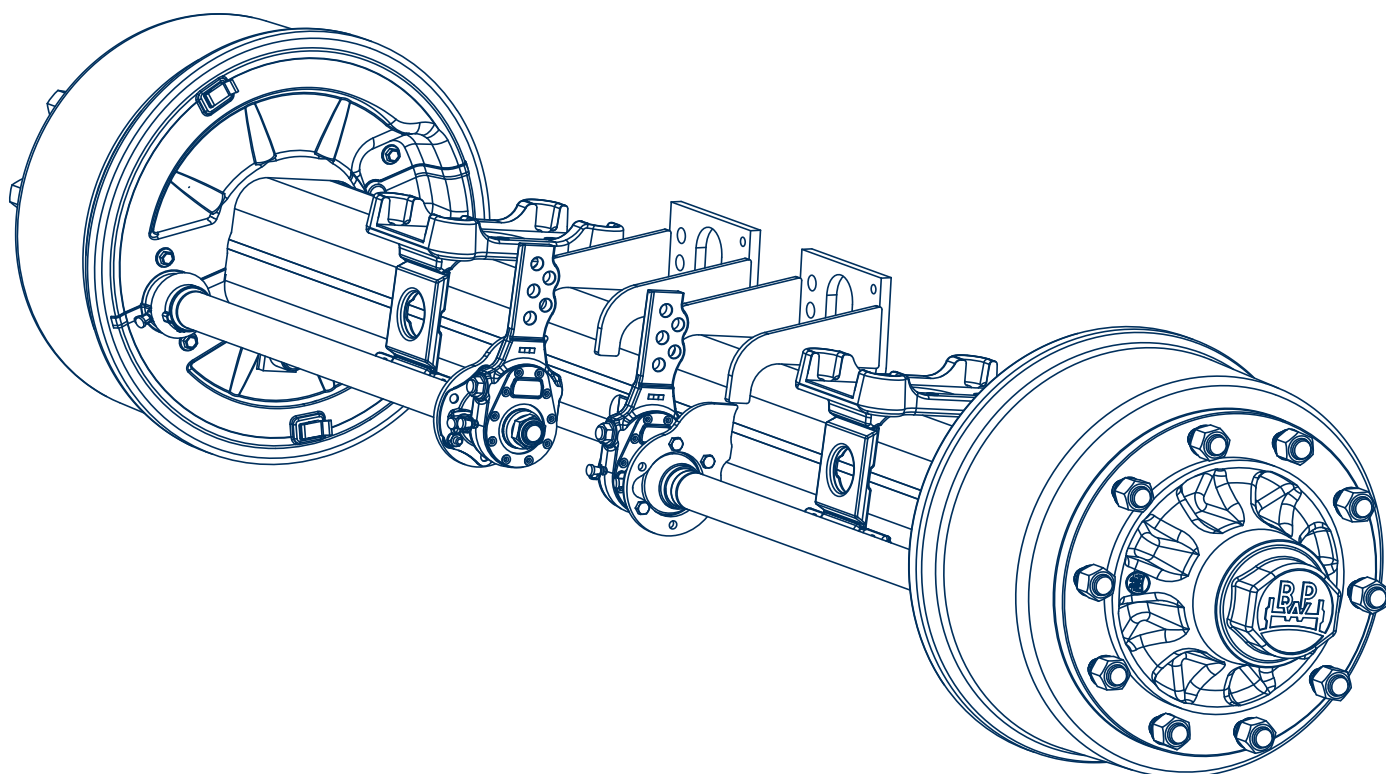




Workshop Manual

Agricultural Brake Systems



Fundamental rules

Never overload axles, brakes and chassis!

Consequently

- Do not overload the vehicle in contravention of regulations, by exceeding the maximum laden weight.
- Do not exceed the maximum permitted braking loads.
- Avoid one-sided overload resulting from incorrect loading or driving over kerbs etc.
- Do not fit unauthorised wheels or tyres. The maximum distance between the track and the spring centre must be adhered to.
- Avoid excessive strain resulting from the use of offset wheels or unauthorised wheel offsets.
- Do not exceed the maximum top speed.
- Each time before using the vehicle, check to ensure that the brakes and brake systems are correctly adjusted and in good working order.
- Wear and tear and any unauthorised alterations are not covered by guarantee.

It is essential that all maintenance work is carried out in accordance with the prescribed intervals in order to maintain the safe operation and roadworthiness of the trailer. The relevant operation and service regulations of the vehicle manufacturer and of the manufacturers of other vehicle parts must also be adhered to.

Rectification of any defects which are discovered or replacement of worn parts should be carried out by a BPW Service Centre or BPW Direct Service Partner unless the vehicle owner has the facilities, equipment and workshop manuals and possesses an official certificate to perform interim inspectors or special brake inspections.

When installing spare parts, it is strongly recommended that only original BPW components are used. Parts approved by BPW for trailer axles and suspensions regularly undergo special test procedures. BPW accepts product responsibility for them.

However, BPW cannot assess every single third-party product as to whether it can be used for BPW trailer axles and suspensions without any risk of safety. This applies even if such products have already been tested by an accredited test authority.

The warranty becomes null and void if spare parts other than original BPW parts are used.

Valid: 10 January 2019

2nd edition

Subject to change without notice.
Current versions and additional information can be found online at www.bpwagrar.com

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1 Product identification

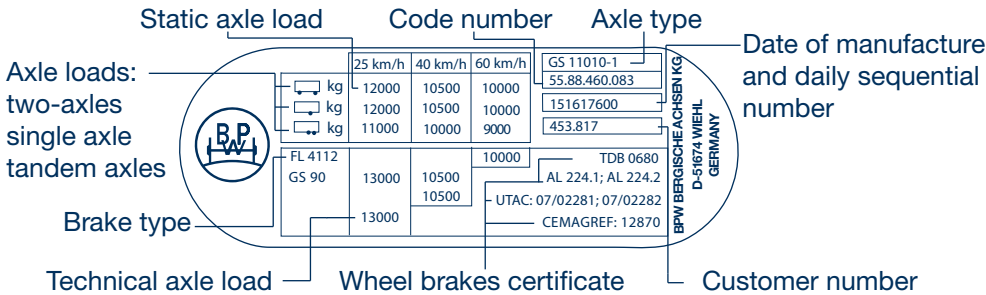
1.1 BPW Type plate for agricultural axles



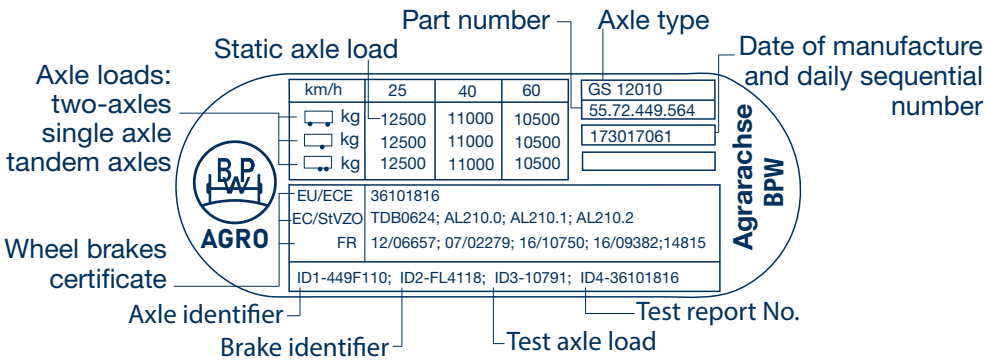
Every BPW axle has a type plate. It is affixed to the centre of the axle beam - opposite to the travel direction.

Data on the type plate can be used to define the required spare parts or - after an accident, for instance - the complete axle.

Type plate braked axle old version



Type plate braked axle new version from May 2018



Type designation and number key 1.2

Type designation axles: Example

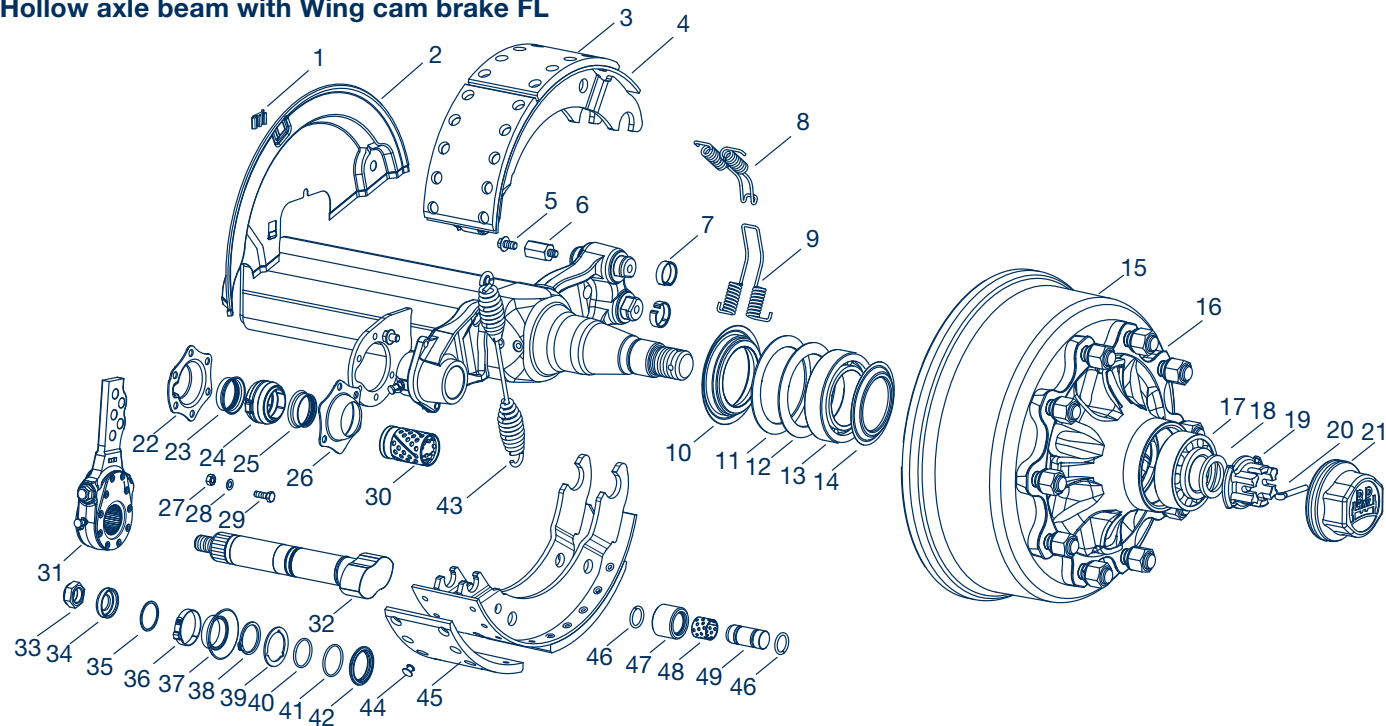
G	S		LA	11010	-1	
G						BPW trailer axle for agricultural vehicles
	S					Single wheels, wheels without offset
		N				Braked axle (max. speed: 80 km/h)
		ST				Axle stub
			LA			Unit steering axle, type LA
			LL			Unit steering axle type LL
			HLL			Unit steering axle type LL for underneath brake cylinders
			L			Steering axle type L (positive steering)
				11010		Axle capacity number of wheel studs per wheel (last two digits)
					-1	Bearing type number

