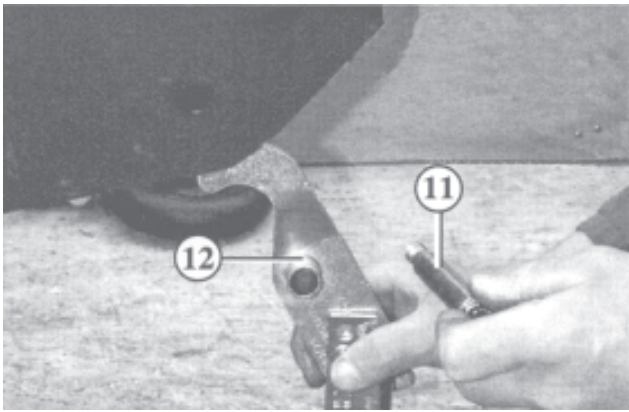
- Unscrew the locking bar (4) and washer (5)



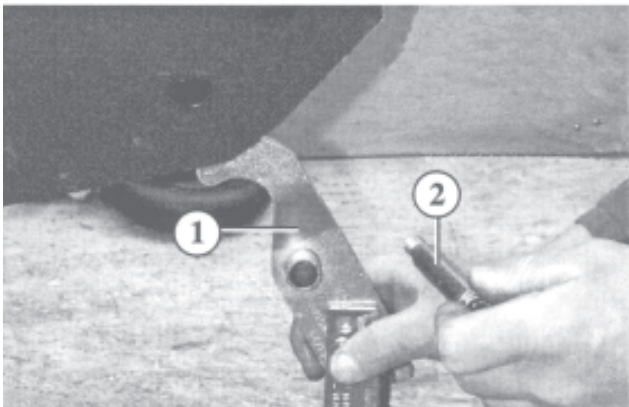
- Take out the pivot bolt (6)



- Remove the split pin retaining the pin (7)
- Remove the pin and washer (8)
- Separate the overrun lever (9) from the brake rod (10)

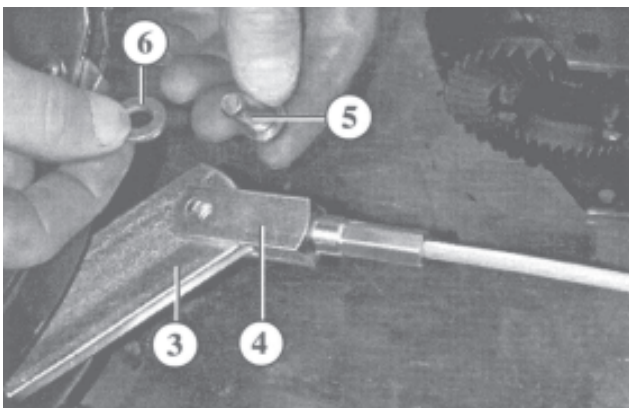


- Unscrew the rear attachment screw (11) and remove the nut
- Pull out the screw and the upper overrun lever (12)



4.3.20 Installing the overrun lever, upper

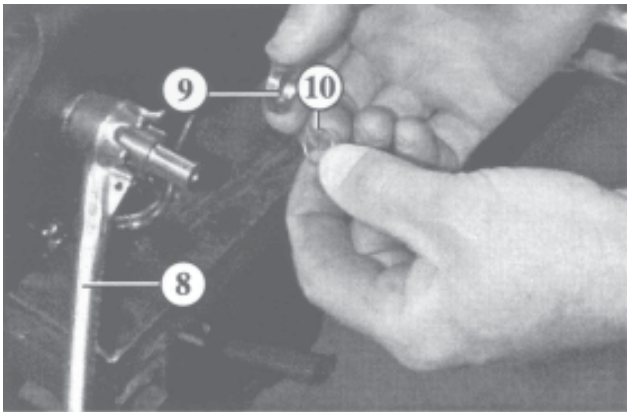
- Insert the upper overrun lever (1) into the housing
- Insert the rear attachment screw (2)
- Fit a new self-locking nut and tighten to 86 Nm



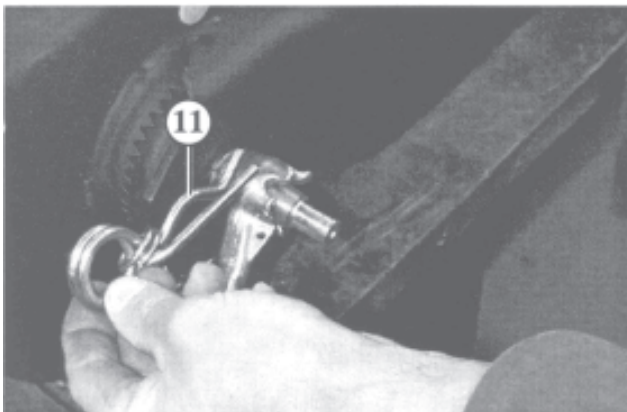
- Connect the overrun lever (3) and the brake rod (4) with a pin (5)
- Fit the washer (6) and secure the pin with a split pin



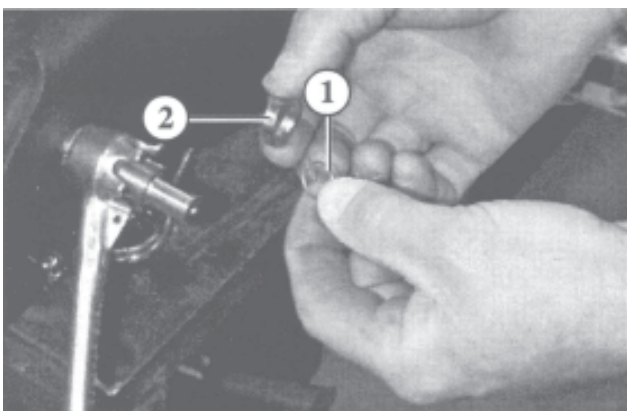
- Insert the overrun lever into the upper part and locate with the pivot bolt (7)



- Screw up the locking bar (8), fit the shaped washer (9) and secure with the retaining ring (10)



- Insert the spring clip (11)

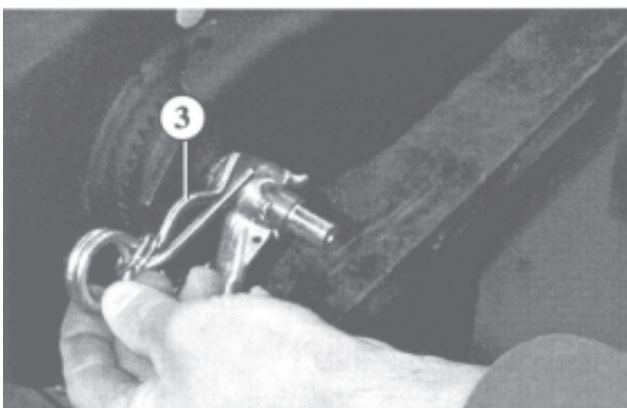


4.3.21 Removing the overrun lever, lower

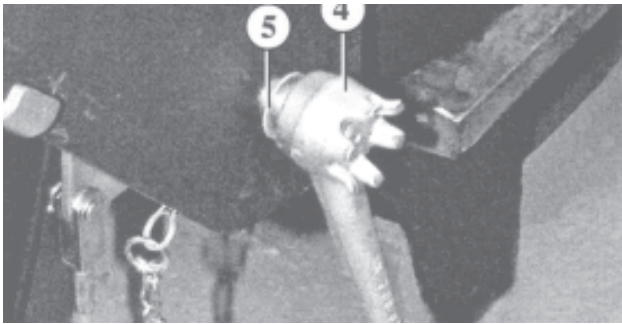


Before loosening the lower overrun lever, the overrun device and height adjustment arms must be secured against falling.

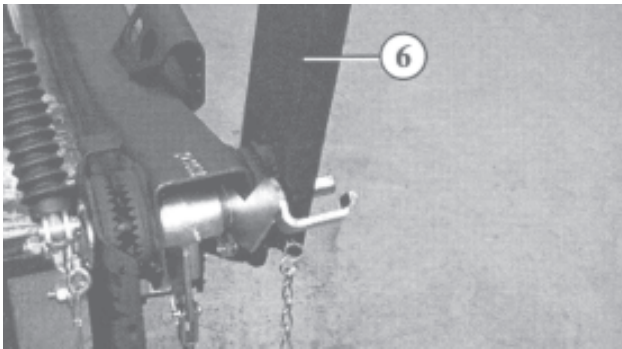
- Remove the retaining ring (1) and shaped washer (2) of the locking bar



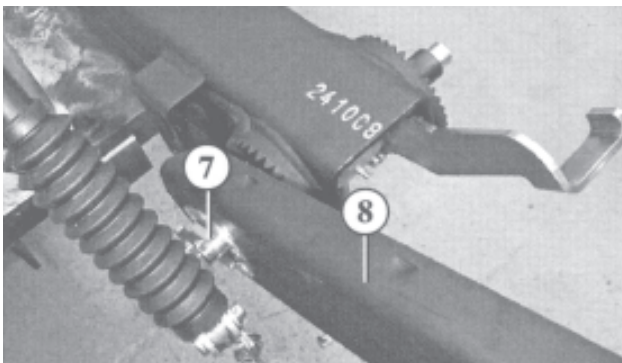
- Pull out the spring clip (3)



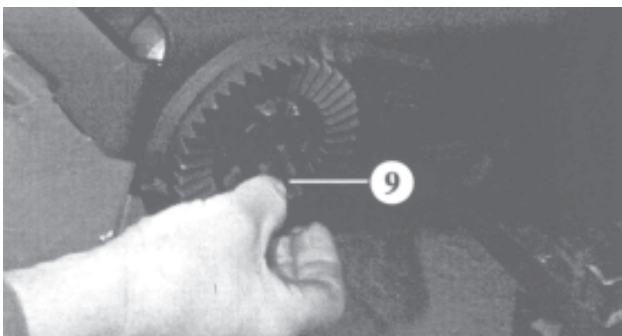
- Remove the locking bar (4) and washer (5)



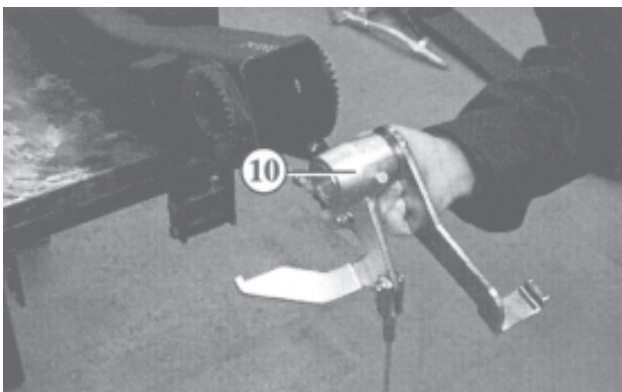
- Pull off the left-hand height adjustment arm (6)



- Pull out the pivot bolt (7) with the hand brake lever, not forgetting the right-hand height adjustment arm (8)



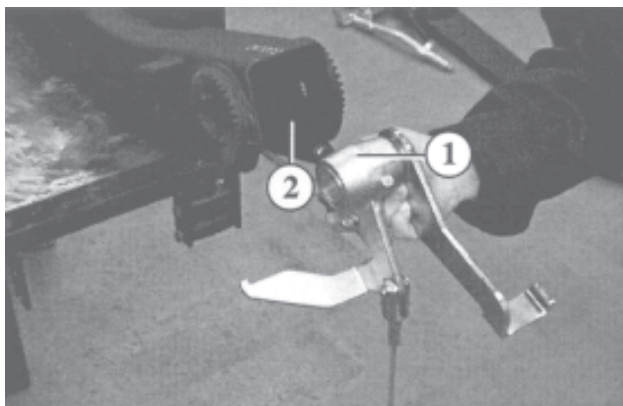
- Pull out the pivot bearing bush (9) of the lower overrun lever with adjustment aid



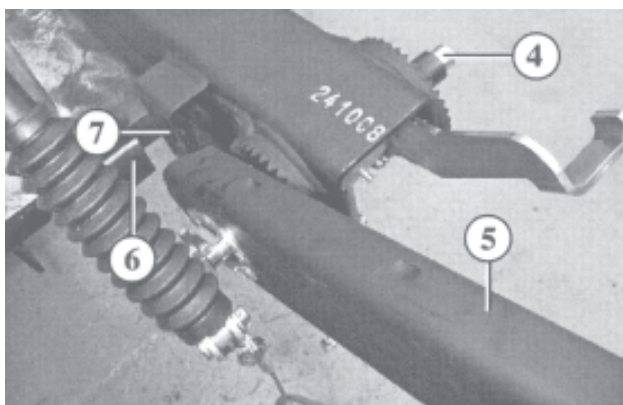
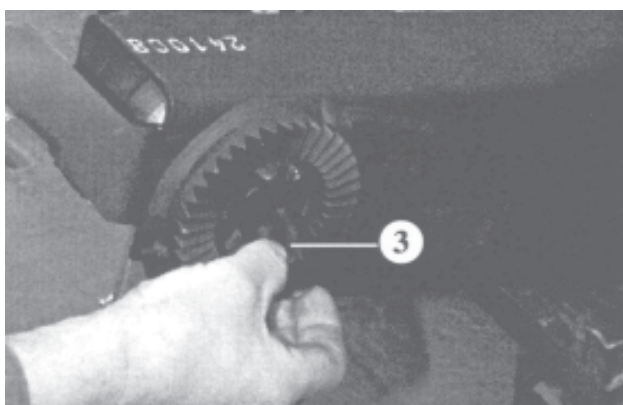
The lower overrun lever (10) with adjustment aid will fall out when the pivot bolt is removed.

4.3.22 Installing the overrun lever, lower

- Insert the overrun lever (1) with adjustment aid into the towbar (2) and locate with the pivot bolt (3)



The gas strut of the adjustment aid must be inserted into the opening (abutment) in the towbar.



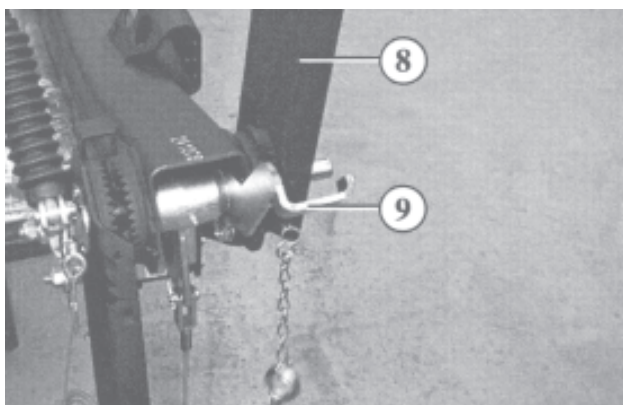
- Insert the pivot bolt (4) with handbrake lever, not forgetting the right hand height adjustment arm (5)



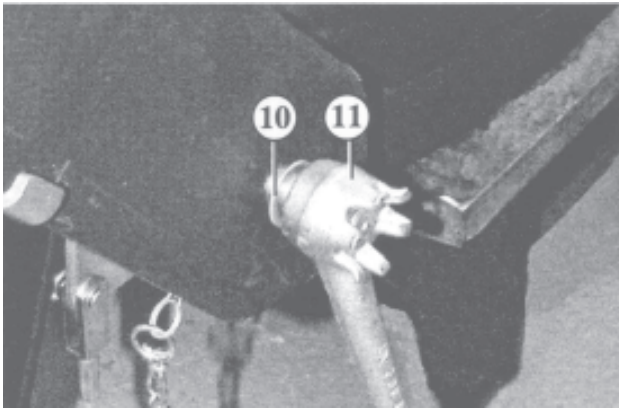
The handbrake lever securing bracket (6) must be inserted into the slot (7) in the towbar.