Code number key, axles: Example

55.	88.	460.	600	
26. or 36.				Agricultural trailer axle, steered
55.				Agricultural trailer axle, braked and unbraked
58.				Agricultural axle stub, braked and unbraked
	53.			GS 3606; Bearings: 30206-30209
	56.			GS 4006; Bearings: 32207-30210
	62.			GS 5006; Bearings: 32207-32211
	63.			GS 5506; Bearings: 32207-32013x
	66.			GS 8010-2; Bearings: 32310A-32215
	67.			GS 7006; GS 7008; Bearings: 30210-32014x
	70.			GS 8008-3; GS 8010-3; Bearings: 32213-32215
	72.			GS 12010; GSN 12010; Bearings: 33213-33118
	76.			GS 9010; Bearings: 32213-32215
	77.			GS 12010; GSN 12010; Bearings: 33213-33118
	74.			GS 14010; Bearings: 33215-32219
	88.			GS 11008-1; GS 11010-1; Bearings: 32310A-33116
	001.			Without brake
	356.			Wedge - type brake S 3008 RA (3081)
	375.			Wedge - type brake S 3006-7 RASK
	376.			Wedge - type brake S 3006-7 SK
	381.			Wedge - type brake S 3006-7 RAZG
	384.			Wedge - type brake S 3006-7 ZG
	443.			Cam brake N 3006-3
	447.			Cam brake N 4408-3
	448.			Cam brake N 4012-3
	454.			Cam brake N 3108-3
	449.			Wing cam brake FL 4118
	460.			Wing cam brake FL 4112
	461.			Cam brake N 4008-4
	462.			Cam brake N 4012-4
	463.			Cam brake N 3411-1
	744.			S-Cam brake SN 4220
		001 999		Serial number

2 Exploded view / Designations

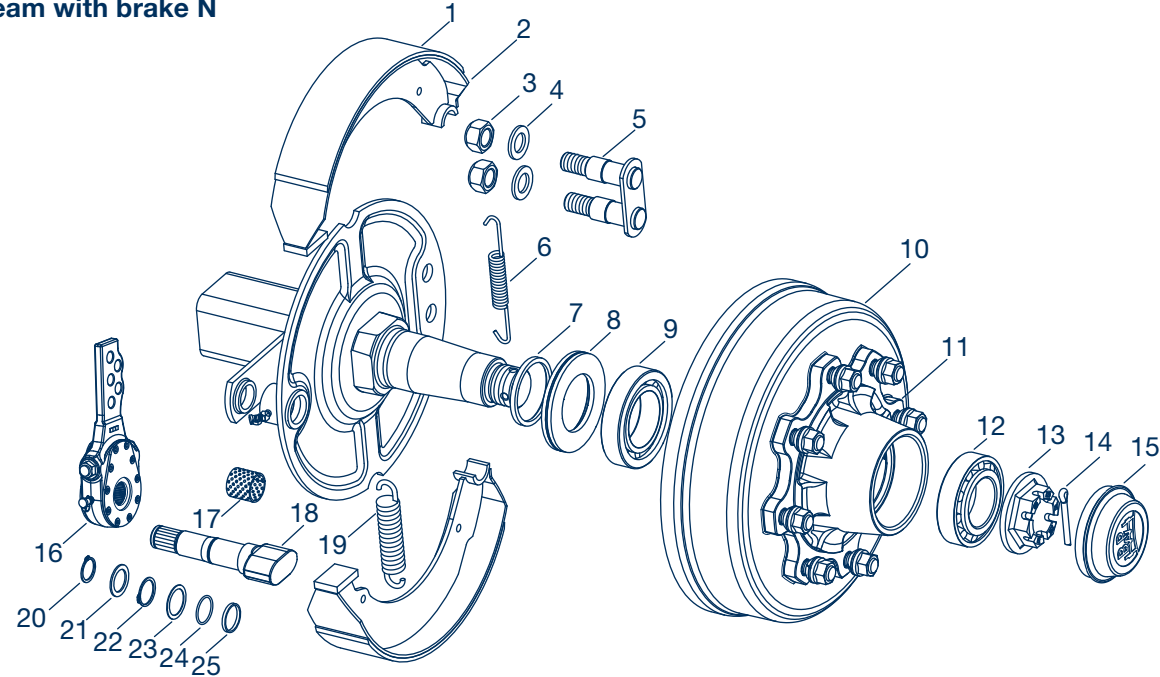
Hollow axle beam with Wing cam brake FL



Item	Description
1	Rubber plug
2	Dust shield
3	Brake lining
4	Brake shoe
5	Collar screw
6	Extension piece
7	„C“ Clip
8	Tension spring (Hook)
9	Tension spring (Eye)
10	Thrust washer
11	Ring (Nylon)
12	Ring (Nylon)
13	Tapered roller bearing
14	Dust cover (Oil catcher)
15	Brake drum
16	Hub
17	Tapered rolling bearing
18	Shim
19	Axle nut
20	Split pin
21	Hub cap
22	Bearing box for grease nipple
23	Sealing ring
24	Spherical bearing
25	Sealing ring

Item	Description
26	Bearing box
27	Hexagon nut
28	Spring washer
29	Hexagon bolt
30	Bush
31	Slack adjuster
32	Brake camshaft
33	Lock nut
34	Washer
35	Retaining ring
36	Locking ring
37	Sealing ring
38	Circlip
39	Sealing ring
40	O-Ring
41	O-Ring
42	Ring
43	Brake return spring
44	Rivet
45	Brake lining
46	Ring
47	Roller
48	Bush
49	Bolt

Solid axle beam with brake N

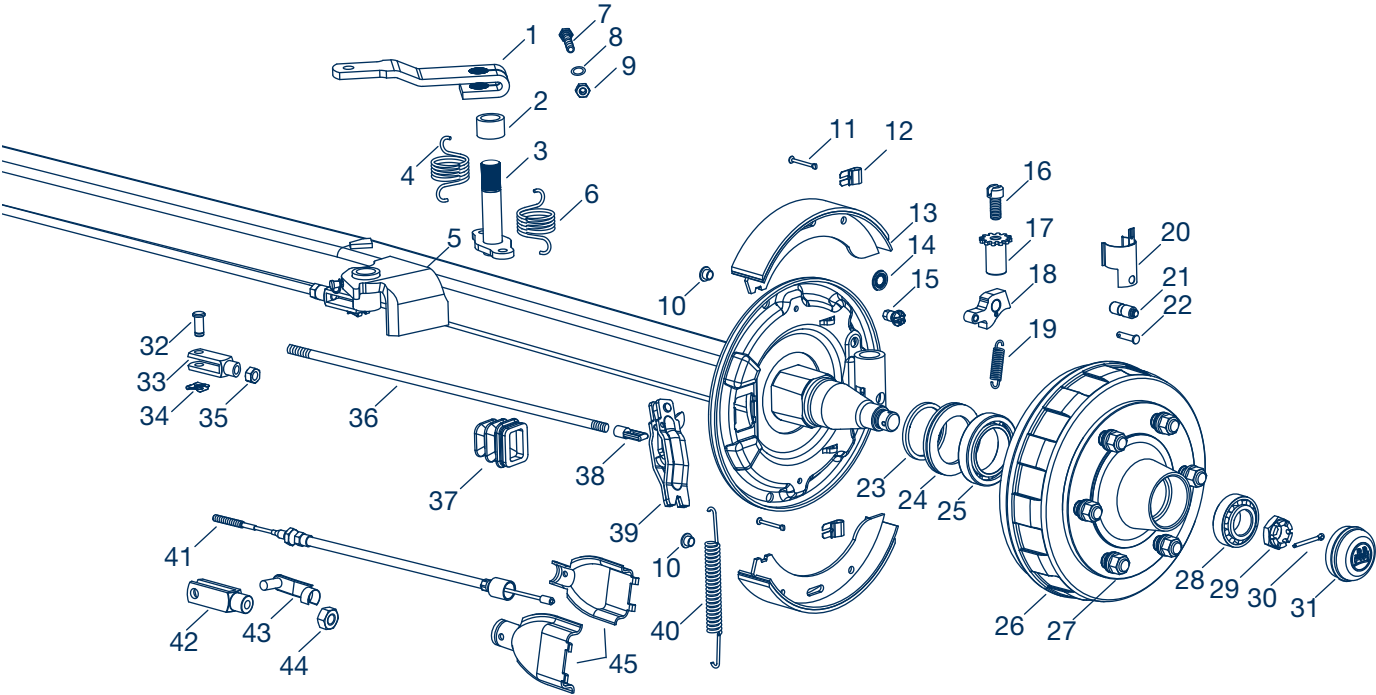


Item	Description
1	Brake lining
2	Brake shoe
3	Lock nut
4	Plain washer
5	Brake anchor pin
6	Brake return spring
7	Thrust washer
8	Gasket
9	Tapered roller bearing (inner)
10	Brake drum
11	Hub
12	Tapered roller bearing (outer)
13	Axle nut

Item	Description
14	Cotter pin
15	Hub cap
16	Slack adjuster
17	Bush
18	Brake camshaft
19	Brake return spring
20	Circlip
21	Distance shim
22	Circlip
23	Shim
24	O-Ring
25	Sealing washer

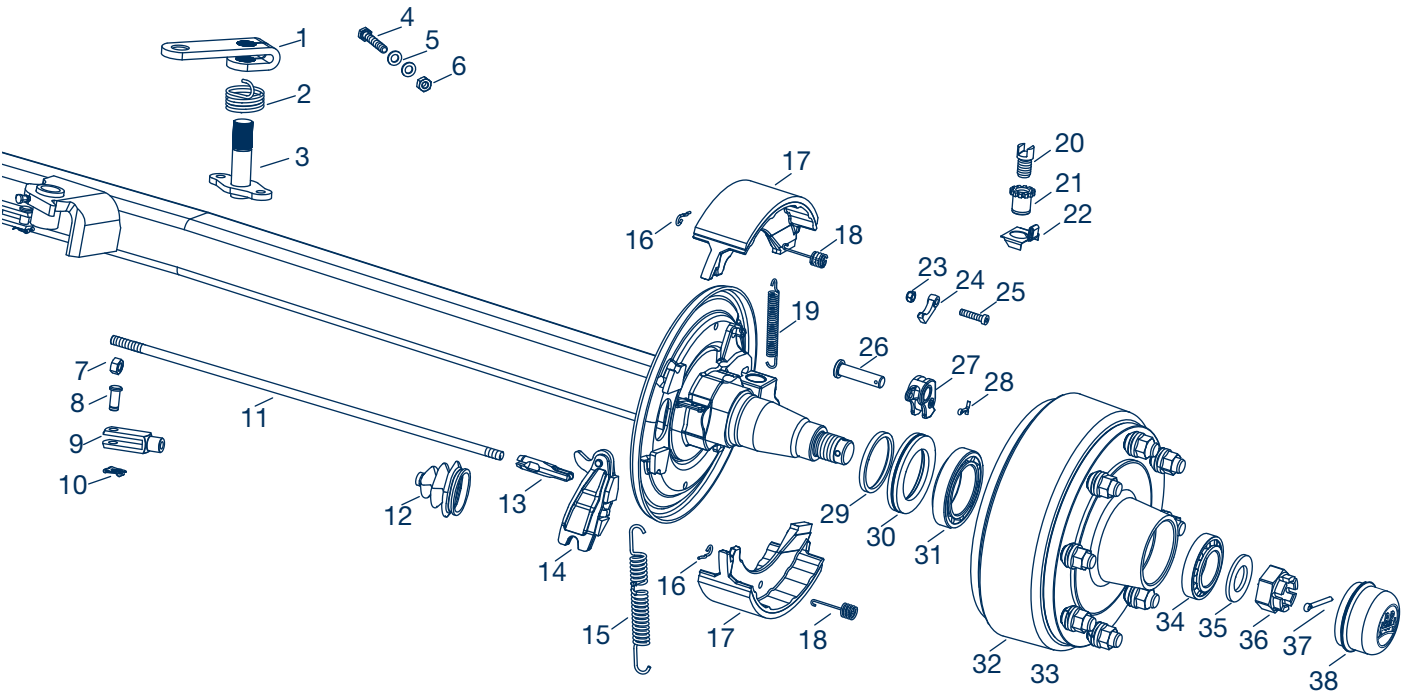
2 Exploded view / Designations

Solid axle beam with wedge-type brake S 3006-7



Item	Description	Item	Description
1	Brake lever	24	Seal
2	Spacer bushing	25	Tapered roller bearing (inner)
3	Lever shaft	26	Brake drum
4	Coiled spring (left)	27	Wheel hub
5	Lever shaft bracket	28	Tapered roller bearing (outer)
6	Coiled spring (right)	29	Axle nut
7	Bolt	30	Split pin
8	Plain washer	31	Hub cap
9	Hexagon nut	32	Clevis pin
10	Plastic plug	33	Clevis
11	Dowel pin	34	Tension plate
12	Retaining clip	35	Hexagon nut
13	Brake shoe	36	Pull rod
14	Starlock washer	37	Bellow
15	Adjusting bolt	38	Connection eye
16	Screw	39	Expander clutch
17	Adjusting nut	40	Brake return spring
18	Auto-reverse lever	41	Bowden cable
19	Cam return spring	42	Clevis
20	Secure clip	43	Clevis pin
21	Dowel pin	44	Hexagon nut
22	Pin	45	Cup
23	Thrust washer		

Solid axle beam with wedge-type brake S 3008 RA (3081)



Item	Description	Item	Description
1	Brake lever	20	Adjusting screw
2	Coiled spring	21	Adjusting bolt
3	Lever shaft	22	Secure clip
4	Bolt	23	Lock nut
5	Plain washer	24	Ratchet
6	Hexagon nut	25	Allen screw
7	Hexagon nut	26	Bolt
8	Clevis pin	27	Auto-reverse lever
9	Clevis	28	Cotter pin
10	Spring clip	29	Thrust washer
11	Pull rod	30	Seal
12	Bellow	31	Tapered roller bearing (inner)
13	Connection eye	32	Brake drum
14	Expander clutch	33	Hub
15	Tension spring	34	Tapered roller bearing (outer)
16	Spring clip	35	Shim
17	Brake shoe	36	Axle nut
18	Pressure spring	37	Split pin
19	Tension spring	38	Hub cap

3 Safety regulations, safety information

3.1 Safety regulations

- ⦿ All work must be performed by trained mechanics at competent repair facilities or authorised specialised workshops who have access to all relevant tools and have acquired the know-how required for this work. Anyone who performs maintenance and repair work must have been trained as an automotive mechanic and already have experience in repairing trailers. Anyone who performs brake work must be trained in brake systems.
- ⦿ Comply with local safety regulations.
- ⦿ The relevant operations and service regulations as well as safety regulations of the vehicle manufacturer and of the manufacturers of the vehicle parts must be adhered to.
- ⦿ The dust created from grinding brake linings comprises particles that can cause lung damage. A safety mask must therefore be worn to prevent brake dust from being inhaled.
- ⦿ Use prescribed dust washing devices or vacuum cleaners for cleaning, never use compressed air or other high-pressure devices.
- ⦿ Ensure adequate ventilation at the workplace.
- ⦿ The vehicle must be prevented from moving during repair work. Please observe the relevant safety regulations for repair work on commercial vehicles, in particular the safety regulations for jacking up and securing the vehicle.
- ⦿ During repair work, make sure that the brake is not operated inadvertently.
- ⦿ Do not perform repair work unless wearing protective clothing (gloves, safety boots, safety goggles, etc.) and using the recommended tools.
- ⦿ Work on brake components removed from the vehicle must be carried out with the components fixed in place such as in a vise.
- ⦿ Only use recommended tools.
- ⦿ A second mechanic must provide assistance when working with heavy components (brake drums or brake removal/installation).
- ⦿ All air lines and components must be depressurised before being removed.
- ⦿ Following each repair, perform a function check or a test drive in order to make sure that the brakes are functioning correctly. New drums and linings only have maximum effect after a few braking actions. Avoid hard braking.
- ⦿ All exchanged components must be reused or disposed of in accordance with the applicable environmental regulations, laws and directives.
- ⦿ Tighten bolts and nuts with the prescribed tightening torque.

This workshop manual contains different types of safety instructions, each of which is designated an icon and a signal word. The signal word describes the severity of the potential danger.



- Danger ! **Immediate** potential danger of serious or fatal injury (severe injury or death).
- Warning ! **Possible** potential danger of serious or fatal injury (severe injury or death).
- Caution ! **Possible** dangerous situation (slight injury or damage to property).

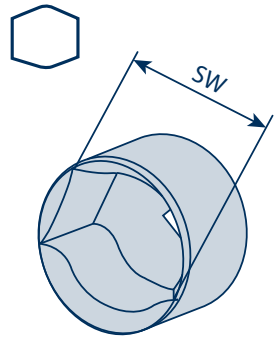
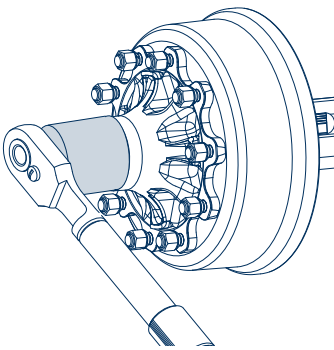
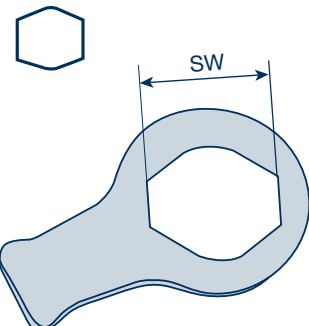
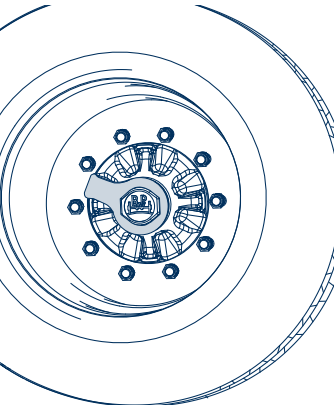
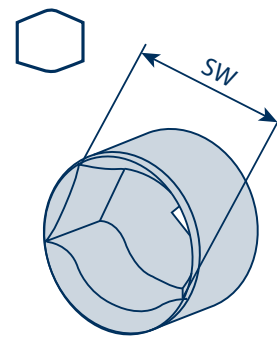
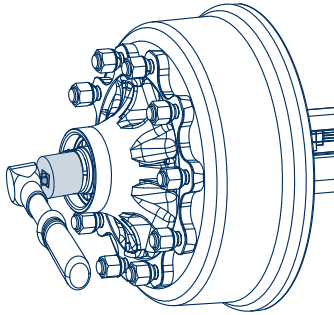
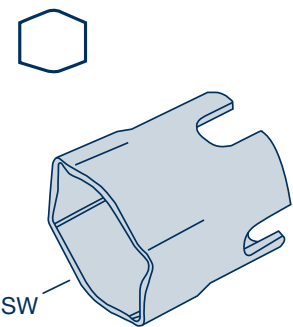
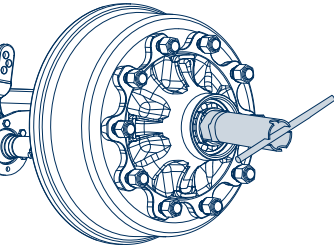


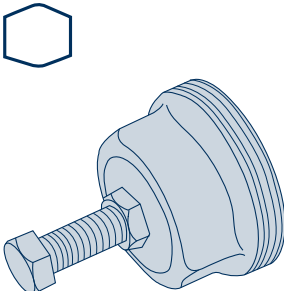
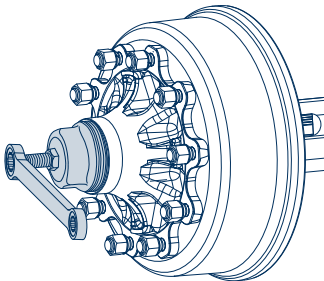
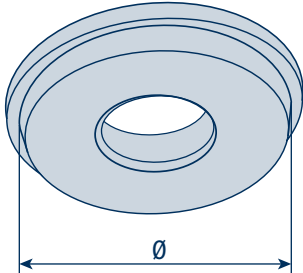
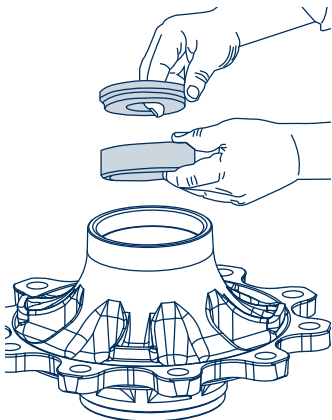
- Repair Guide ! Risk of damage to property or consequential damage if this information is not observed.