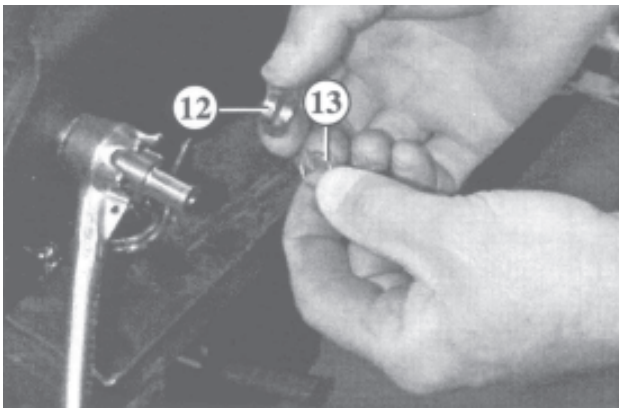
The height adjustment arm must be secured against dropping.



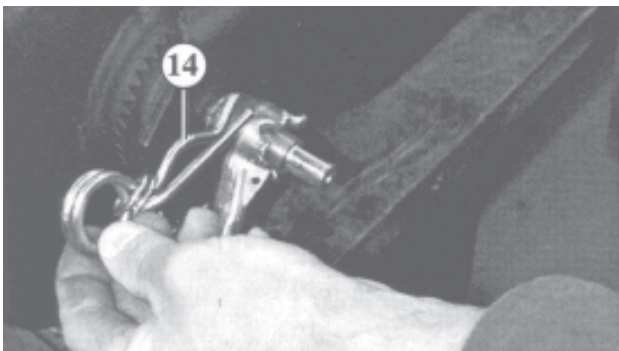
- Fit the left-hand height adjustment arm (8) so that it is in the support (9) of the adjustment aid



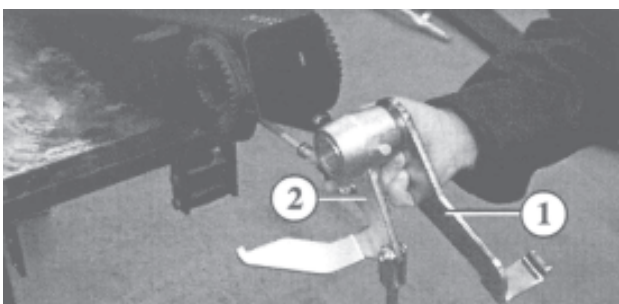
- Fit the washer (10) and tighten the locking bar (11)



- Fit the shaped washer (12) and retaining ring (13)



- Insert the spring clip (14)



4.3.23 Removing the adjustment aid

This work is described in the section "Removing the overrun lever, lower".

- The adjustment aid (1) with gas strut is taken off the bush of the overrun lever (2)



4.3.24 Installing the adjustment aid

- The adjustment aid (1) with gas strut is fitted onto the bush of the overrun lever (2)

The remaining work is described in the section "Installing the overrun lever, lower".

5 Safety winches

5.1 Function and Construction of Winches

5.1.1 Function

The winch is used for lifting and hauling loads.

To avoid uncontrolled lowering of the load, all winches have an automatic load-pressure brake.



If less than the minimum weight is lifted, uncontrolled lowering of the load may occur.

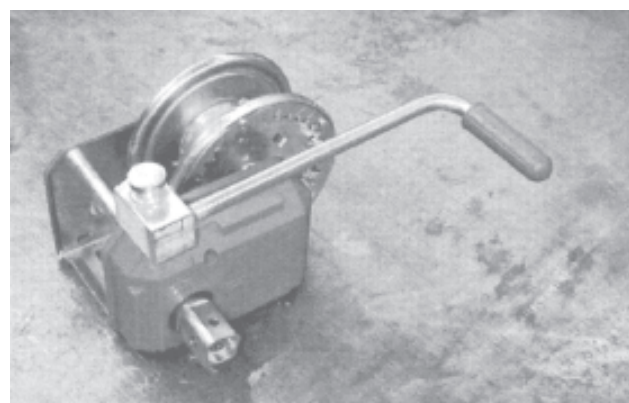


The load-pressure brake only becomes effective after correct pre-tensioning by turning the crank several times.



Under load, at least two turns of cable (turns of strap) must be left on the drum.

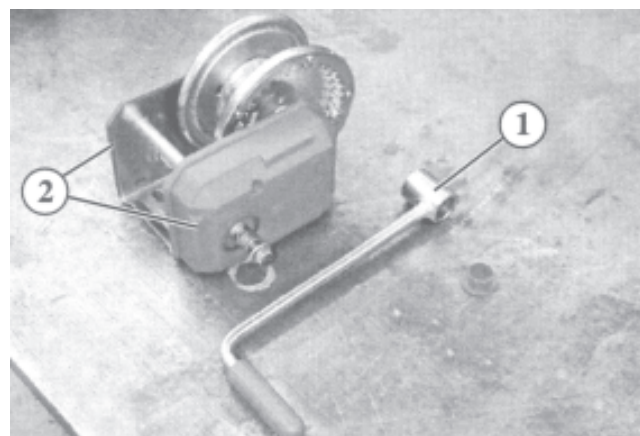
Types 901 A and 1201 A have an auto-unwind device. The cable or strap can be speedily unwound when the crank is removed.



Caution. Wire cables can cause injury. Always wear gloves.



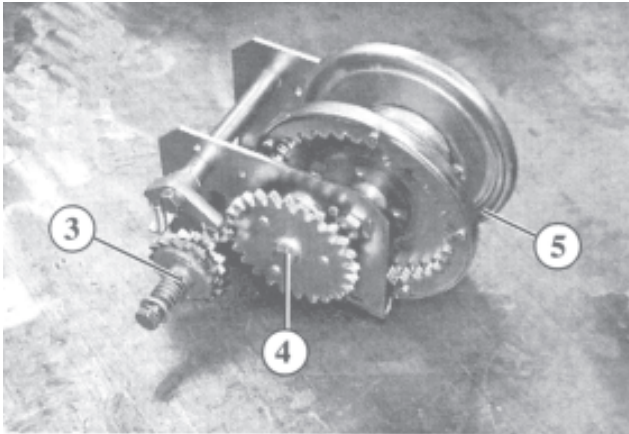
To prevent release of the load-pressure brake, the crank must be left on the drive shaft when the winch is used with a suspended load.



5.1.2 Construction

The winch consists of the following assemblies:

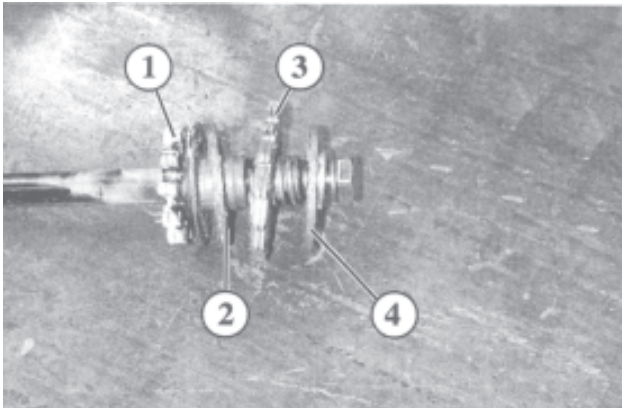
- Crank handle (1)
- Cover (2) to protect the gearing and brake mechanism



- Drive shaft (3)
- Intermediate shaft (4)
- Drum (5) to take up the cable or straps

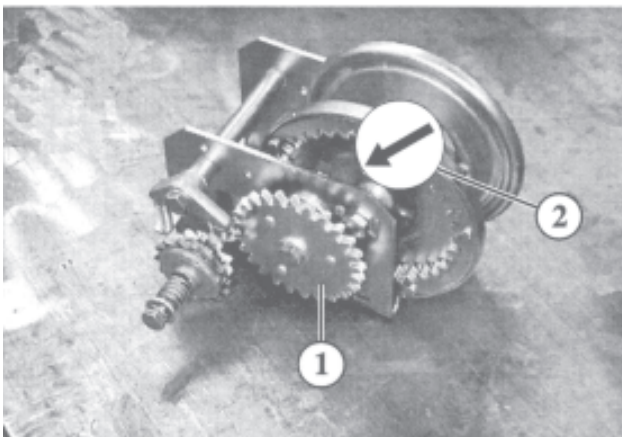


The intermediate shaft (4) is omitted on types 351 and 501. In those cases, the teeth on the drum (5) face outwards instead of inwards.



The drive shaft comprises the following assemblies:

- Transmission pinion (1)
- Inner brake disc (2)
- Ratchet wheel (3) to engage the pawl
- Outer brake disc



The intermediate shaft comprises the following assemblies:

- Gear wheel (1)
- Intermediate pinion (2)

5.2 Maintenance

5.2.1 Checking the cables and straps



Cables and straps must be checked regularly for wear or damage and if necessary replaced immediately.

Checking criteria for cables

- Examine for
 - Crushed areas
 - Breakage of individual wires

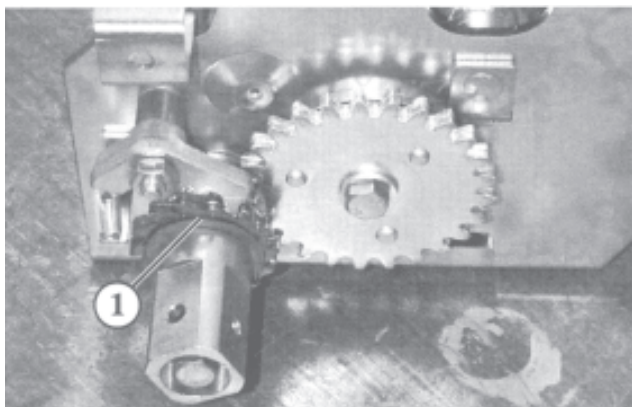
Checking criteria for straps

- Examine for
 - Abrasion
 - Cracks
 - Breakage of fibres

5.2.2 Compulsory specialist check (at least once a year)



In accordance with the UVV "Winches, lifting and hauling gear" (VGB 8 §23), the winch must be checked at least once a year by a specialist. Depending on the conditions of use (frequency of use) and operating conditions, more frequent testing may be required.



5.2.3 Maintenance work



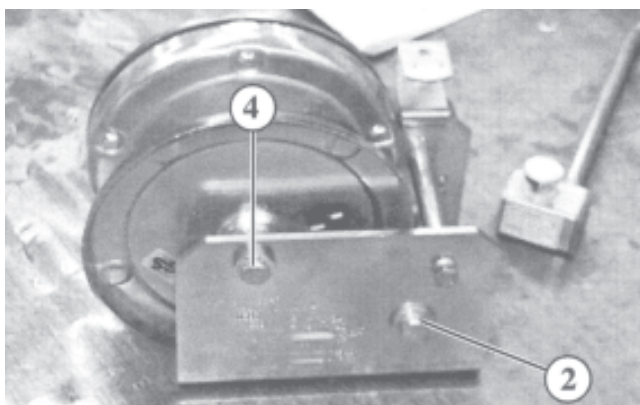
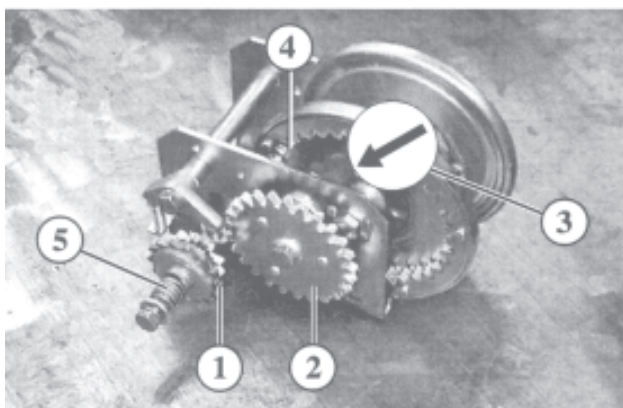
On all models, make sure that the brake discs (1) do not come into contact with oil or grease.



Models with loose brake discs are assembled as standard with graphite paste (Klüber company, Wolfracoate 99113)

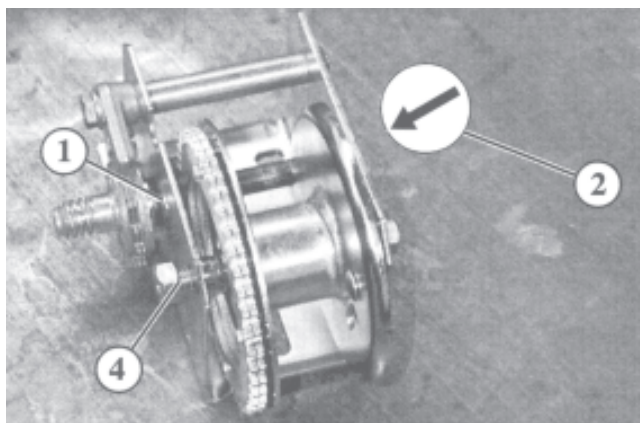


No other lubricants are permitted.



Lubrication with oil

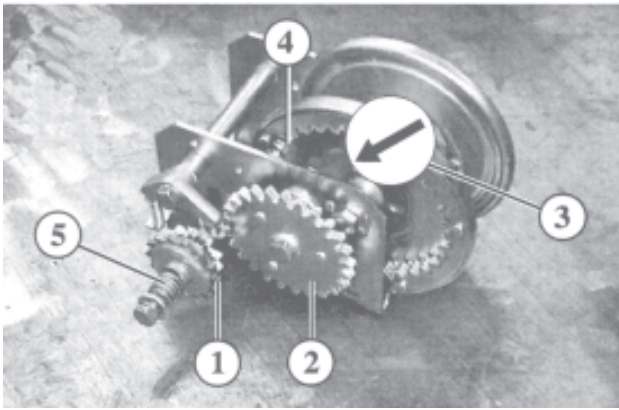
- Regularly oil the bearing bushes (1,2) of the drive shaft
- Regularly oil the bearing bushes-needle bearings of the intermediate pinion (3)
- Regularly oil the bearing (4) of the drum hub



- On the back, also oil the bearing bushes of the drive shaft (2) and the outer surfaces of the shaft (4)



On type 501, the intermediate stage is omitted.

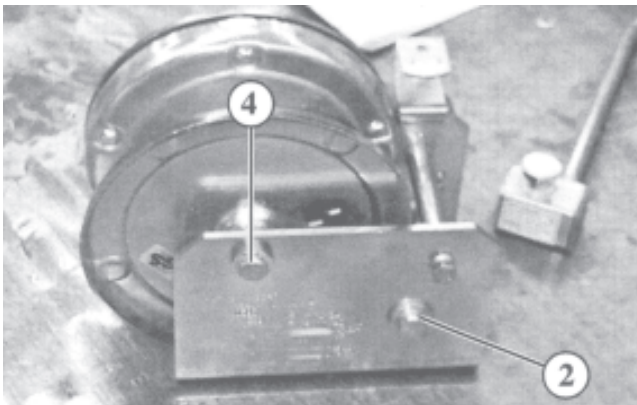


Lubrication with grease

- Regularly grease the tooth flanks of the gear wheels (1-4)
- Grease the acme thread of the crank mounting (5) regularly and adequately

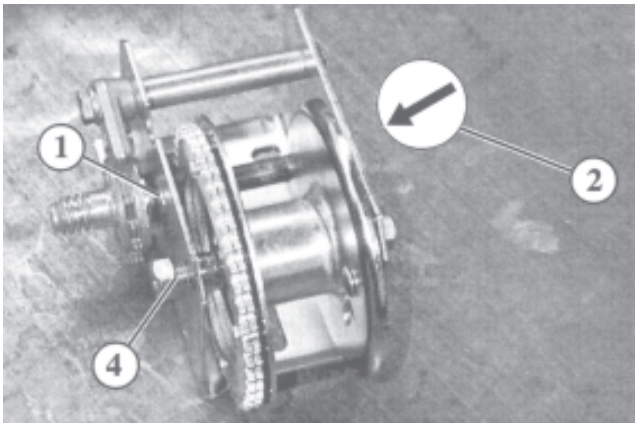


On all models, make sure that the brake discs (1) do not come into contact with oil or grease.



Cleaning dirty screw threads

- Regularly clean the acme thread on the crank mounting

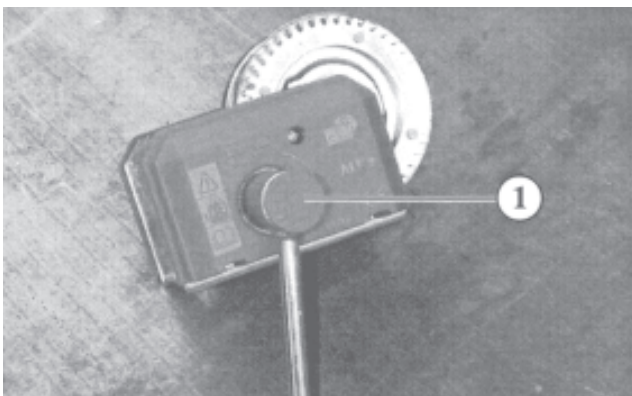


On models 901A and 1201A

- Grease the acme thread (1) of the crank mounting (crank nut) regularly and adequately, removing the crank and unscrewing the crank nut for this purpose.



On all models, make sure that the brake discs (1) do not come into contact with oil or grease.

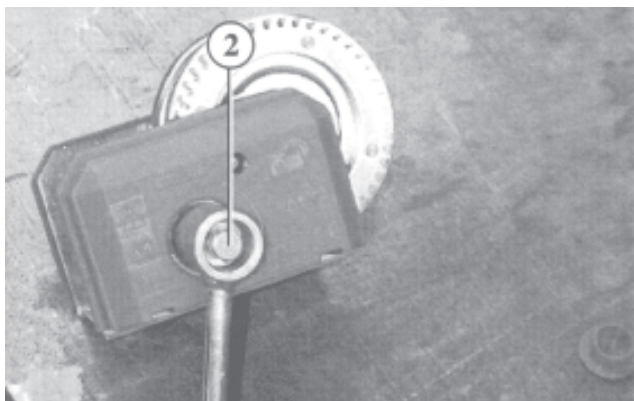


5.3 Repair

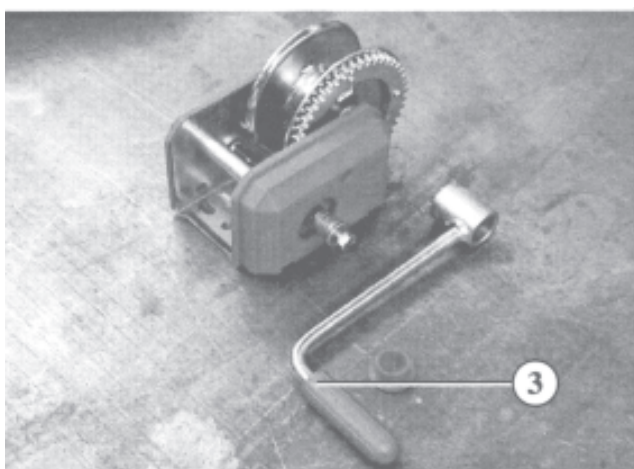
5.3.1 Removing the crank

Types 501 to 901

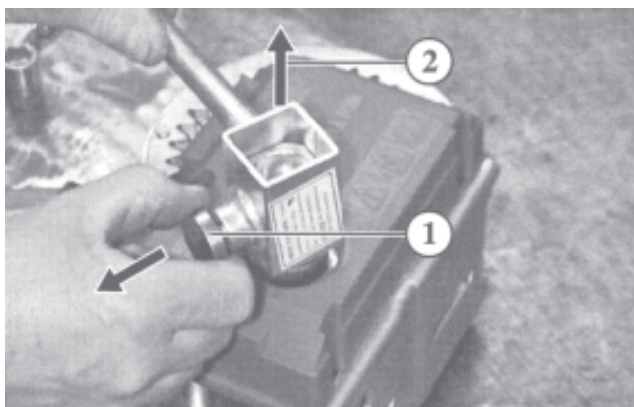
- Remove the cover cap (1)



- Lock the cable drum
- Unscrew the attachment screw (2)
- Remove the retaining ring and washer



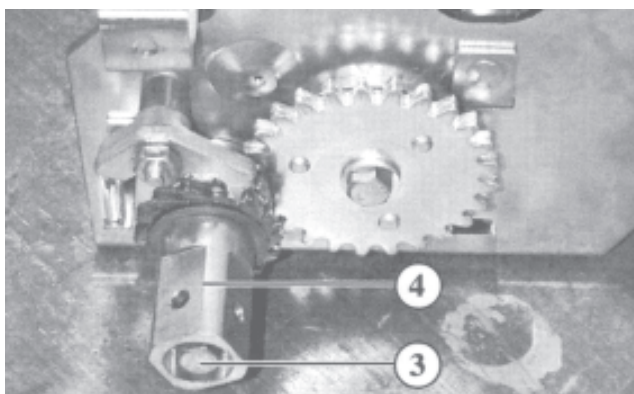
- Loosen and take off the crank handle (3) by turning to the left several times



Types 901 A and 1201 A

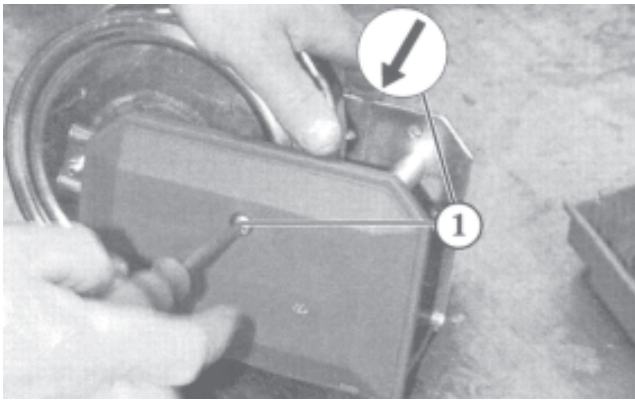
Removing the crank handle

- Pull out the locking button (1)
- Pull the crank handle off the crank nut (2)



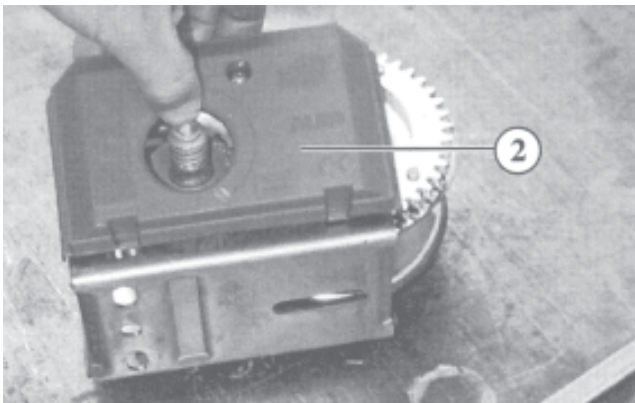
Removing the crank mounting

- Lock the cable drum
- Unscrew the attachment screw (3)
- Remove the retaining ring and washer
- Loosen and take off the crank nut (3) by turning to the left several times



5.3.2 Removing the covers

- Remove the crank handle
- Unscrew the screws (1)
- Fold the covers (2) on the top outwards and remove



5.3.3 Removing the brake discs and ratchet wheel

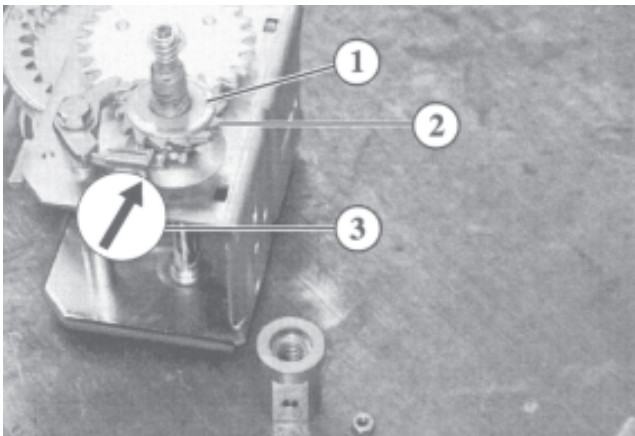
- Remove the crank handle
- Remove the covers



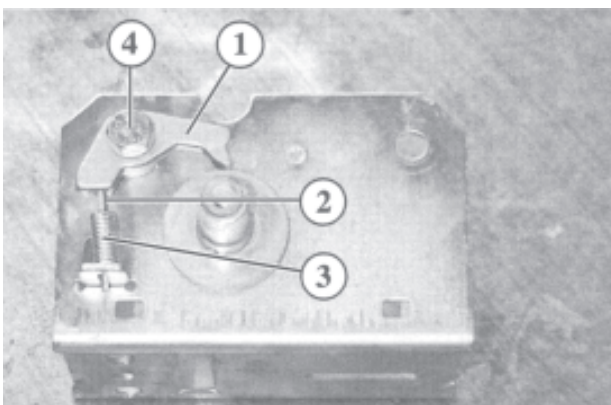
Until the pressure spring and the spring retaining plate on the pawl have been unhooked, beware of trapped fingers when removing.



Both brake discs and the ratchet wheel are free to move axially on the drive shaft. They can be removed without tools.



- Remove the outer brake disc (1)
- Remove the ratchet wheel (2)
- Remove the inner brake disc (3)



5.3.4 Removing the pawl

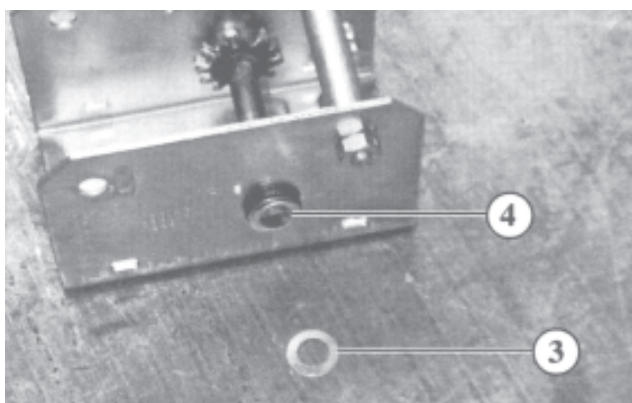
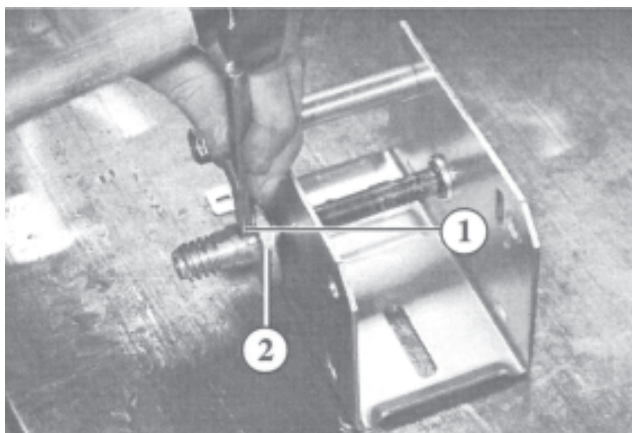
- Remove the brake discs and ratchet wheel
- Turn the pawl (1) to the right
- Press the spring retaining plate (2) downwards
- Unhook the spring retaining plate with spring (3)
- Unscrew the hexagon screw (4)
- Remove the pawl

5.3.5 Removing the drive shaft

On type 351, the drive shaft cannot be removed. Accordingly, removal is described for type 501 only.

Type 501

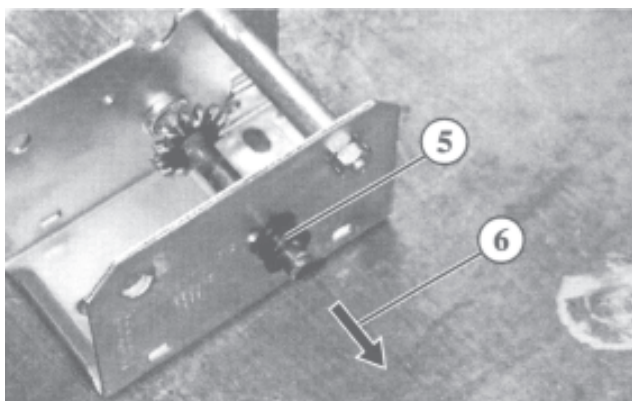
- Remove the brake discs and ratchet wheel
- Remove the pawl
- Drive the pin (1) out of the drive shaft
- Remove the crank mounting (2) from the drive shaft.



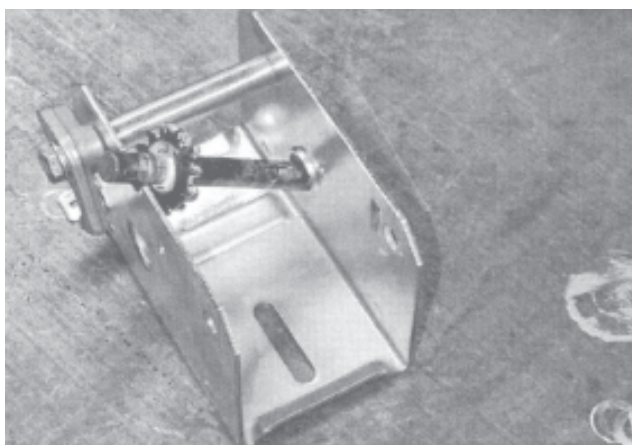
- Remove the retaining ring (3) from the drive shaft
- Remove the washers (4) from the drive shaft



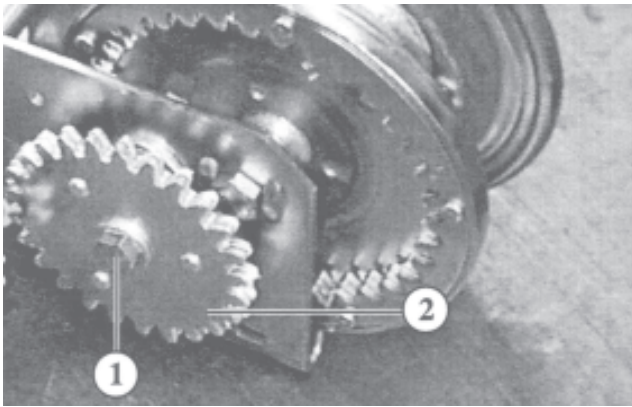
The washers are used for lengthwise adjustment and the same number must therefore be refitted.