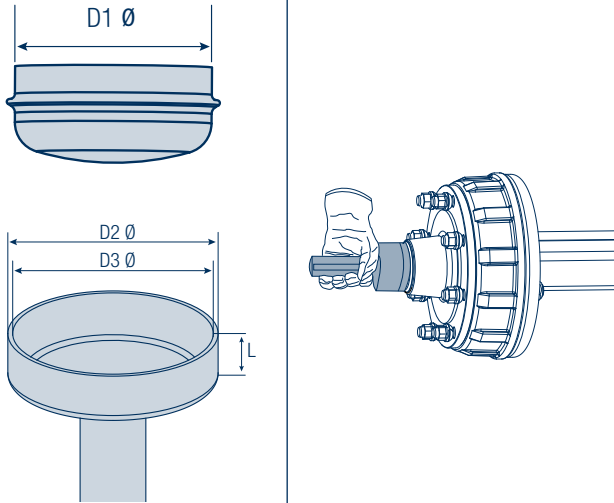
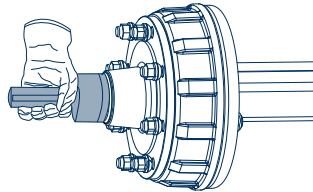
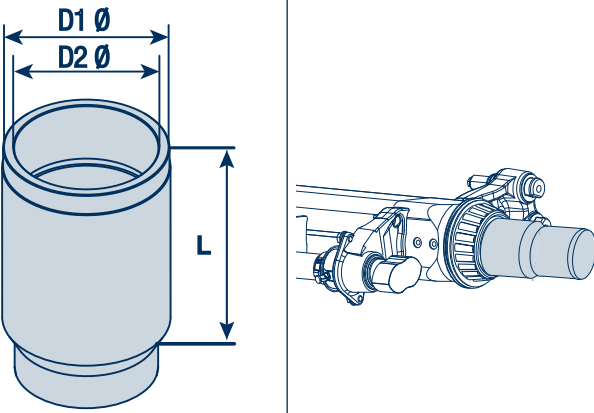
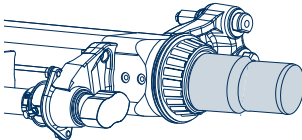
- Note ! Application hints and especially useful information.

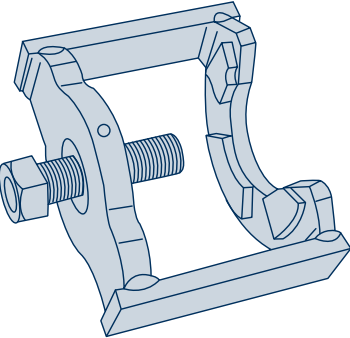
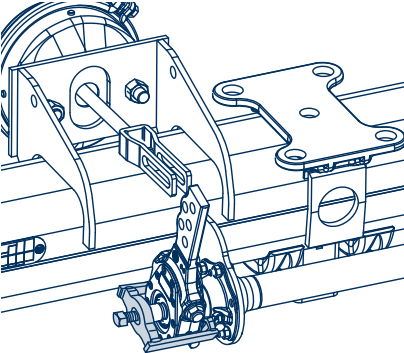
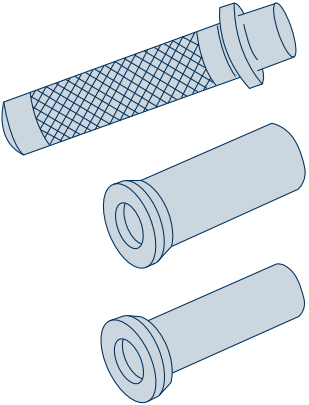
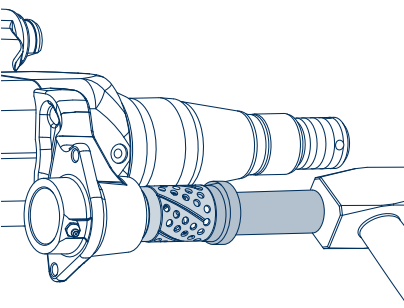
4 Special tools

No.	Description	Illustration of tool	Tool in operation
1	Sockets for hub caps (BPW shape) BPW code number: 03.364.29.02.0 WAF 95 03.364.29.03.0 WAF 110		
2	Ring spanner for hub caps (flat shape / BPW shape) BPW code number: 03.339.04.03.0 WAF 95 03.339.05.04.0 WAF 110 03.339.05.02.0 WAF 120		
3	Sockets for axle nuts (BPW shape) BPW code number: 03.364.20.03.0 WAF 65 03.364.24.03.0 WAF 80		
4	Box spanner for axle nuts BPW code number: 03.364.20.02.0 WAF 65 03.364.24.02.0 WAF 80 03.364.26.03.0 WAF 85		

No.	Description	Illustration of tool	Tool in operation																					
5	Hub puller BPW code number: 05.012.26.03.0 WAF 95 M 115 x 2 05.012.27.05.0 WAF 110 M 125 x 2 05.012.28.03.0 WAF 120 M 150 x 2 Order bolt separately BPW code number: 02.5026.70.80 M 22 x 100																							
6	Press tools for inserting the outer rings of roller bearings <table border="1"><thead><tr><th>Roller bearing</th><th>Ø</th><th>BPW code number</th></tr></thead><tbody><tr><td>32310</td><td>100</td><td>15.005.20052</td></tr><tr><td>32219</td><td>160</td><td>15.008.20052</td></tr><tr><td>33118</td><td>142</td><td>15.011.20052</td></tr><tr><td>33116</td><td>123</td><td>15.012.20052</td></tr><tr><td>33213</td><td>113</td><td>15.013.20052</td></tr><tr><td>33215</td><td>123</td><td>15.014.20052</td></tr></tbody></table>	Roller bearing	Ø	BPW code number	32310	100	15.005.20052	32219	160	15.008.20052	33118	142	15.011.20052	33116	123	15.012.20052	33213	113	15.013.20052	33215	123	15.014.20052		
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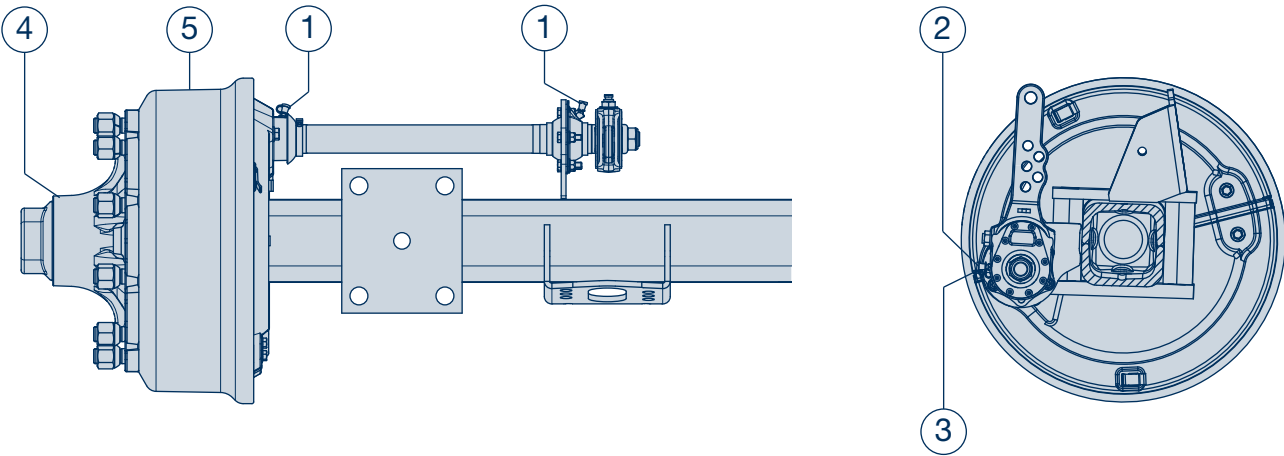
4 Special tools

No.	Description	Illustration of tool	Tool in operation																																																																															
7	Impact tool for hub cap (without thread)																																																																																	
	<table><tr><th>Hub cap code number</th><th>D1 Ø</th><th>D2 Ø</th><th>D3 Ø</th><th>L</th></tr><tr><td>03.211.03.05.0</td><td>62</td><td>70</td><td>64</td><td>17</td></tr><tr><td>03.211.08.03.0</td><td>120</td><td>122</td><td>116</td><td>19</td></tr><tr><td>03.211.05.06.0</td><td>72</td><td>78</td><td>72</td><td>22</td></tr><tr><td>03.211.20.08.0</td><td>120</td><td>120</td><td>114</td><td>27</td></tr><tr><td>03.211.07.03.0</td><td>90</td><td>98</td><td>92</td><td>44</td></tr></table>			Hub cap code number	D1 Ø	D2 Ø	D3 Ø	L	03.211.03.05.0	62	70	64	17	03.211.08.03.0	120	122	116	19	03.211.05.06.0	72	78	72	22	03.211.20.08.0	120	120	114	27	03.211.07.03.0	90	98	92	44																																																	
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	03.211.20.08.0			120	120	114	27																																																																											
03.211.07.03.0	90	98	92	44																																																																														
8	Impact sleeve for bearings																																																																																	
	<table><tr><th rowspan="2">Type of bearing</th><th colspan="3">Tool</th></tr><tr><th>D1Ø (mm)</th><th>D2Ø (mm)</th><th>L (mm)</th></tr><tr><td>30206</td><td>37</td><td>31</td><td>130</td></tr><tr><td>30209</td><td>52</td><td>46</td><td>130</td></tr><tr><td>32207</td><td>46</td><td>36</td><td>130</td></tr><tr><td>30210</td><td>58</td><td>51</td><td>130</td></tr><tr><td>32211</td><td>62</td><td>56</td><td>130</td></tr><tr><td>32013</td><td>72</td><td>66</td><td>130</td></tr><tr><td>32310</td><td>61</td><td>51</td><td>130</td></tr><tr><td>32215</td><td>82</td><td>76</td><td>180</td></tr><tr><td>30210</td><td>61</td><td>51</td><td>130</td></tr><tr><td>32014</td><td>77</td><td>71</td><td>140</td></tr><tr><td>32213</td><td>76</td><td>66</td><td>130</td></tr><tr><td>32215</td><td>82</td><td>76</td><td>130</td></tr><tr><td>33213</td><td>76</td><td>66</td><td>130</td></tr><tr><td>33118</td><td>97</td><td>91</td><td>190</td></tr><tr><td>33215</td><td>86</td><td>76</td><td>130</td></tr><tr><td>32219</td><td>102</td><td>96</td><td>200</td></tr><tr><td>32310</td><td>61</td><td>51</td><td>130</td></tr><tr><td>33116</td><td>87</td><td>81</td><td>180</td></tr></table>			Type of bearing	Tool			D1Ø (mm)	D2Ø (mm)	L (mm)	30206	37	31	130	30209	52	46	130	32207	46	36	130	30210	58	51	130	32211	62	56	130	32013	72	66	130	32310	61	51	130	32215	82	76	180	30210	61	51	130	32014	77	71	140	32213	76	66	130	32215	82	76	130	33213	76	66	130	33118	97	91	190	33215	86	76	130	32219	102	96	200	32310	61	51	130	33116	87	81	180
	Type of bearing				Tool																																																																													
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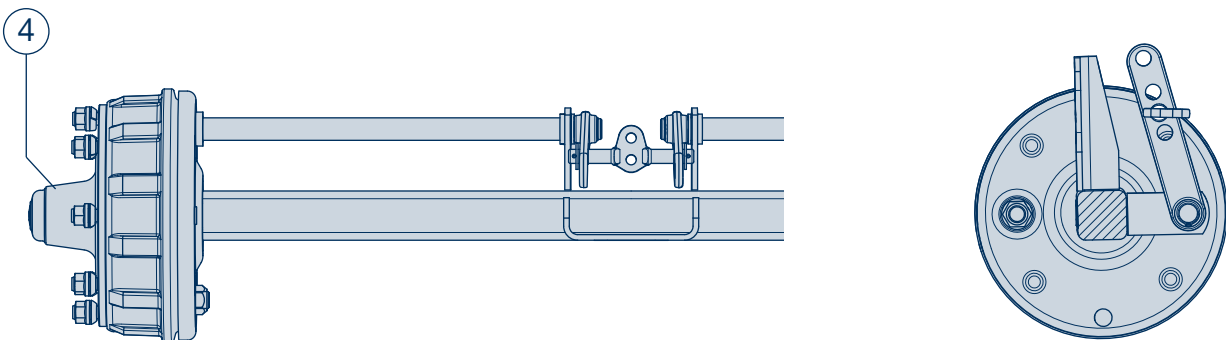
No.	Description	Illustration of tool	Tool in operation
9	Pulling device for slack adjusters and automatic slack adjuster BPW code number: 02.4306.15.00		
10	Driving mandrel complete BPW code number: 05.001.04.04.0		