- Press the bearing bush (5) outwards and remove
- Push the drive shaft inwards (6) out of the bearing on the drive side

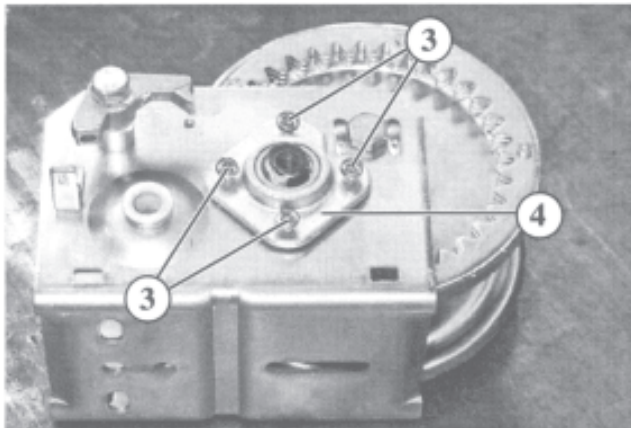


- Take out the drive shaft

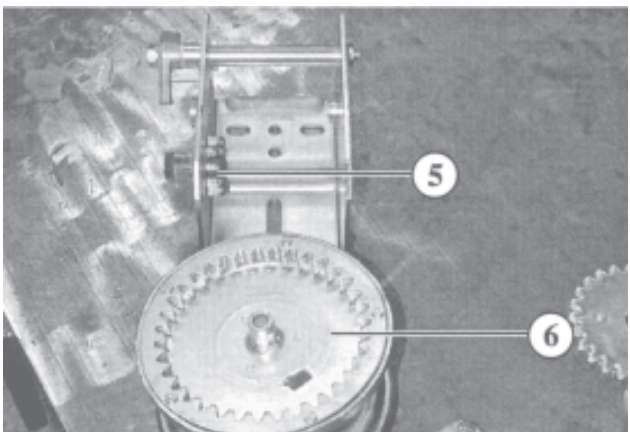


5.3.6 Removing the gear wheel and bearing

- Remove the drive shaft
- Unscrew the hexagon screw (1)
- Take off the gear wheel (2)



- Unscrew the screws (3)
- Take off the bearing housing (4)



- To remove the intermediate pinion (5), remove the drum (6)

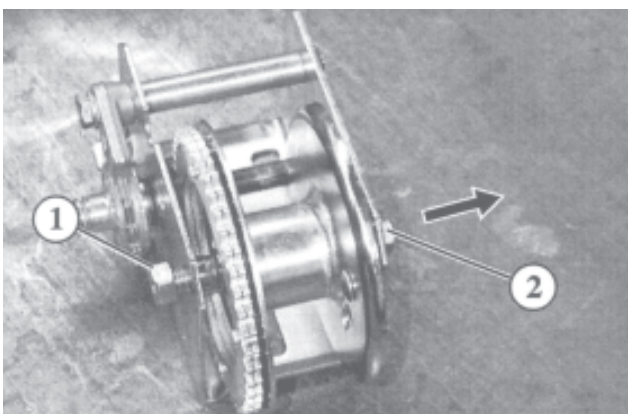
Type 651 to type 901

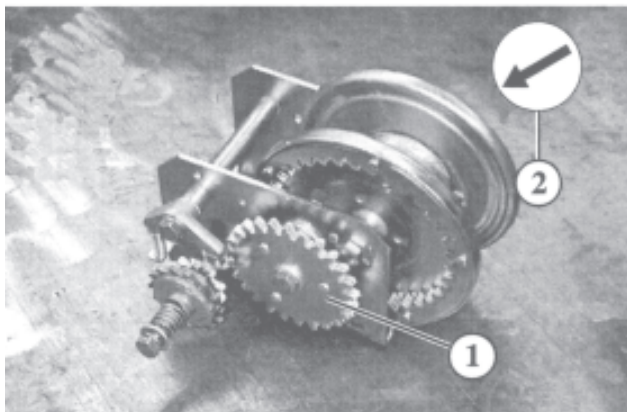
- Remove the gear wheel (1)
- Unscrew the nut (2) on the back of the housing frame

5.3.7 Removing the drum

Type 501

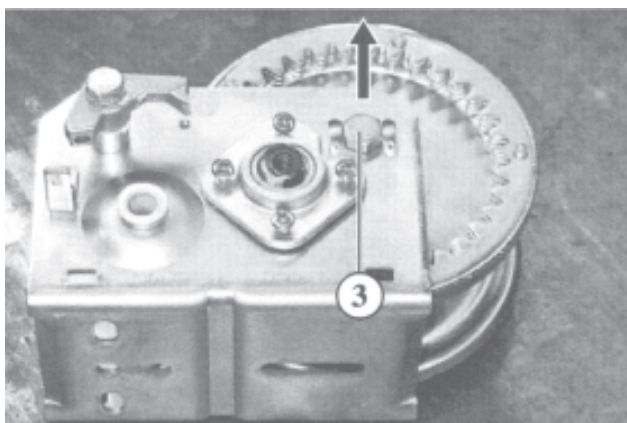
- Unscrew the nut (1)
- Take out the screw (2)
- Take out the drum





Type 651 to type 901

- Remove the gear wheel (1)
- Unscrew the nut (2) on the back of the housing frame

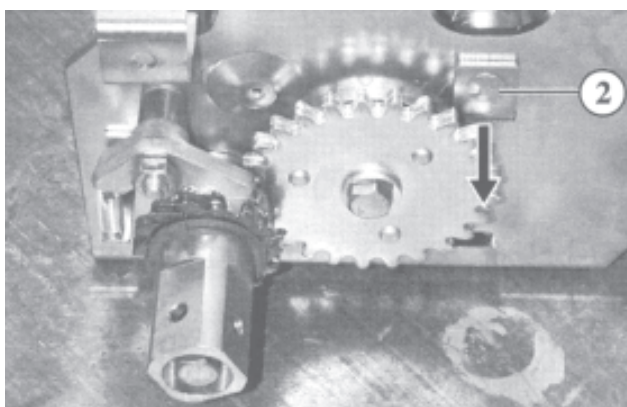


- Pull out the screw (3)
- Take out the drum



Type 1201

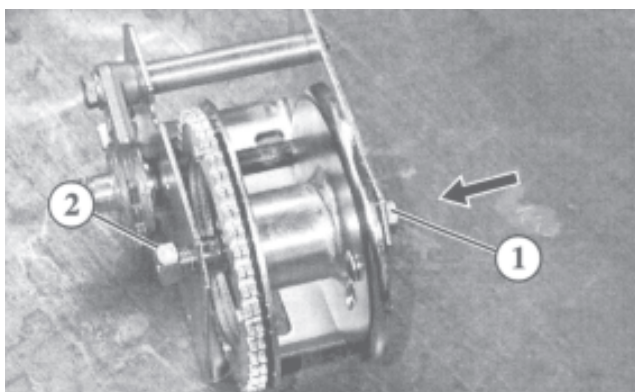
- Remove the gear wheel
- Remove the retaining ring (1) from the drum shaft



- Pull out the axle (2)
- Take out the drum



Contrary to the illustration, the axle can only be taken out with the gear wheel removed.



5.3.8 Installing the drum

Type 501

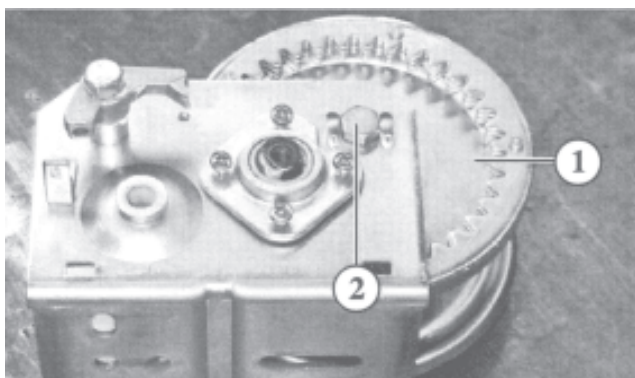
- Insert the screw (1) in the direction of the arrow into the drum and housing
- Tighten the nut (2)



The drum must rotate freely.

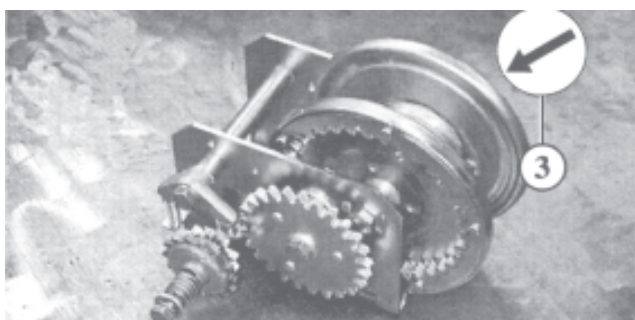


Do not re-use self-locking nuts.



Type 651 to type 901

- Insert the drum (1), ensuring that it meshes with the inner intermediate pinion
- Insert the screw (2) into the drum and the frame of the unit



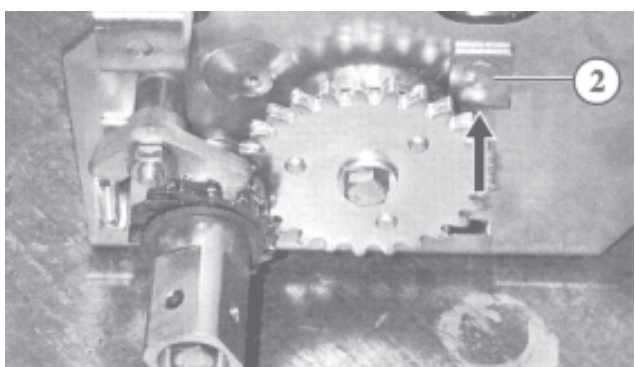
- Tighten the nut (3) on the back of the housing frame



The drum must rotate freely.



Do not re-use self-locking nuts.



Type 1201

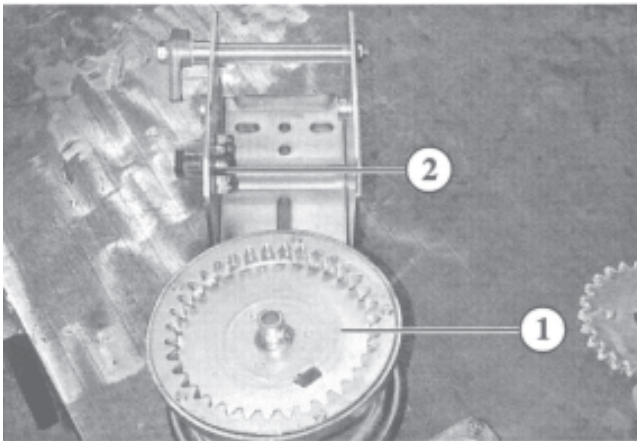
- Insert the drum (1), ensuring that it meshes with the inner intermediate pinion
- Insert the axle (2) into the drum and the housing



Contrary to the illustration, the axle can only be fitted with the gear wheel removed.

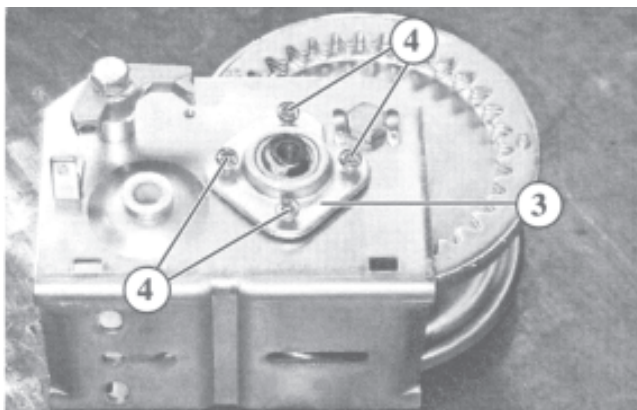


- Fit the retaining ring (3) onto the drum axle

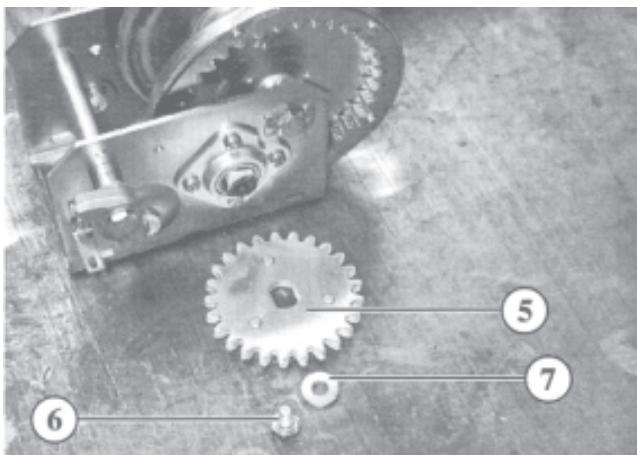


5.3.9 Installing the intermediate pinion and bearing

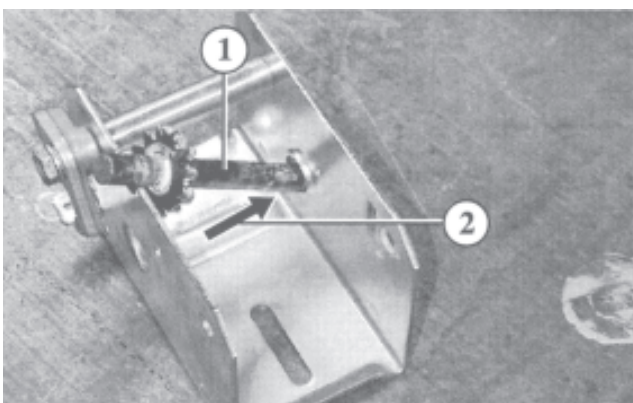
- Install the drum (1)
- Insert the intermediate pinion (2)



- Position the bearing housing (3)
- Tighten the screws (4)



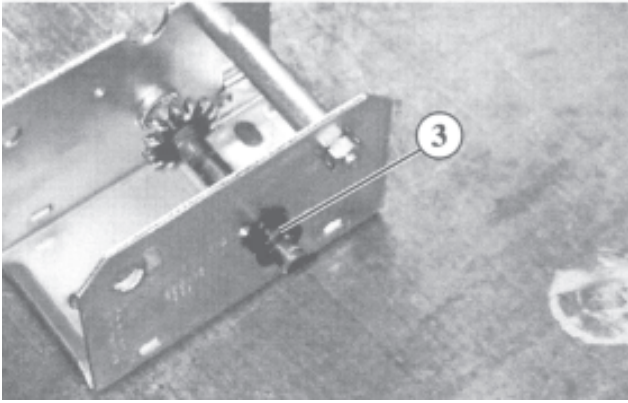
- Fit the gear wheel (5)
- Tighten the screw (6) and washer (7)



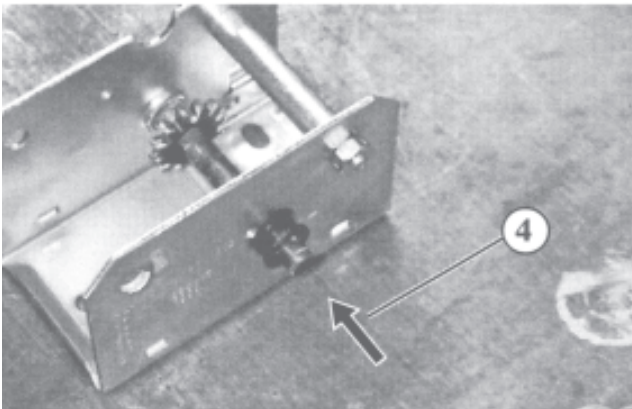
5.3.10 Installing the drive shaft

Type 501

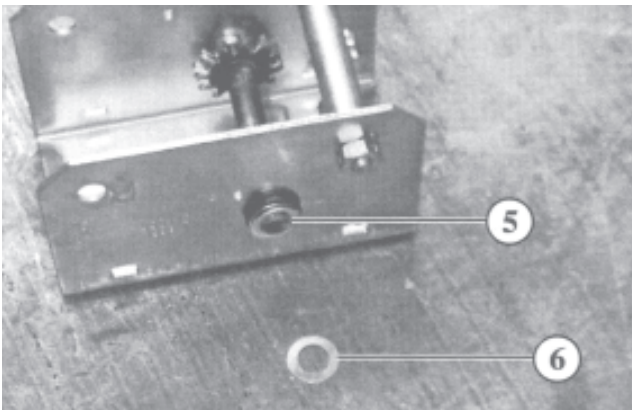
- Position the drive shaft (1) at an angle
- Insert the free end into the bearing opening as shown (2)



- Fit the bush (3) onto the drive shaft and press into the housing

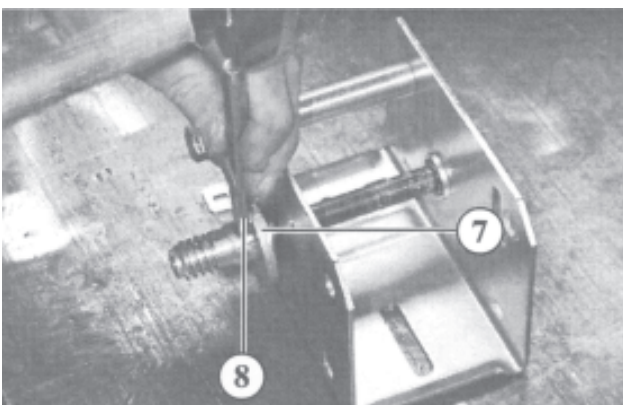


- Push the drive shaft and bush into the bearing on the drive side (4)

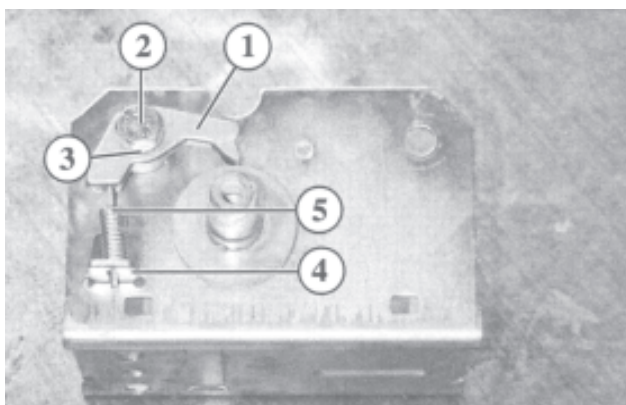


The washers are used for lengthwise adjustment and the same number must therefore be refitted.

- Fit the washers onto the drive shaft
- Fit the retaining ring (6) to the drive shaft



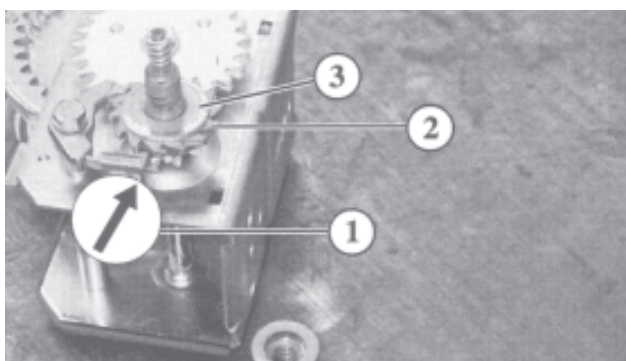
- Fit the crank mounting (7) onto the drive shaft
- Drive a new pin (8) into the drive shaft



5.3.11 Installing the pawl

- Place the pawl (1) onto the spacer tube
- Screw on the hexagon screw (2) and washer (3)
- Turn the pawl to the right
- Insert the spring retaining plate (4) and spring (5) into the retainer on the housing
- Hook the spring retaining plate and pressure spring into the pawl

5.3.12 Installing the brake discs and ratchet wheel



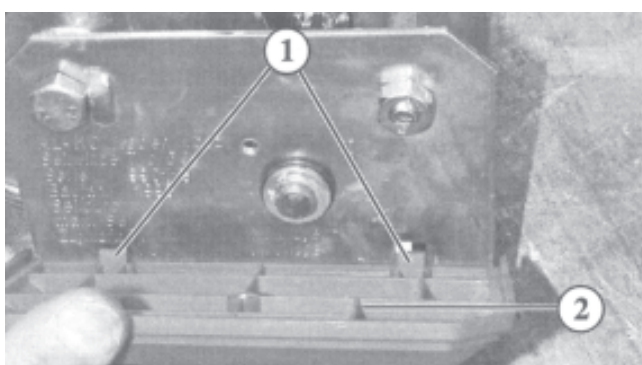
If the pressure spring on the pawl is not unhooked, beware of trapped fingers when installing.



On types 351 to 901, the brake disks should be lubricated with graphite paste (Wolfracoate 99113). On type 1201, they are not metal and must therefore not come into contact with oil or grease.



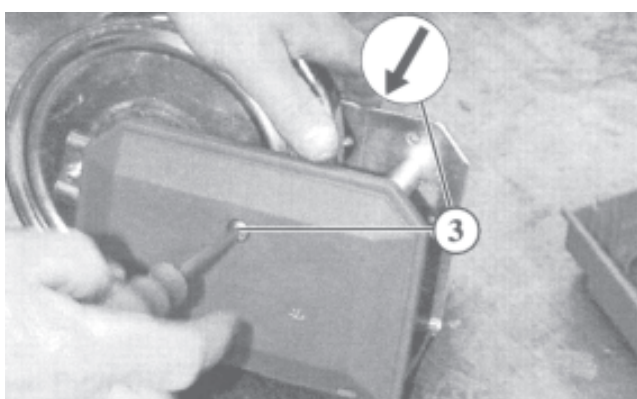
Both brake discs and the ratchet wheel are free to move axially on the drive shaft. They can be fitted without tools.



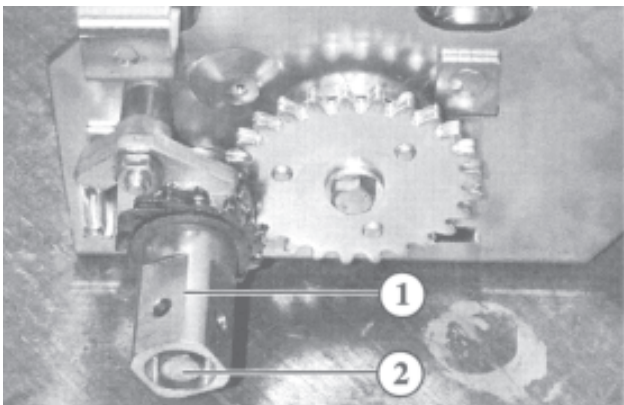
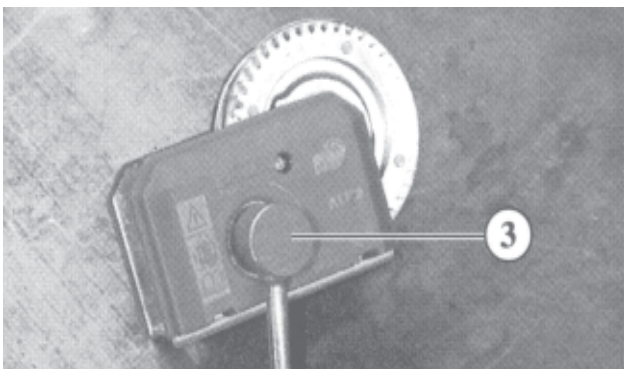
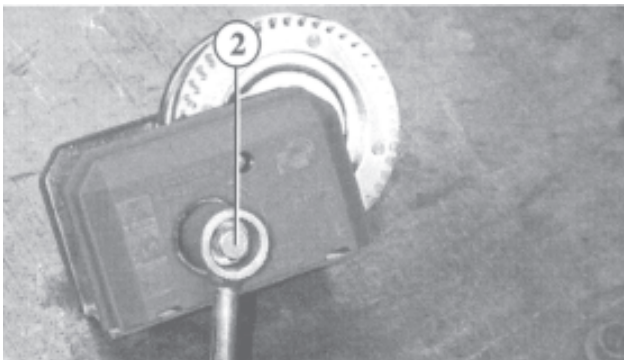
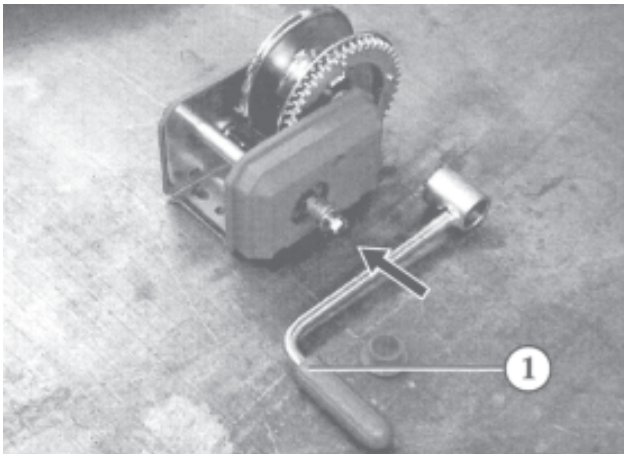
- Fit the inner brake disc (1)
- Fit the ratchet wheel (2)
- Fit the outer brake disc (3)

5.3.13 Fitting the covers

- Insert plastic lugs (1) on the covers (2) into the winch housing
- Fit the covers



- Tighten the screws (3)



5.3.14 Installing the crank handle

Type 501 to type 901

- Fit the crank handle (1) onto the drive shaft, having previously removed the screw, washer and retaining ring
- Screw the crank handle onto the drive shaft, until the crank nut bears against the brake disc

- Lock the cable drum
- Fit the washer
- Fit the retaining ring
- Tighten the attachment screw (2)

Note maximum torque values:

- type 351: 10 Nm
- types 501 - 901: 20 Nm
- type 901 A: 10 Nm
- type 1201 A: 20 Nm

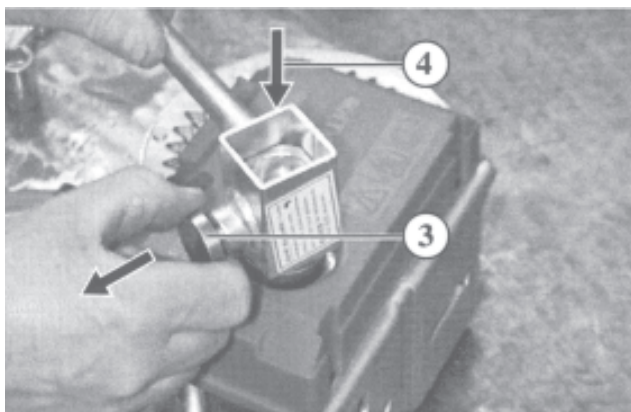
The crank must turn at least a quarter of a turn to the left without the drive shaft or cable drum moving or turning with it.

- Press on the cover cap (3)

Types 901 A and 1201 A

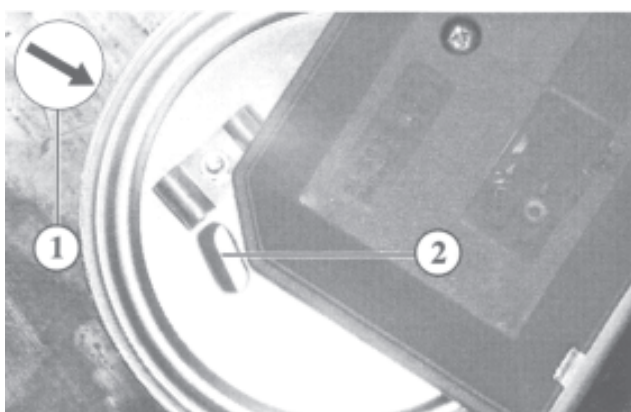
Fitting the crank nut

- Place the pressure spring in the crank nut
- Screw the crank nut onto the drive shaft until the crank nut bears against the brake disc
- Lock the cable drum
- On type 1201 A, insert the attachment screw (2) and tighten
- On type 901 A, fit a new self-locking hexagon nut onto the threaded section of the drive shaft



Fitting the crank handle

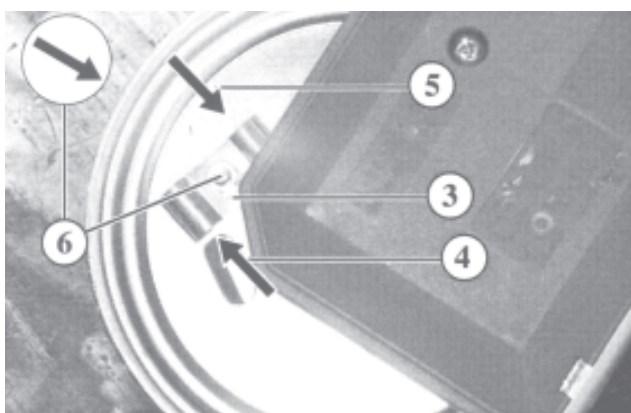
- Pull out the locking button (3)
- Fit the crank handle onto the crank nut (4)
- Engage the locking button



5.3.15 Replacing cables and straps

Installing the cable on types 501 to 901

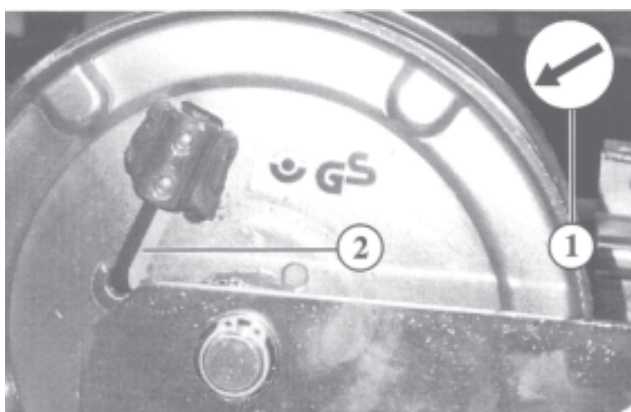
- Thread the cable end from the inside (1) of the drum outwards through the opening (2)



- Pass (4) the cable end out of the opening and under the retaining plate (3)
- Bring the cable end back to the other side of the retaining plate (5) so that a semi-circular loop is formed
- Tighten the screw (6)

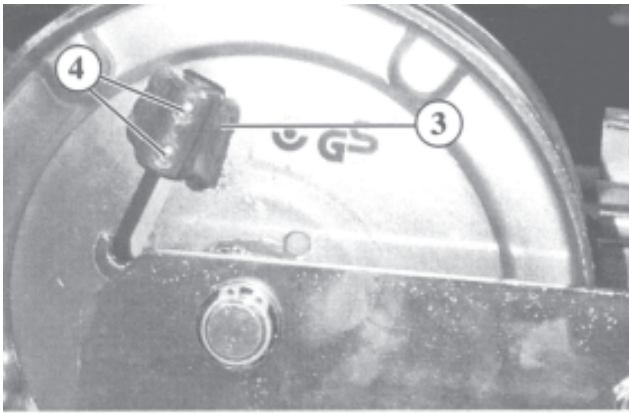


Note: maximum torque 10 Nm.



Installing the cable on type 1201

- Thread the cable end from the inside (1) of the drum outwards through the opening (2)



- Pass the cable end out of the opening and through the sleeve (3)
- Tighten the screws (4) on the outside of the sleeve

Installing the strap on types 501 to 901

The anchor bar (1) includes a washer (2) and screw (3).