5 Lubrication

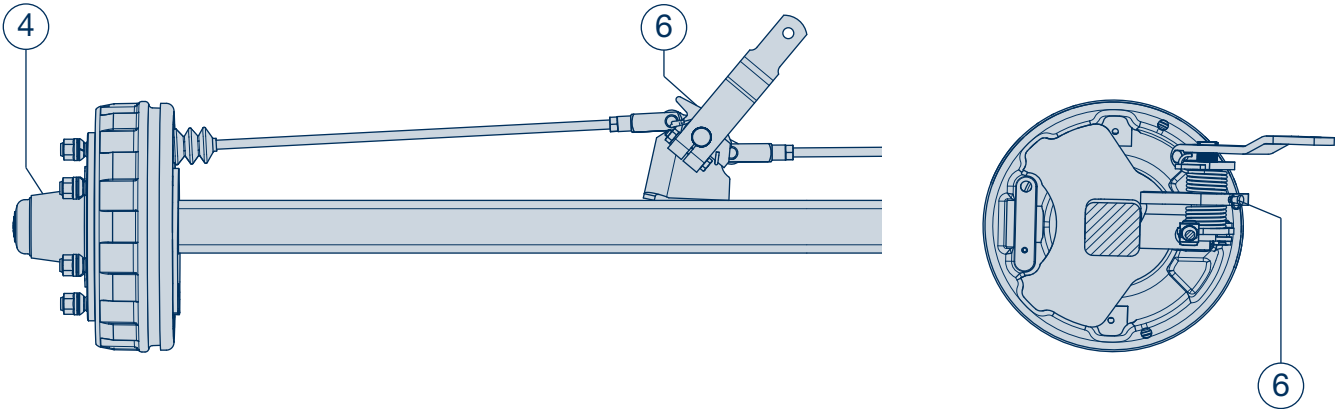
BPW trailer axle with wing cam brake



BPW trailer axle with flat cam brake



BPW trailer axle with overrun brake



Lubrication

Overview

○ Lubrication with BPW Special longlife grease ECO-Li-91.

① Brake camshaft bearing outer and inner.	①		
② Manual slack adjuster.	②		
③ Automatic slack adjuster.		③	
④ Change wheel hub bearing grease, check taper roller bearings and rotary shaft seal for wear.			④
With CTIS (Central Tire Inflation System).		④	
⑤ Brake shoe bearing.			⑤
⑥ Lever shaft.		⑥	

every 200 operating hours, at every brake lining replacement, latest half-yearly ^{1),2)}	all 500 operating hours, at every brake lining replacement, latest half-yearly ²⁾	every 1000 operating hours, at least annually, at each brake lining change
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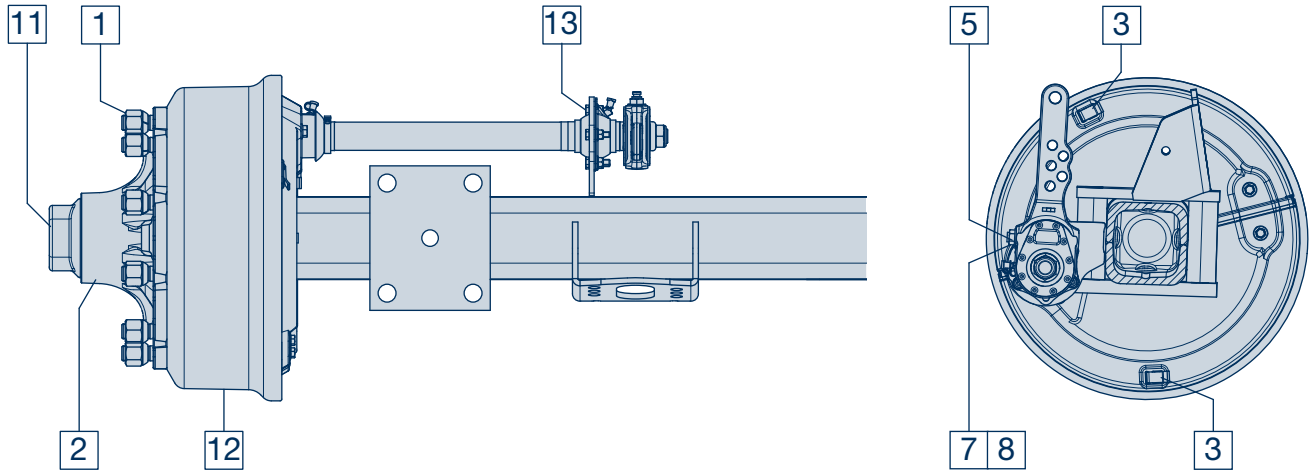
¹⁾ After a long idle period, prior to use, actuate the brake lever and lubricate the brake camshaft bearing.

²⁾ During heavy use (e.g. Wagework Company) the given lubrication and maintenance intervals must be abridged.

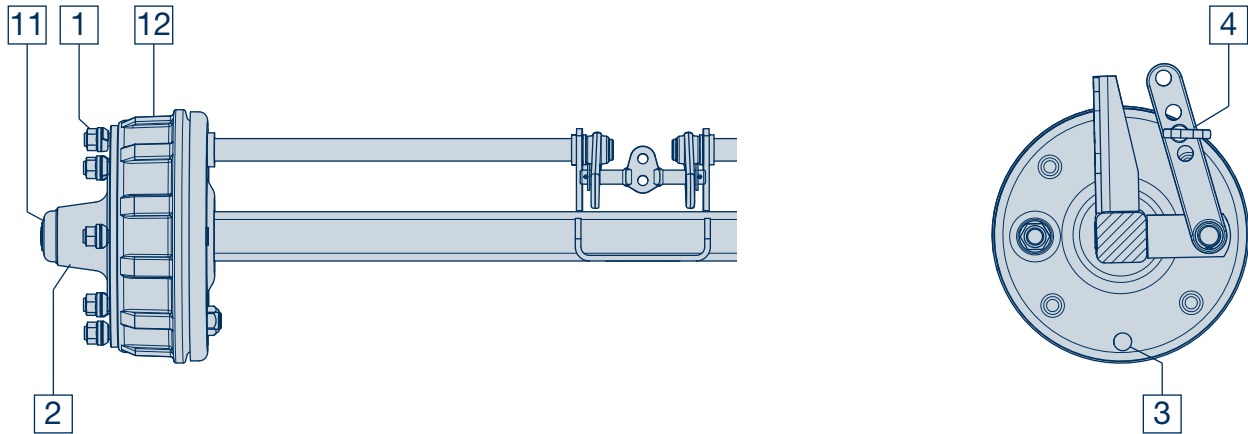
For the position ① ② ③ the use of a high-pressure central lubrication system which is capable of feeding special longlife grease of viscosity class 2-3 which is permissible. The use of liquid lubricants is not permitted!

6 Maintenance

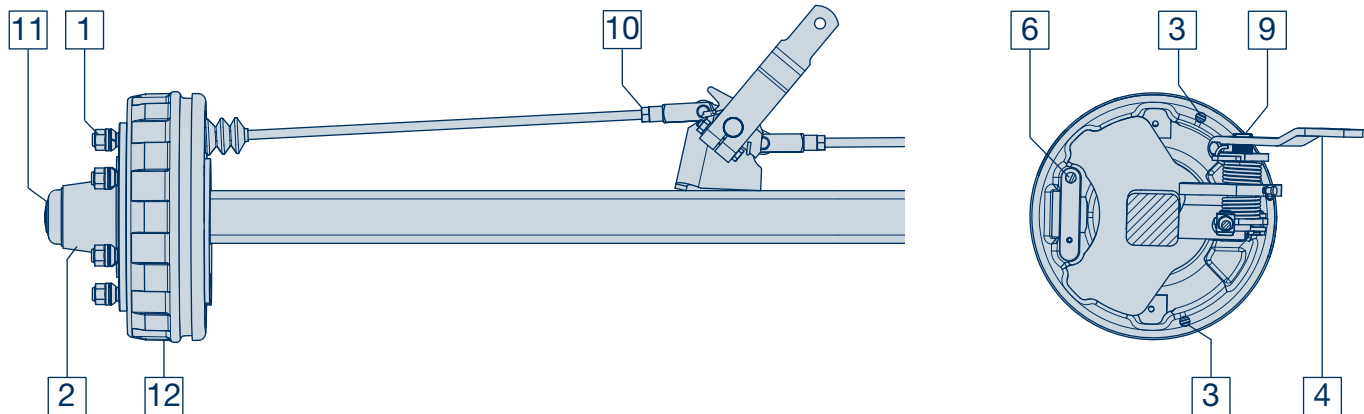
BPW trailer axle with wing cam brake



BPW trailer axle with flat cam brake



BPW trailer axle with overrun brake



Maintenance

Overview

☐ Maintenance

	after the first run under load ¹⁾	after 50 operating hours	every 200 operating hours, at every brake lining replacement, latest half-yearly ^{1), 2)}	all 500 operating hours, at every brake lining replacement, latest half-yearly ²⁾
1 Check wheel nuts for tightness, or re-tighten if necessary.	1			1
2 Check wheel hub bearing play, adjust if necessary.	2			2
3 Check brake lining thickness.			3	
4 Check brake adjustment on the brake lever, adjust if necessary.			4	
5 Check brake adjustment on the slack adjuster, adjust if necessary.			5	
6 Check brake adjustment on the overrun brake, adjust if necessary.			6	
7 Check brake adjustment on the automatic slack adjuster, adjust if necessary.				7
8 Check operation of automatic slack adjuster.				8
9 Check operation of lever shaft.		9	9	
10 Check lock nut of pull rod for tightness.		10	10	
11 Check the hub cap for tightness.			11	
12 Check brake drum for condition and sufficient residual strength				12
13 Check the bolts of spherical bearing support plates for tightness, and re-tighten if necessary.			13	
○ Check the tyres for uneven wear, adjust the inflation pressure if necessary according to the manufacturer's specification.			○	
- Visual inspection of all parts and welding seams for damage and wear.				-

¹⁾ After the first run under load conditions, as well as after each wheel change.

²⁾ During heavy use (e.g. Wagework Company) the given lubrication and maintenance intervals must be abridged.

Note: Components that have damages due to improper mounting are to be exchanged after a review by a BPW Service Centre.