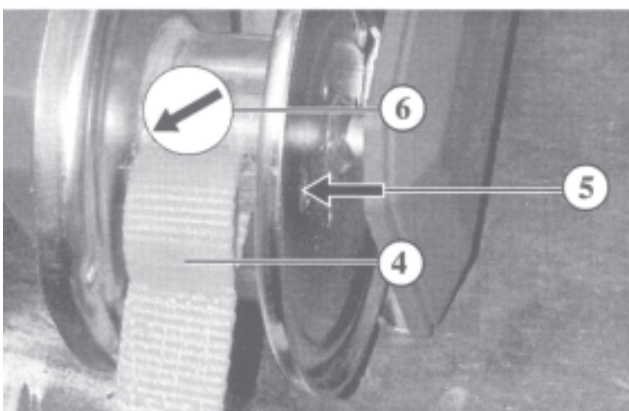


The various small and medium size models each require different anchor bars and strap sizes.

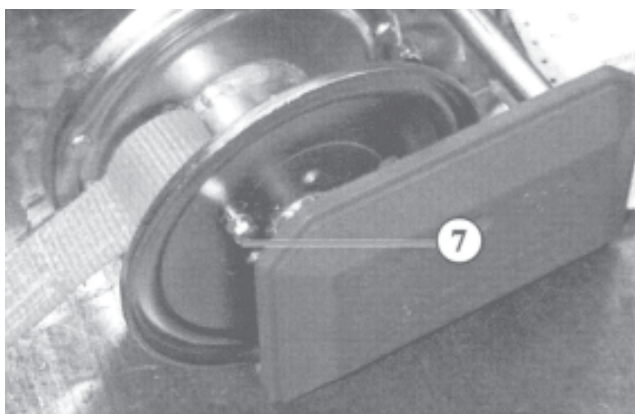


The breaking strain of the strap must be at least seven times the specified hauling load in the lowermost layer of cable.

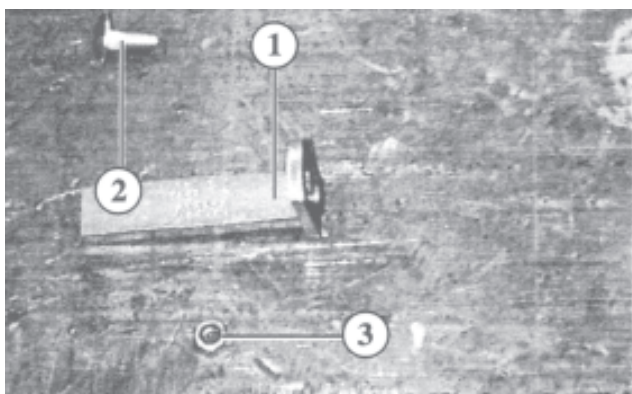
Type	Anchor bar	Strap	Minimum breaking strain
351	352.516	245.355	2450 kg
501	352.514	245.356	3500 kg
651	352.515	245.357	4550 kg
901	352.516	245.358	6300 kg
1201	352.657	245.115	8750 kg



- Pass (5) the anchor bar from the outside of the drum through the strap loop (4)
- Engage the anchor bar on the opposite side (6)



- Insert and tighten the screw complete with washer (7) through the outside of the drum into the threaded hole in the anchor bar



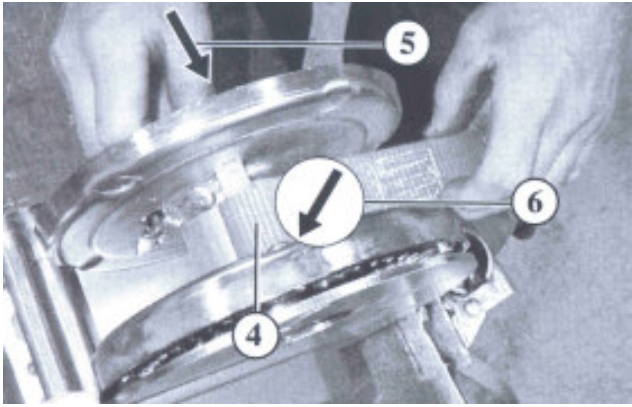
Installing the strap on type 1201

- The anchor bar (1) includes the carriage bolt (2) and self-locking nut (3)

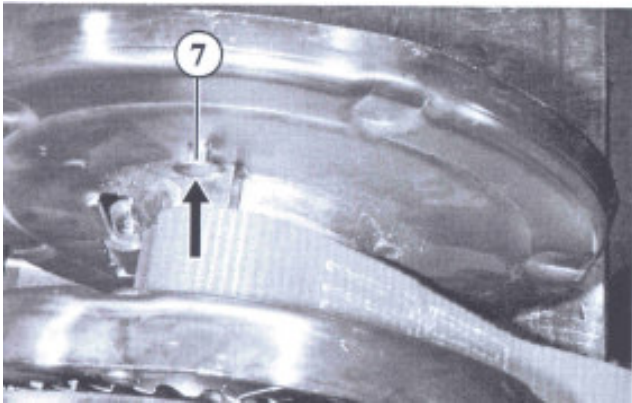


The breaking strain of the strap must be at least seven times the specified hauling load in the lowermost layer of cable.

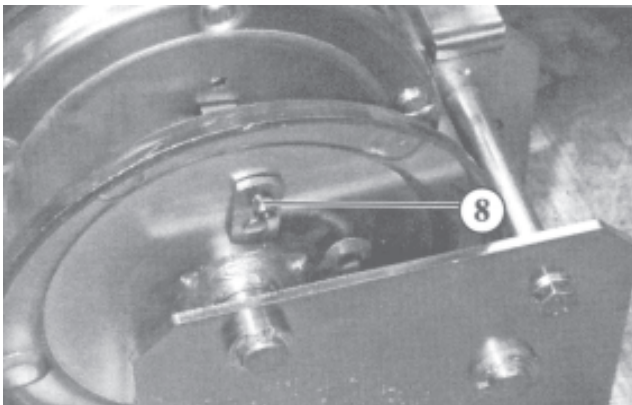
Type	Anchor bar	Strap	Minimum breaking strain
351	352.516	245.355	2450 kg
501	352.514	245.356	3500 kg
651	352.515	245.357	4550 kg
901	352.516	245.358	6300 kg
1201	352.657	245.115	8750 kg



- Pass (5) the anchor bar from the outside of the drum through the strap loop (4)
- Engage the anchor bar on the opposite side (6)



- From the inside of the drum, insert the carriage bolt (7) into the square opening in the anchor bar



- Tighten the self-locking nut (8) on the outside of the drum

6 Accessories

6.1 Dampers

6.1.1 Overview of range

The weight range for which the usual axle dampers available on the market are designed has too wide a spread (1).

The consequence: optimum damping is only achieved at average trailer weights (2). Lighter trailers bounce and bump because the damping is excessive, and with heavier trailers the usual additional dampers have scarcely any effect, as the damping is insufficient.

AL-KO build dampers with different settings for four different weight ranges:

- Green for axle weights up to 900 kg (3)
- Blue for axle weights up to 1300 kg (4)
- Red for axle weights up to 1800 kg (5)
- Black for axle weights over 1800 kg (6).

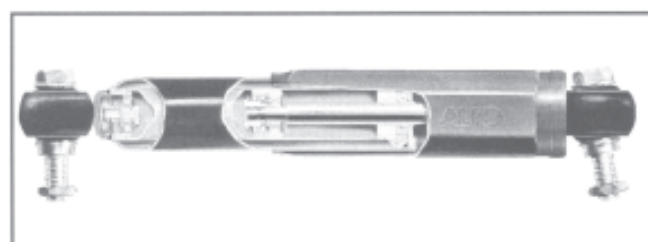
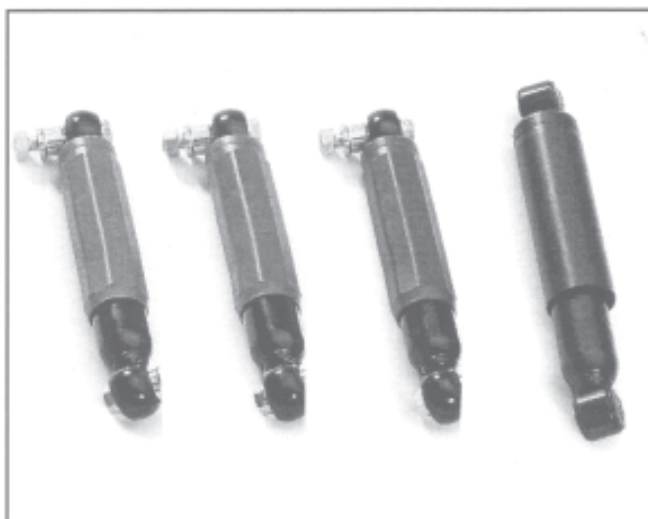
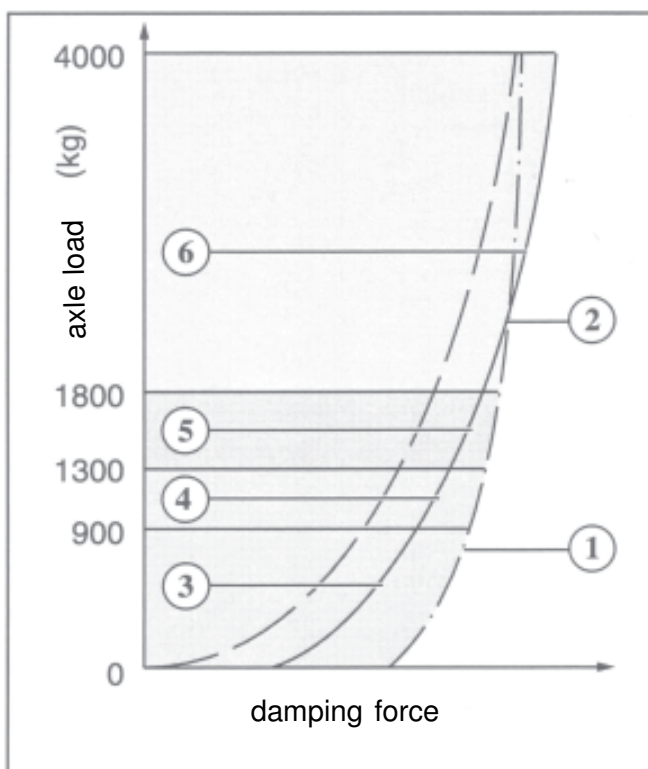
Optimum damping action is thus achieved for most types of trailers.

This means:

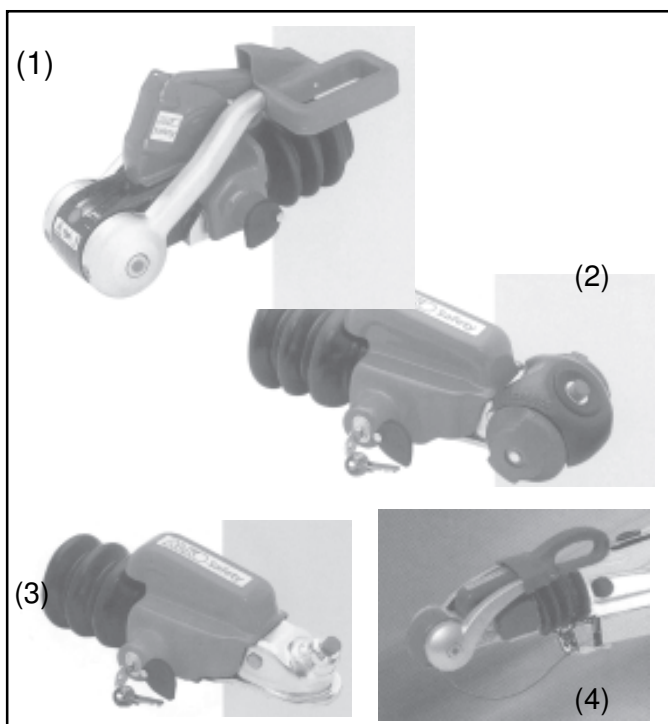
- Better driving stability
- Better braking stability
- Optimum road contact.

Features of AL-KO Octagon dampers

- The installation position ensures low wear and strain-free mounting with up to 5° tilt permitted by the attachment eyes with bushed rubber mountings
- The integral bolts and nuts fitted to the damper eyes are provided as standard
- Overload protection prevents overstressing of the materials
- Only best quality seals used
- Valves of chromium plated silver metal
- Piston rod surface finish 0.1 Ra
- Dust protection between outer and inner tubes
- Only special fluid used.



Installation dimensions, technical data and order numbers can be found in section 3.4.10 "Installing dampers".

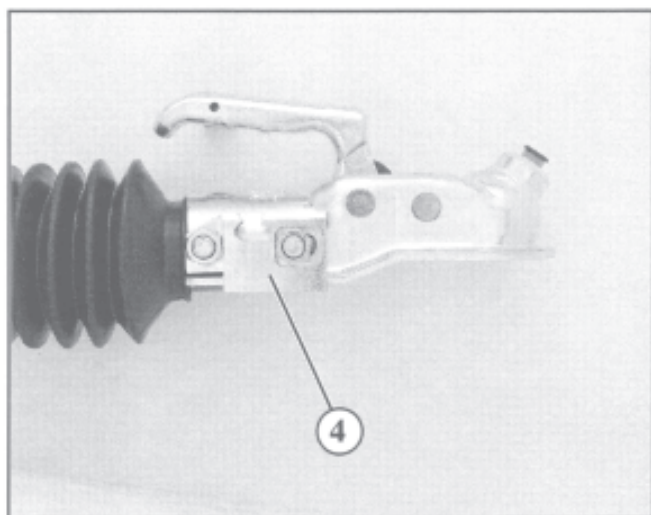


6.2 AL-KO Safety security devices

6.2.1 Overview of range

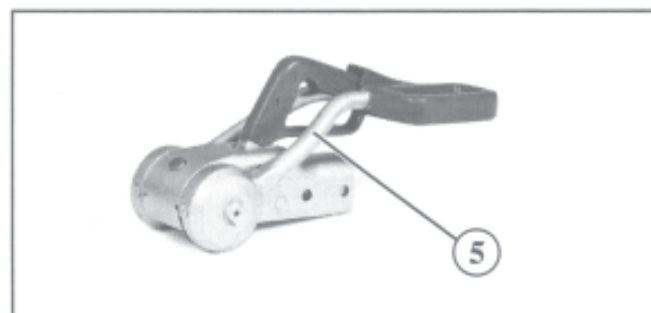
AL-KO Safety anti-theft devices are produced in four different models:

- for AKS 2000/2500/2700 (1)
- for AKS 1300 (2)
- for AK 300 and 160 (3)
- for AK 160 with 35 mm shaft diameter
- for AKS 2004 (4)



Features of the AL-KO Safety anti-theft devices:

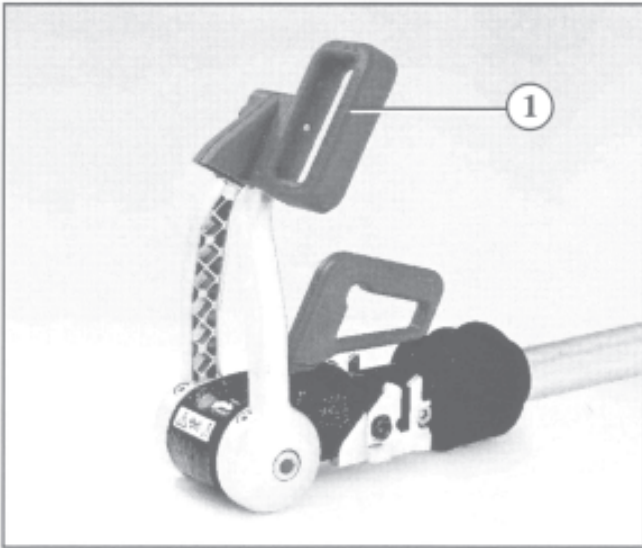
- Protection against unauthorised coupling and uncoupling
- Protection against theft of the ball coupling
- Barrel lock with anti-drilling protection
- Fitted by locking plates (4) on right and left sides (integral part of casting on on AKS 2004)
- Can remain fitted for driving
- Have Sold Secure & TUV Approvals.