7 Fasteners torque values

Description	Thread /wrench size/	Fastener torque values
Locknut for slack adjusters	M 22 x 1,5 / WAF 32	M = 80 - 90 Nm
Hexagon bolt for brake camshaft bearing	M 8 / WAF 13	M = 25 Nm
Locking screws for cover plates	M 10 / WAF 13	M = 38 Nm
Self tapping screw for cover plates	M 10 / WAF 13	M = 43 Nm
Self tapping screw for sensor bracket	M 8 / WAF 13	M = 25 Nm
Locking screw for sensor bracket	M 6 / WAF 10	M = 8 Nm
Self locking nut for brake cylinder	M 16 x 1,5 / WAF 24	M = 180 Nm
Locknut for brake cylinder fork	M 16 x 1,5 / WAF 24	M = 80 Nm
Locknut for the mechanical release device	WAF 24	M = 20 Nm
Locknut for brake lever	M 10 / WAF 13	M = 38 Nm
Brake carrier for N - brake system	M 24 x 1,5 / WAF 36	M = 400 Nm

Check and adjust the clearance of the wheel brakes 8

Manual Slack Adjuster 8.1

- after every 200 working hours, at every brake lining replacement and at the latest every six months.



Warning!
Prevent the vehicle from rolling away!
Release the park and service brake
only after lifting!

Functional check:
Push the slack adjuster by hand in the operation di-
rection. Ensure the slack (push rod travel) **(a)** is within
max. 35 mm, if not it must be re-adjusted.



Warning!
Re-adjustment of the brake is required
in case, in the course of the full
braking has been used the 2/3 part of
the air chamber stroke length.

- Adjustment:**
- [1] Turn the adjustment bolt with a ring spanner (WAF 19) until the lining contacts the drum and the adjustment bolt will not turn any further.
 See Fig. 1.
 - [2] Back off the adjustment bolt while set play “a” to 10 - 12% of connected brake lever length “B”.
E.g. if brake lever length = 150 mm,
play = 15 - 18 mm.
 See Fig. 2.
 - [3] The angle between the slack adjuster and push rod is 90° or as close as practical. If not, then a brake adjustment is required.
 See Fig. 3.



Repair Guide:
After the brake adjustment a test drive
must be carried out with the vehicle.
The function of the test drive is to con-
firm the correct operation of the brake.

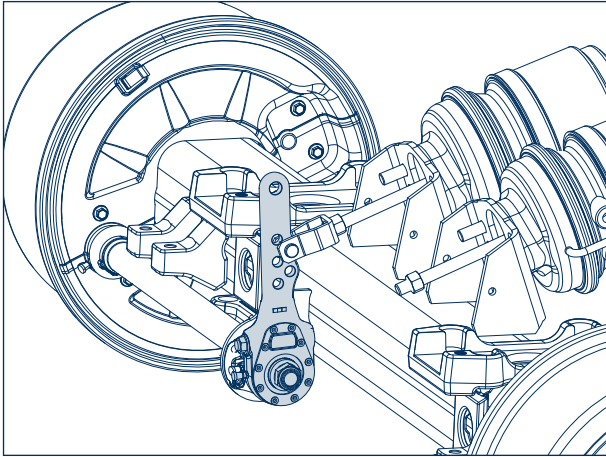


Figure 1

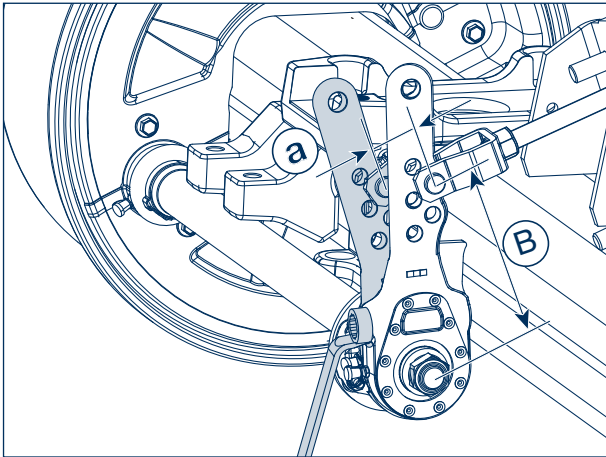


Figure 2

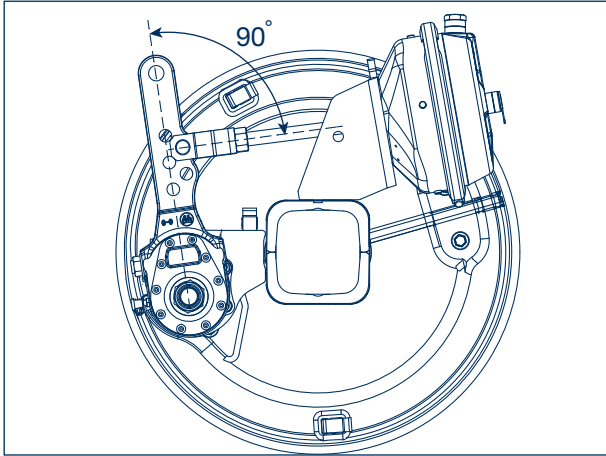


Figure 3

8.2 Automatic Slack Adjuster

- after every 500 working hours, at every brake lining replacement and latest annually.

Functional check:

- [1] Actuate the slack adjuster by hand or with 0.8 bar compressed air.
In case, the idle stroke „a“ corresponds to 10 - 15 % of the connected brake lever length “B”, e.g. brake lever length 150 mm = free play 15 - 22 mm.
- [2] Check the adjustment if the free play is not within tolerance.
Split open the rubber seal cap.
- [3] Turn back adjustment screw by approximately 3/4 of a turn in a counterclockwise direction using a ring spanner. Free play at least 50 mm must be available, if the lever length is 150 mm.

See Fig. 4.

- [4] Actuate the brake lever several times by hand.
When this is done automatic adjustment must take place smoothly.
Engagement of the clutch coupling is audible and on the return stroke the adjustment screw turns slightly in a clockwise direction.
- [5] Fit the rubber seal cap.

Adjusting:

- [1] Remove the rubber seal cap.
- [2] Set play “a” to 10 - 15 % of the connected brake lever length “B” by turning the adjustment bolt (keep clutch sleeve pressed down). For example if brake lever length 150 mm = play 15 - 22 mm.
- [3] When the brake is applied, the angle between the slack adjuster and cylinder push rod should be 90° or as close as practical.

See Fig. 6.

- [4] Fit the rubber seal cap.



Repair Guide:

Brake lining wear indicators must be set vertically upwards.
Locknut of the brake camshaft must be tightened with torque of 80 to 90 Nm.

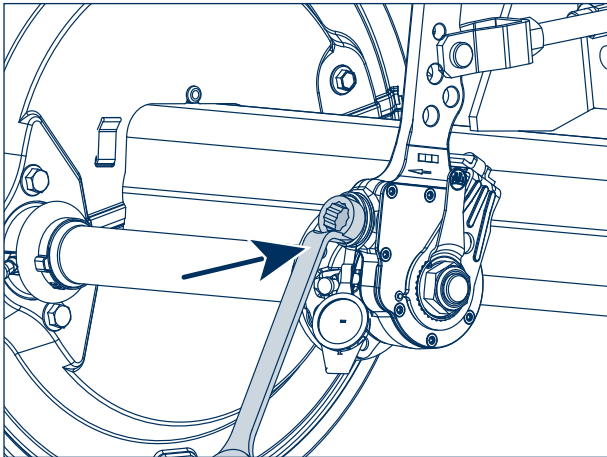


Figure 4

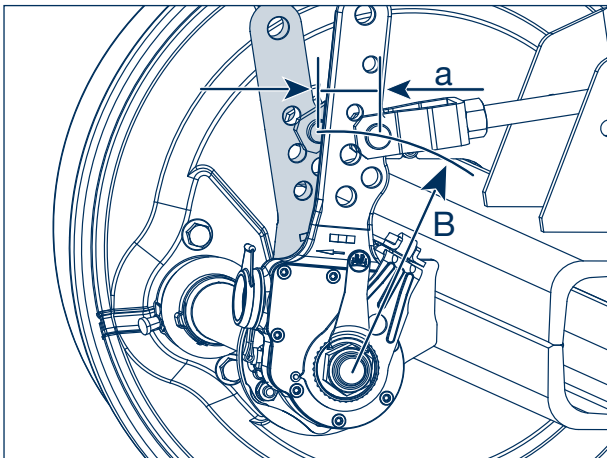


Figure 5

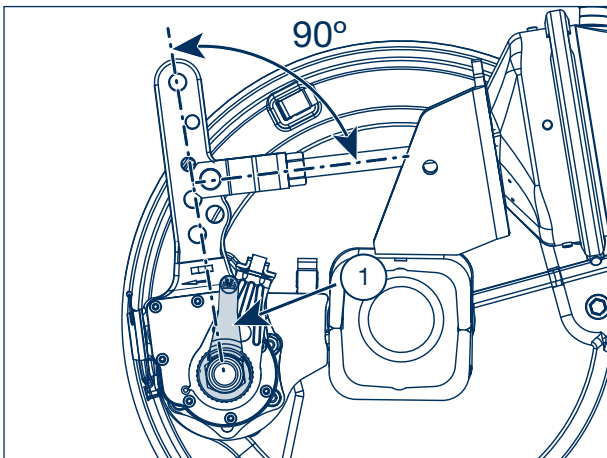


Figure 6

Lubrication 9



Repair Guide:

After cleaning the vehicle with high-pressure cleaners, all lubrication points must be lubricated again.

Brake camshaft bearing outer and inner

- after every 200 working hours, at every brake lining replacement and latest annually.

Lubricate the brake camshaft bearing through the grease nipple with BPW special longlife grease (ECO-LI 91) until fresh grease emerges from the bearing points.

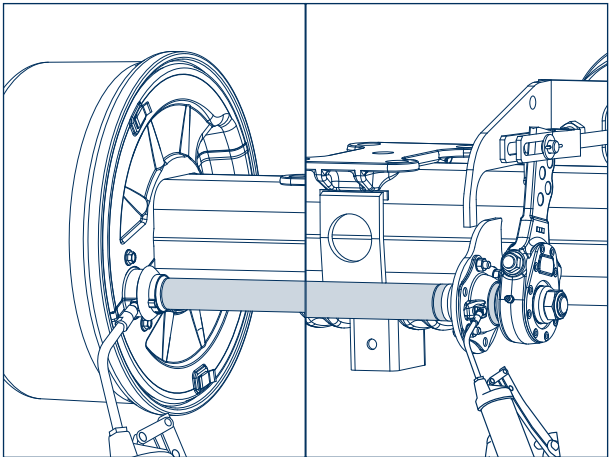


Figure 7

Manual Slack Adjuster:

- after every 200 working hours, at every brake lining replacement.

Automatic Slack Adjuster:

- after every 500 working hours, at every brake lining replacement and latest annually.

- [1] Remove the rubber seal cap.
- [2] Grease nipple with BPW special longlife grease (ECO-Li 91). Grease (80g) up to the screw sufficiently until fresh grease emerges.
- [3] Turn back adjustment screw (keep clutch sleeve pressed down) by approx. one turn using a ring spanner. Actuate the brake lever several times by hand. The adjustment must be carried out smoothly. If necessary, repeat several times.
- [4] Once again only use BPW special longlife grease (ECO Li 91).
- [5] Adjust the brake.
See Page 22.
- [6] Fit the rubber seal cap.

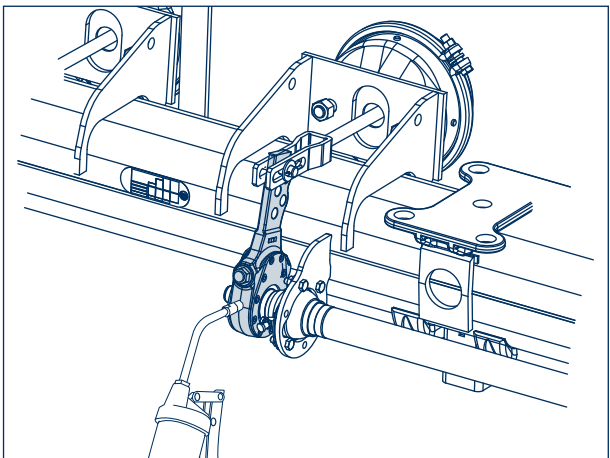


Figure 8

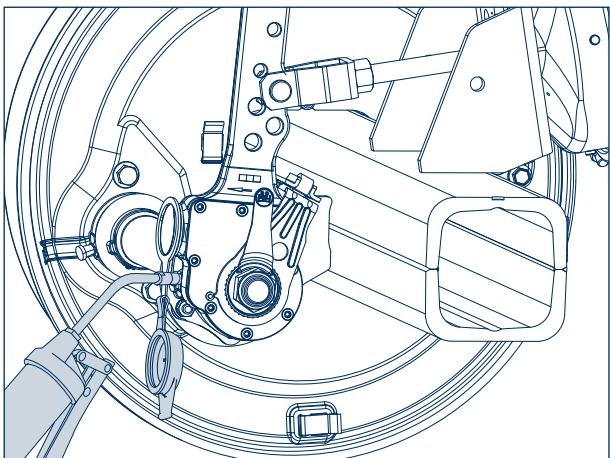


Figure 9

10 Installation of the Slack Adjuster

10.1 Automatic Slack Adjuster



Warning!
Prevent the vehicle from rolling away!
Release the park and service brake
only after lifting!

Disassembly:

- [1] Unscrew the lock nut (WAF 32) from the brake camshaft.
- [2] Remove cotter pin and clevis pin out from fork head.



Repair Guide:
Before disassembling, measure the
brake chamber push rod length and
corresponding bore of slack adjuster
linkage point because these are
important factory settings.

- [3] Depress the locking collar and turn back adjustment screw by approx. ¾ of a turn in the counterclockwise direction using a ring spanner (WAF 19), until the slack adjuster with the clevis of the brake chamber does not collide with each other.

- [4] Use a suitable puller for the slack adjuster removal.

See Chapter 4.



Repair Guide:
After removing or replacing the brake
cylinder, the camshaft or the automatic
slack adjuster must be carried out the
basic settings again.

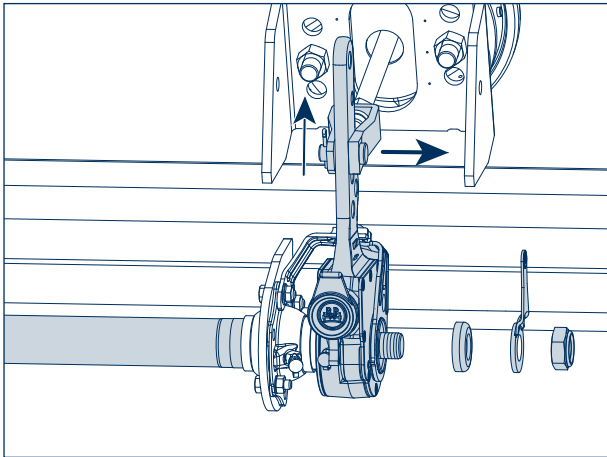


Figure 10

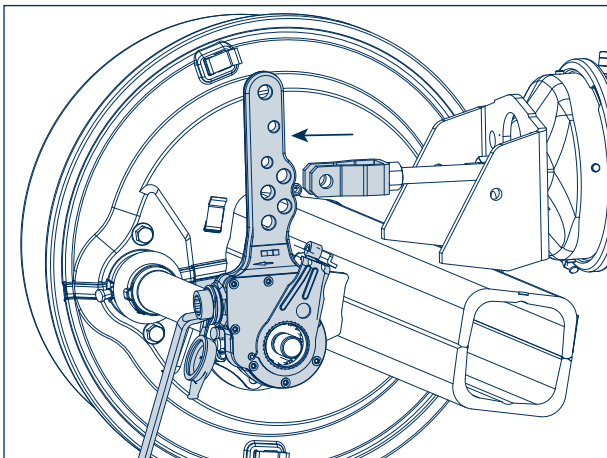


Figure 11

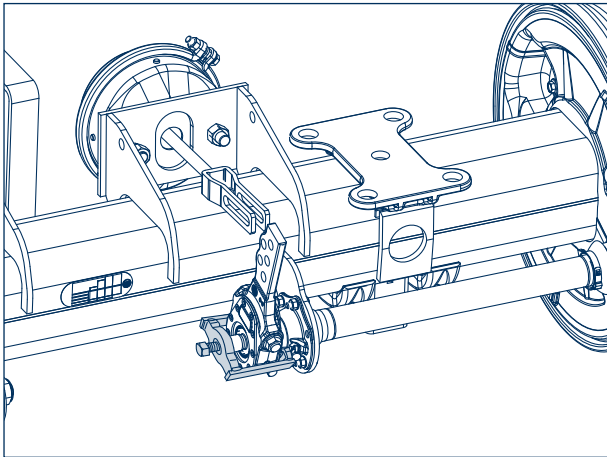


Figure 12

Assembly:

- [1] Grease the grooved part of camshaft with BPW special longlife grease ECO-Li 91.
- [2] Install automatic slack adjuster onto the brake camshaft.
- [3] The bolts of reaction bracket should not be tightened because of easier assembling of the automatic slack adjuster.
- [4] In this position, fit yoke of the reaction bracket onto control lever.
(Note left and right version!)

See Fig. 13.

- [5] Fit washer and brake lining wear indicator pointing vertically upwards. and new lock nut (WAF 32) and tighten to 80 - 90 Nm.
- [6] Remove cap, press down clutch sleeve with ring spanner (WAF 19 arrowed) and by turning to left or right, align the bolt hole in brake lever with round hole or end of slot in the clevis.
(Hook in the return spring when lever length is between 150 to 180 mm.)

See Fig. 14.

- [7] Holding the clutch sleeve down, press control arm and reaction bracket in the appropriate direction until it reaches the endstop.

See Fig. 15.

- [8] The spike on the control arm will now point to the marking pin.
- [9] Secure plate with two hexagon bolts M 8 x 25 and lock nuts (WAF 13) to inner side of camshaft support bearing cup.
Tightening torque: M = 28 Nm.



Repair Guide:
Make sure the control arm does not
move from its basic position while
tightening fasteners.

- [10] Brake adjusting.

See Page 21.

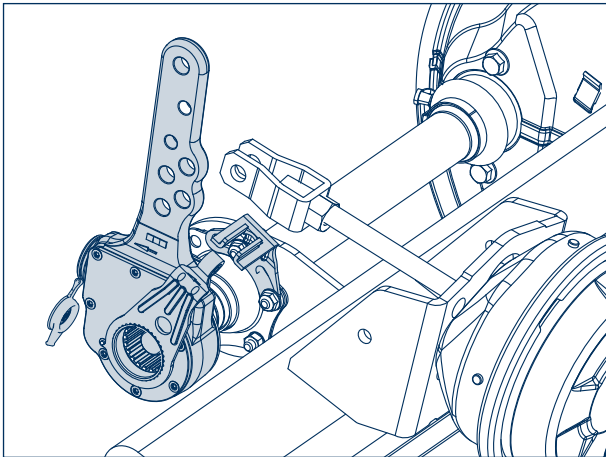


Figure 13

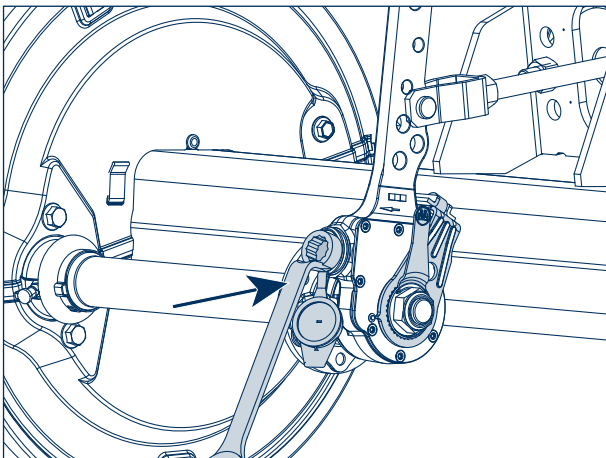


Figure 14

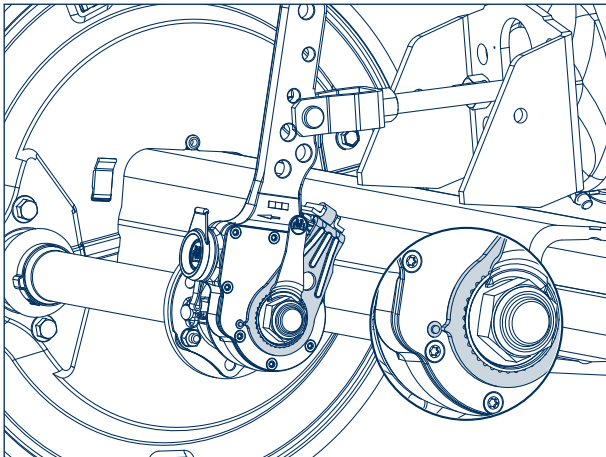


Figure 15

10.2 Manual Slack Adjuster

Disassembly:

- [1] Hook out the tension spring if fitted.
- [2] Unscrew the locking nut (WAF 32) of the brake camshaft.
- [3] Remove the clevis pin and cotter pin into the clevis of the brake cylinder.

👉 See Fig. 17.

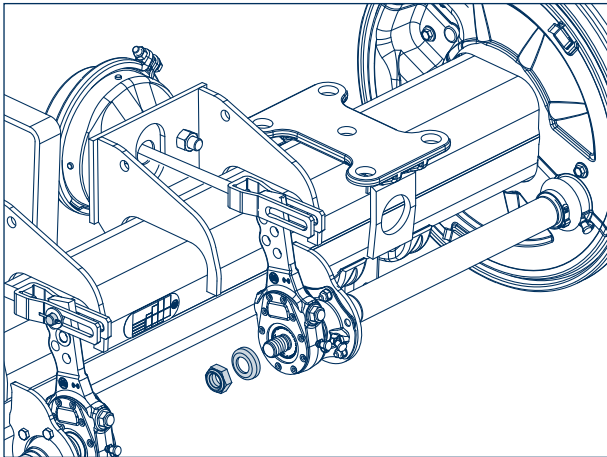


Figure 16

Repair Guide:



After changing or replacing the brake cylinder, the camshaft or the automatic slack adjuster must be carried out the basic settings again.