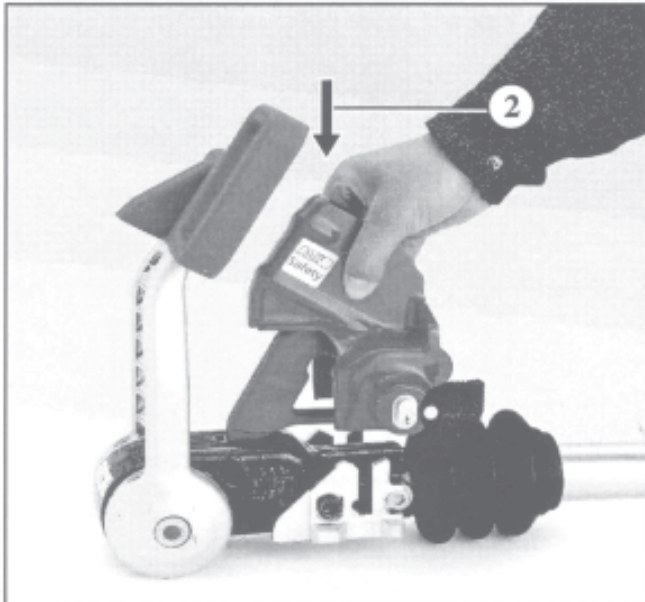
On the AKS 2000 with round side arms ([5], units built up to 1992), the AL-KO Safety cannot remain fitted for driving, as the stabilising handle cannot be operated fully ie the handle cannot be pushed fully down due to interference with the safety device..

6.2.2 Fitting the device (illustrations show the AKS 2700)

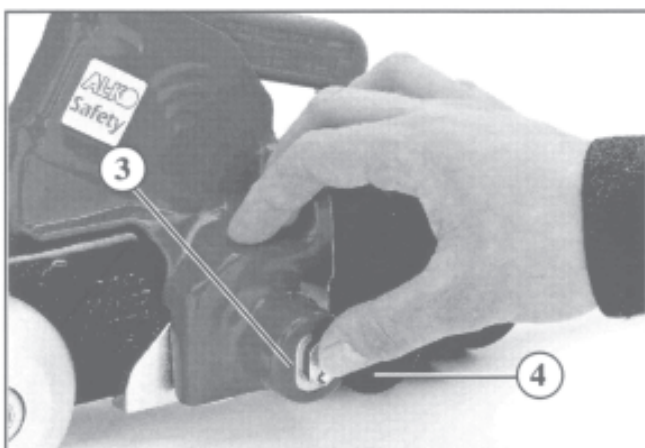
- Open the stabilising lever (1) on the AKS



- Place the AL-KO Safety on the AKS (2)



- Press in the lock barrel (3) until it engages
- Dust is excluded by the cover (4) which swivels over the lock barrel.
- Close the stabilising lever



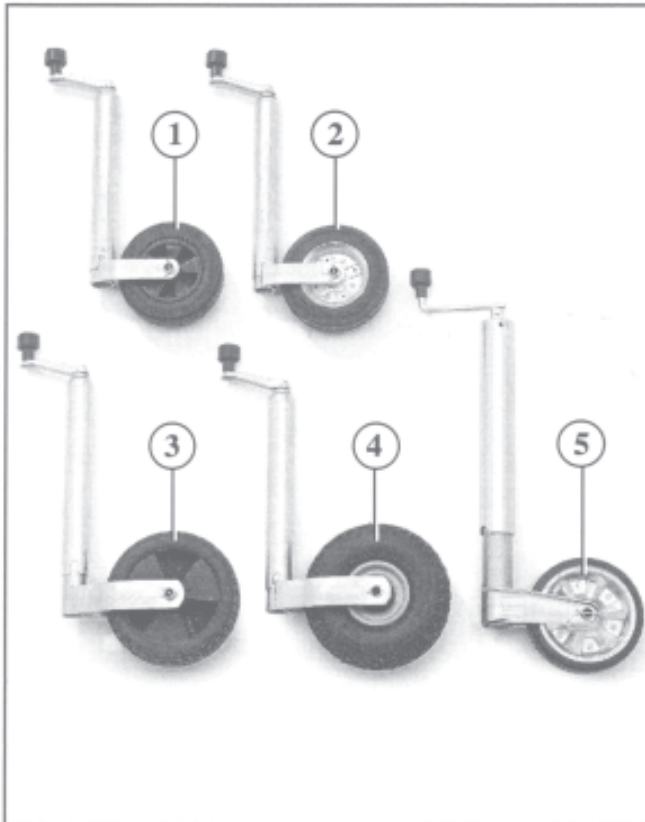
To remove, carry out these steps in reverse order.

6.3 Jockey wheels with spindles

6.3.1 Overview of range

AL-KO jockey wheels with spindles are produced for five different static loads:

- for 150 kg capacity with plastic wheel (1)
- for 150 kg capacity with steel wheel (2)
- for 200 kg capacity with plastic wheel (3)
- for 200 kg capacity with steel wheel (4)
- for 500 kg capacity with steel wheel (5)



It is usual practice is to give the static load capacities only. When manoeuvring (= dynamic loading), the load capacity is reduced by up to 40%.

Features of the AL-KO jockey wheels with spindles:

- Ergonomically shaped crank handles
- Crank handle knobs coloured to suit the other controls of the overrun device
- Excellent durability through the use of hot-galvanised tubes
- Rolled spindles with acme threads ensure special stability

AL-KO jockey wheels with quick-action spindles

The jockey wheel is equipped with a double spindle. This double spindle consists of two spindles with different thread pitches. Friction conditions ensure that the quick-action thread starts first.

Method of operation:

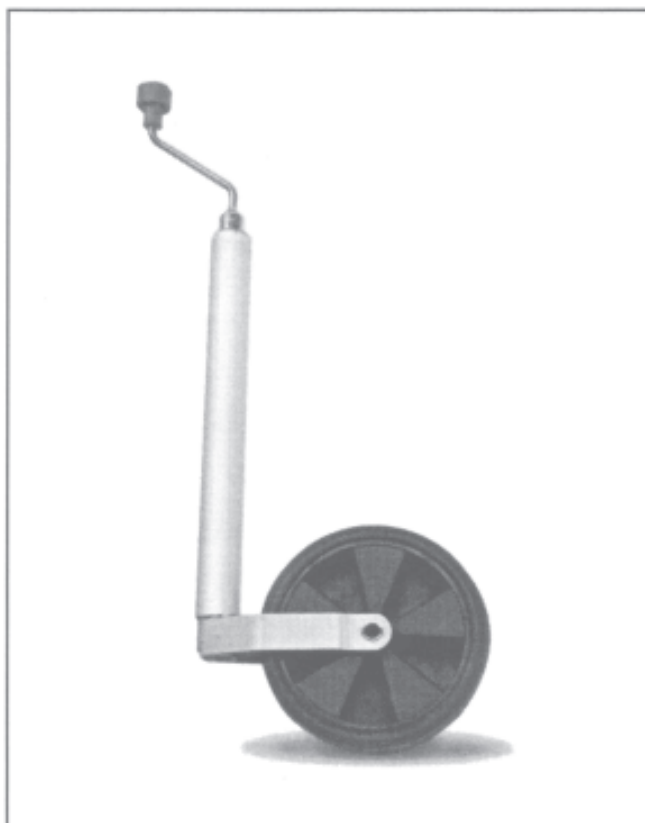
- Starts with quick-action winding up or down
- When resistance occurs as the wheel being lowered contacts the ground, the unit changes to normal action
- As the unit is raised and the end of the quick-action travel is reached, the unit changes to normal action.



A brief jolt may occur when switching over to normal action.



Continue raising the wheel with the normal action until the locking spring engages.





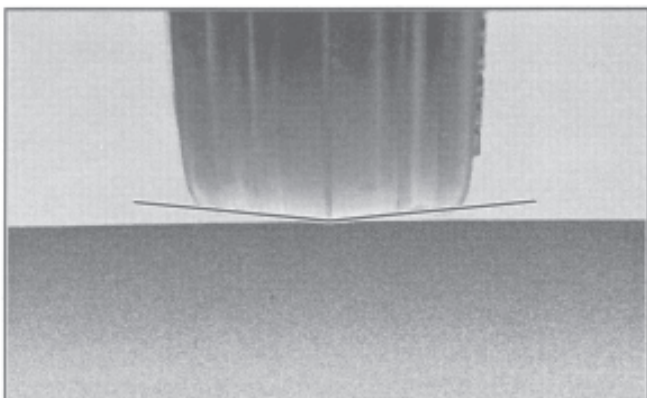
6.3.2 Special version for heavy car trailers

For heavy car trailers with a total weight of up to 3500 kg, AL-KO offer a jockey wheel with a load capacity of 500 kg.

It is usual practice is to give the static load capacities only. When manoeuvring (= dynamic loading), the load capacity is reduced by up to 300 kg.

Additional features of the AL-KO jockey wheels for heavy car trailers:

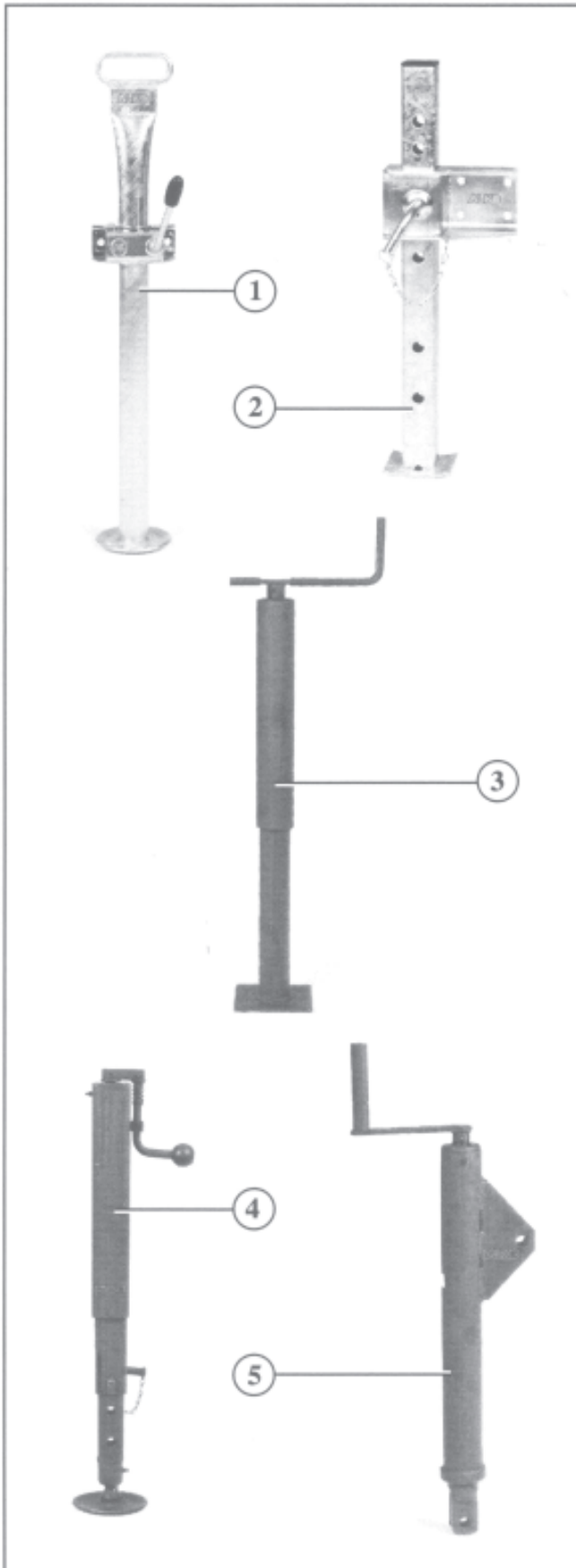
- Thrust bearing for easier crank operation
- Retractable jockey wheel complies with UVV regulations
- Clearly audible ratchet engagement makes for easy locking of the jockey wheel



Special wheels for excellent manoeuvring characteristics. The wheel on these jockey wheels is rounded in shape.

Advantages on hard surfaces: excellent manoeuvring characteristics

Advantages on soft surfaces: broad contact area



6.4 Prop stands and adjuster spindles

6.4.1 Overview of range

Applications

AL-KO prop stands may be used in the most varied situations:

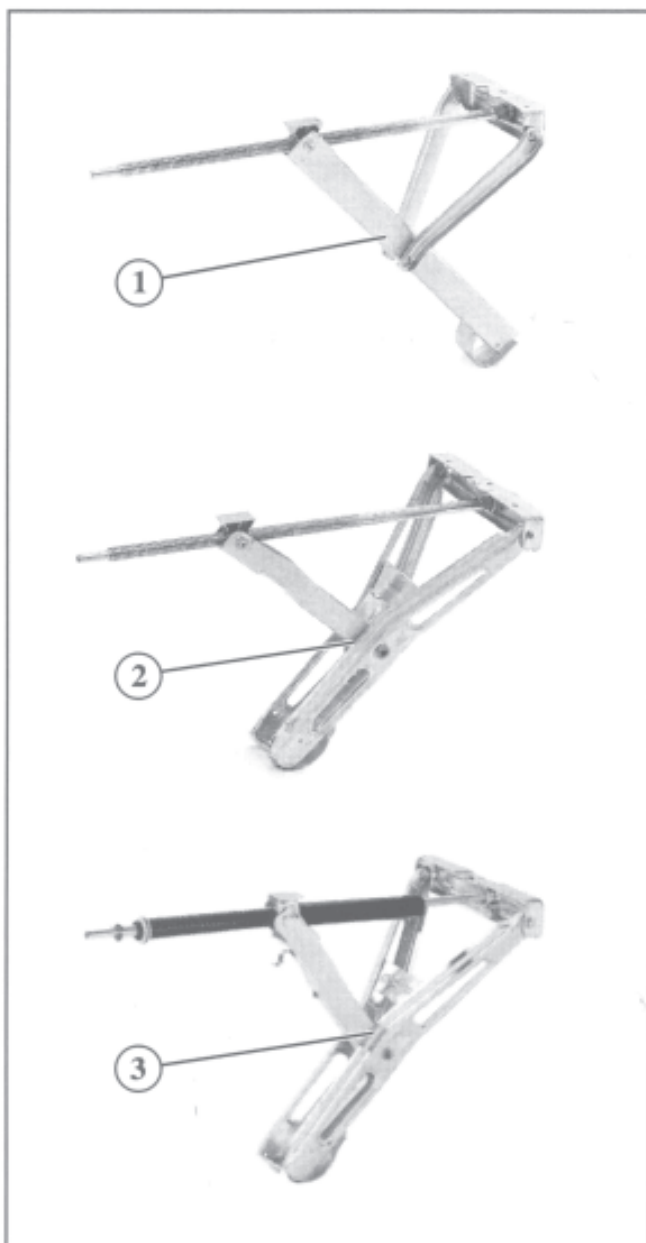
- as an economical alternative to the trailer jockey wheel
- as additional support for trailers carrying extreme loads at the rear (e.g. use as drive-on ramp)
- as a stabilising aid for vehicle lifts, cabins, compressors, emergency generators, car trailers and horse boxes

AL-KO prop stands are manufactured in five different versions:

- rigid prop stand with clamping device for 200 kg load capacity (1)
- rigid prop stand with positive locking system for 400 kg load capacity (2)
- prop stand with spindle for 400 - 1500 kg load capacity (3)
- prop stand with spindle and locking device for 1200 kg load capacity (4)
- adjuster spindle for 400 kg load capacity (5)

Features of the AL-KO prop stands:

- Safe to operate through use of ball bearing thrust races
- Thick-walled tube give special durability
- Use of rolled spindles gives excellent stability



6.5 Corner steadies

6.5.1 Overview of range

AL-KO corner steadies are produced in three different versions:

- 800 kg static load capacity, standard version (1)
- 1000 kg static load capacity, Stabilform version (2)
- 1000 kg static load capacity, Stabilform version, quick wind (3)

Features of the AL-KO corner steadies:

- Fitted quickly and easily using the mounting brackets on the system chassis, secured with two screws
- Hot-galvanised surfaces for long life
- Excellent stability provided by the use of:
 - top-hat sections (standard version)
 - extruded sections (Stabilform version)
 - ribbed side struts (Stabilform version)
- rolled acme thread spindles (standard and Stabilform versions)



AL-KO corner steadies with quick wind spindles

The corner steady is equipped with a double spindle. This double spindle consists of two spindles with different thread pitches. Friction conditions ensure that the quick-action thread starts first.

Method of operation:

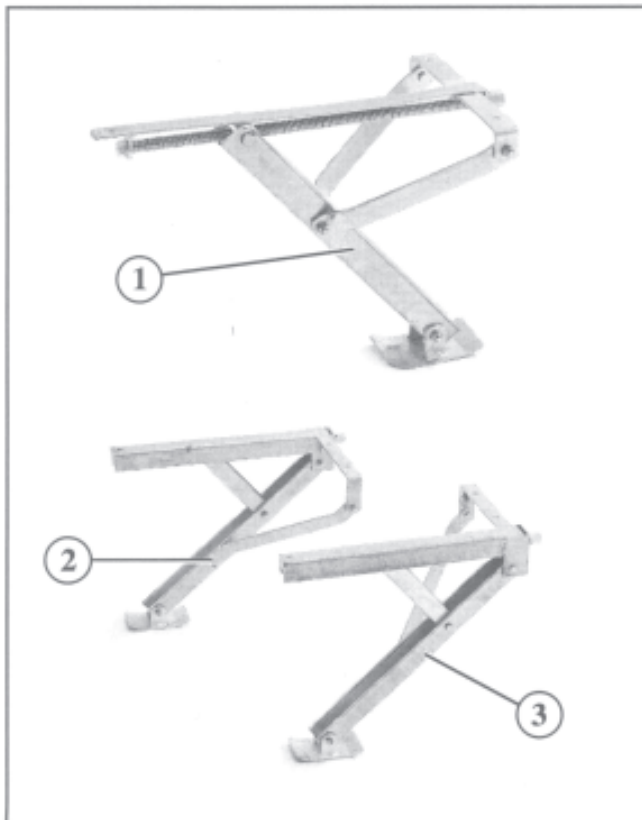
- Starts with quick-action winding up or down
- When resistance occurs as the wheel being lowered contacts the ground, the unit changes to normal action
- As the unit is raised and the end of the quick-action travel is reached, the unit changes to normal action.



A brief jolt may occur when switching over to normal action.



Continue raising the wheel with the normal action until the locking spring engages.



6.6 Steady braces

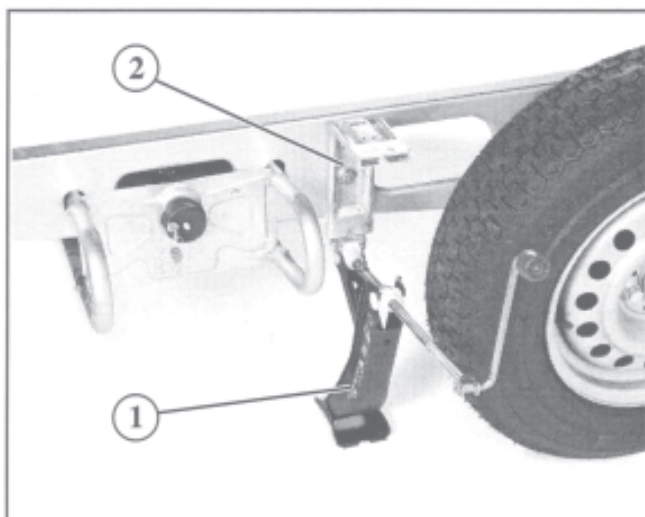
6.6.1 Overview of models

AL-KO steady braces are available in three different versions:

- 500 kg static load capacity, symmetrical construction (1)
- 600 kg static load capacity, asymmetrical construction for front left or rear right fitting (2)
- 600 kg static load capacity, asymmetrical construction for front right or rear left fitting (3)

Features of the AL-KO steady braces:

- Supplied without fastening materials
- Hot-galvanised surfaces for long life



6.7 Vehicle jacks

6.7.1 Overview of range

AL-KO vehicle jacks (1) are used in conjunction with bolted-on jacking points (2) on the frame. This effectively prevents slipping.

Features of the AL-KO Side Lift Jack

- Lift height 85 mm to 375 mm, variable
- Side forces on the frame minimised by the swivelling design of the jack insertion fitting
- Static load capacity up to 800 kg (maximum lift 1600 kg)

Features of the AL-KO Scissor Jack

- Lift height 110 mm to 340 mm, variable

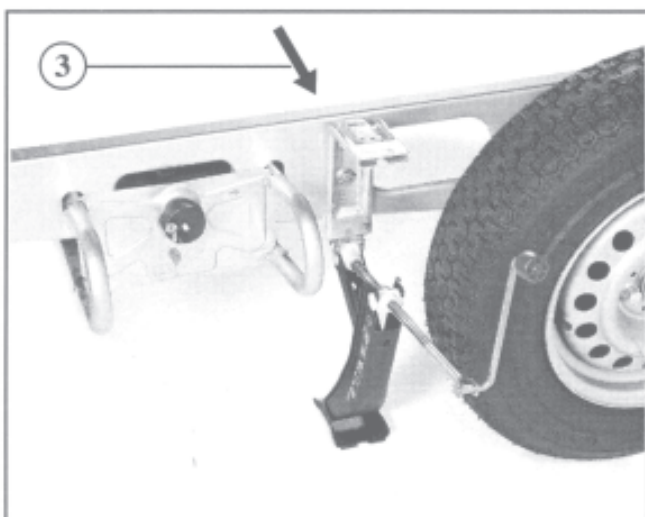


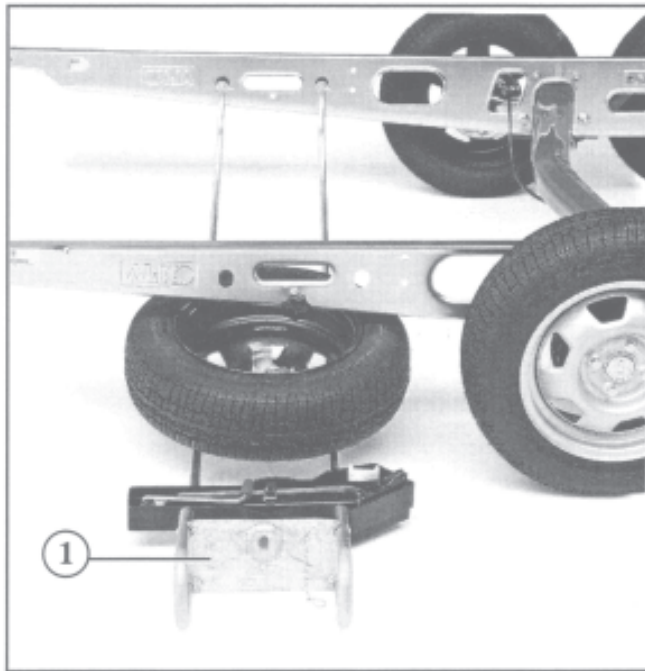
6.7.2 Fitting operations

Holes for jacking point fittings

From 1991 onwards, every AL-KO chassis is equipped as standard with the appropriate mounting holes (3) on the side members for attaching the jacking point fittings.

On all other vehicles from 1980 onwards, the mounting holes are drilled by the user according to the instructions provided.





6.8 Spare wheel carrier

6.8.1 Overview of range

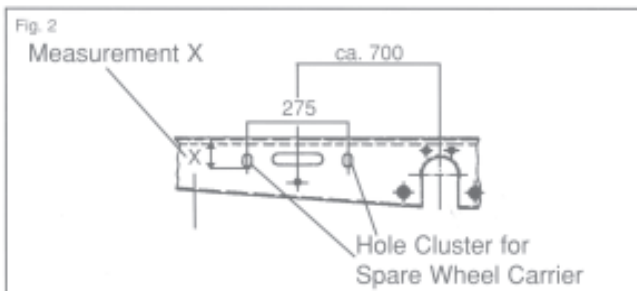
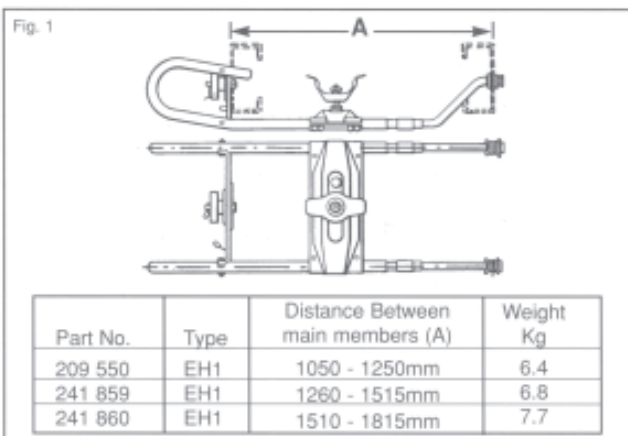
As most breakdowns with trailers are caused by tyre damage, it is recommended that a spare wheel carrier (1) and vehicle jack should be carried on the trailer at all times.

Features of the AL-KO spare wheel carrier:

- Fitting close to the axle and light weight cause minimum impairment of handling
- Under-floor mounting gives unimpeded storage space
- Hot-galvanised surfaces for long life

6.8.2 Determining the Correct Size

AL-KO Spare Wheel Carriers are available in three sizes. To determine which size is suitable, first measure the distance between the chassis members (Fig. 1). You will also need to measure the 'X' dimension (Fig. 2) and have details of the specific wheel and tyre that is fitted to the caravan and refer to Fig. 3 for suitable tyre sizes.

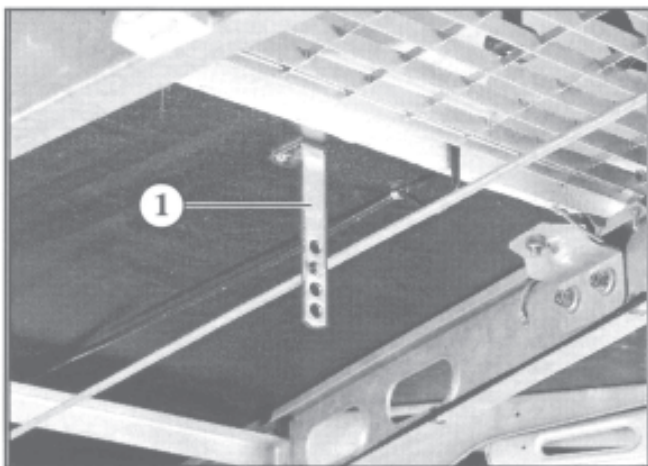


Dim X (mm)	Maximum Tyre Size for 209550	Maximum Tyre Size for 241859/241860
75	155 R13	175 R13, 175 R14, 175/70 R14
85	165 R13	185 R13, 185 R14
95	175 R13, 175 R14, 175/70 R14	195 R13, 195 R14, 195/70 R14
105	185 R14	205/70 R14, 205/70 R15
115	195/70 R14	205/70 R14, 205/70 R15
125	205/70 R14, 205/70 R15	

6.9 Brake rod steadies

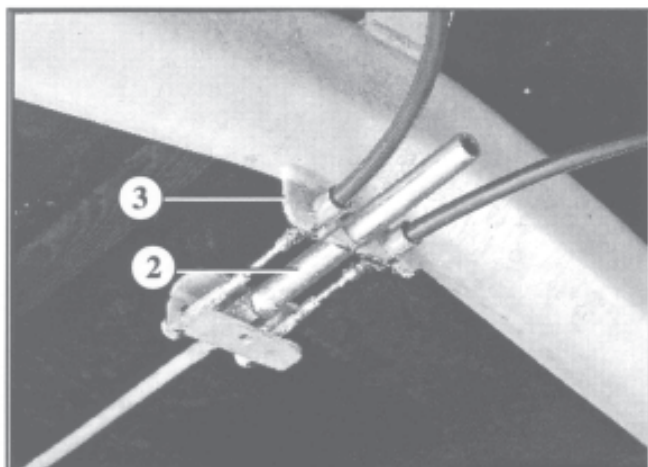
6.9.1 Overview of range

On the road, the free-hanging rods of the brake linkage are able to swing. The swinging is transmitted to the Bowden cables of the axle, causing insignificant but undesirable braking of the trailer. This means reduced performance, additional brake lining wear and reduced car and trailer safety.



AL-KO brake rod steady, front

The brake rod steady, front (1) is attached to a suitable point under the trailer floor. A neat guide is provided for the rod and the braking system operates only when braking is actually required.



AL-KO brake rod steady, rear

The brake rod steady, rear (2) is simply screwed onto the rod and then fed through the axle abutment (3). This means that unwanted braking caused by the weight of the brake rods and equalisers is avoided.

7 Tools and Lubricants

7.0.1 Tools and aids for service stations

Description	Prices in £, nett	Part Number
Euro-axle tool set (for flange nut) consisting of: 1 torque wrench 60 – 300 Nm 1 adapter, 1/2" to 3/4" 3 sockets, sizes 32 / 36 / 41	£125.00 + VAT + Carriage	601203
Drift for protective cap / fitting dust caps For wheel brakes 1637 and 2051 For wheel brake 2361	£12.50 + VAT + Carriage	603751 603752
Brake drum remover for removing and fitting brake drums on wheel brake 2361		605267
Tool for fitting AMC torsion bar axle for removing and fitting round torsion bars BTR version		1211430
Staking tool for collar nut		690342
Tools for overrun devices	Prices on application	
Reamers for reaming drawbar bushes (plastic bushes) Reamer for 35 mm diameter drawbar Reamer for 40 mm diameter drawbar Reamer for 50 mm diameter drawbar Reamer for 60 mm diameter drawbar		247440 247441 247442 247443

7.0.2 Lubricants and servicing products

Description	Prices in £, nett	Part Number
LZ corrosion protection 100 / 150 ml for threaded holes brake drums braking surface brake drums		800057
Poligrat zinc cleaner No. 162-4240 approx. 0.6 litre for removing white corrosion on frame sections, shaft, overrun housings		800061
HSP 1400 high temperature lubricant for wheel brake components, e.g. expanders, adjusters, automatic reverse	Order through Würth	Würth part no. 893.123
HTS Asobon high temperature lubricant for Bowden cables etc.	Order through Würth	Würth part no. 893.123
Shell Retinax LX2 400 g cartridge for AMC torsion bar axle bearings		800075

**7.0.3 Test tools / measuring
equipment**

Description	Prices in £, nett	Part Number
Test ball, 49 mm	Price on Application	1.310.055

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