- [4] Turn back adjustment screw in the counterclockwise direction using a ring spanner (WAF 19). Until the slack adjuster and the clevis of the air chamber does not collide each other.

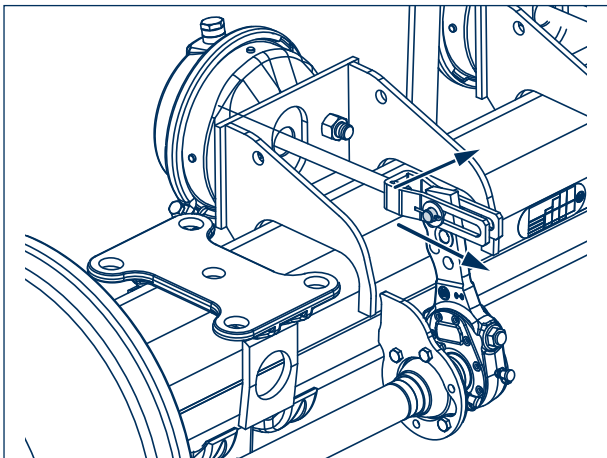


Figure 17

- [5] Use a special puller tool for the slack adjuster removal.

👉 See Chapter 4.

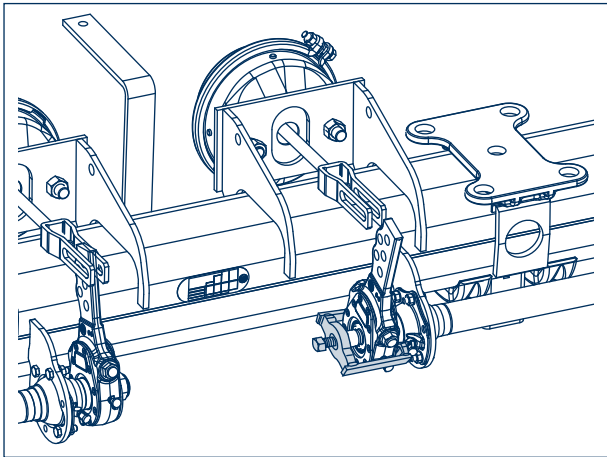


Figure 18

Assembly:

- [1] Grease the grooved part of camshaft with BPW special longlife grease ECO-Li 91.
- [2] Move manual slack adjuster onto the brake camshaft.
- [3] Place the washer with the countersink pointing towards the slack adjuster and screw on new locknut (WAF 32). Tighten to a torque of 80 to 90 Nm.

👉 See Fig. 19.

- [4] Setting of the slack adjuster: turn the screw (WAF 19) of the slack adjuster with ring spanner by left or right rotation to match to the clevis pin hole in the brake lever. Align round hole in the clevis. Insert the clevis pin and secure with a cotter pin.

- [5] Adjusting of brake.

👉 See Page 21.

- [6] Grease every lubrication point with BPW special long-life grease (ECO Li 91).

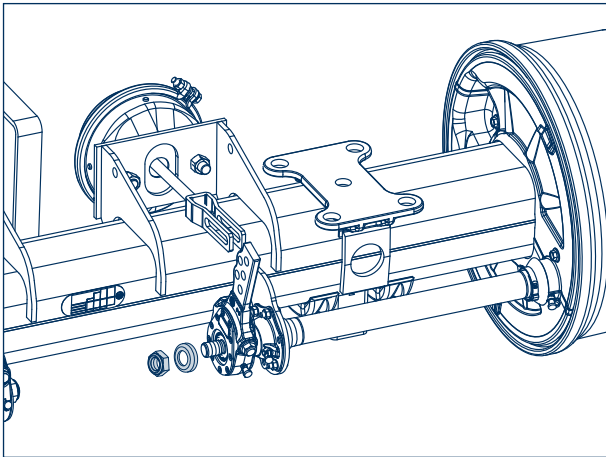


Figure 19

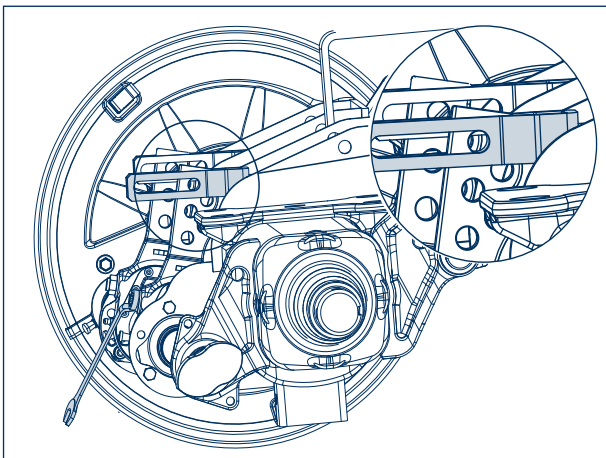


Figure 20

Tyres:

Check the tyres for uneven wear, adjust the inflation pressure if necessary according to the manufacturer's specification.

- ☉ quarterly

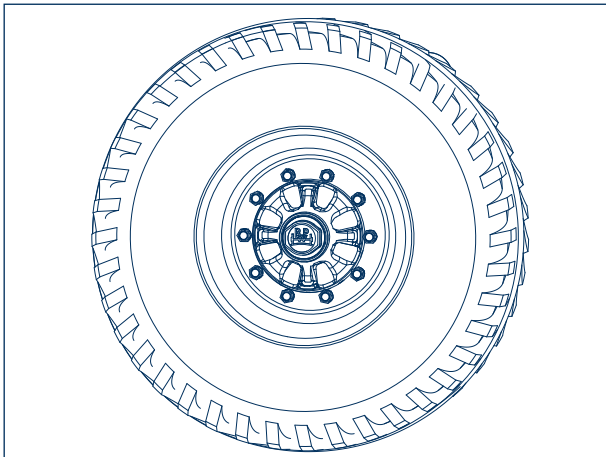


Figure 21

11 Brake lining change

11.1 Check brake lining thickness

☉ every 200 operating hours, latest half-yearly

[1] To check the brake lining thickness, open the inspection hole by pulling the rubber flap or plastic stopper.

👉 See Fig. 22.

[2] When reaching the bottom edge of brake lining wear indicator (FL and SN brake) on the brake lining, the brake lining is to be replaced.

Check the tolerable wear of the brake lining according to the table:

Brake Type	Lining thickness	Residual lining thickness
SN 4220	18 mm	5 mm
FL 4112	12 mm	5mm
FL 4118		
N 4012-3	8 mm	5 mm
N 4012-4	8 mm	5 mm
N 4008-3	8 mm	5 mm
N 4008-4	5 mm	2 mm
N 3108-3	8 mm	5 mm
N 3411-1	8 mm	5 mm
N 3006-3	5 mm	2,5 mm
S 3008	8 mm	2 mm
S 3006-7	5 mm	2 mm

At the automatic slack adjuster:

If brake lining wear indicators are fitted to the automatic slack adjusters, the minimum thickness of the brake linings is indicated by the horizontal position of the lever (when brake is released).

In certain cases the slack adjusters may not be fitted in the normal (i.e. vertical) position. In such instances, the position of the wear indicator will also be different.

👉 See Fig. 24.

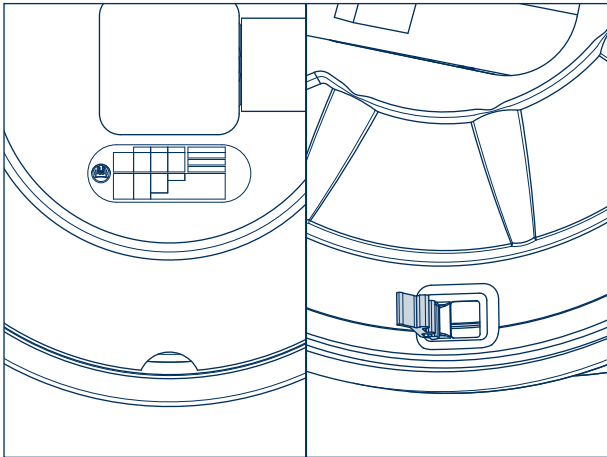


Figure 22

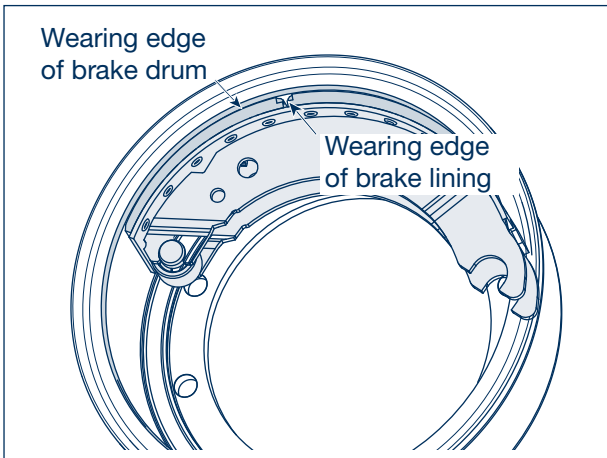


Figure 23

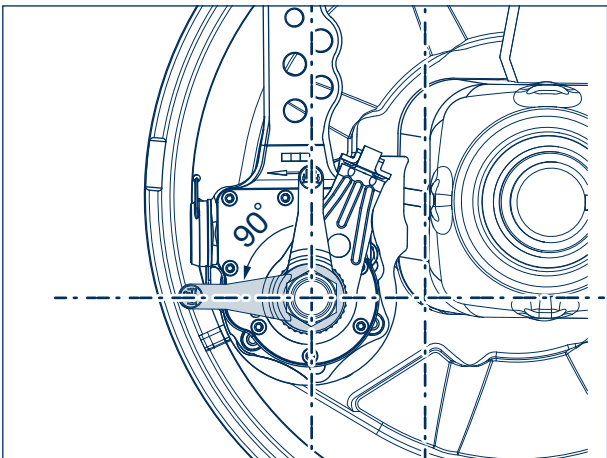


Figure 24

Disassembly of the hub and brake drum 11.2

Conventional hub bearings:



Warning!
Prevent the vehicle from rolling away!
Release the park and service brake only after lifting!

[1] Raise the axle until the tyres are off the floor and remove the tyre and wheel assembly.

[2] Unscrew the cap from the wheel hub with hub cap spanner.

👉 See Fig. 25.

(Before dismantling the hub cap the axle must be locked by the adjusting screw of the slack adjuster (clockwise rotation).

[3] Remove the cotter pin from the castle nut and remove the nut.

[4] Use a suitable hub puller and pull the wheel hub with brake drum, tapered roller bearings and sealing elements off the axle stub.

👉 See Fig. 27

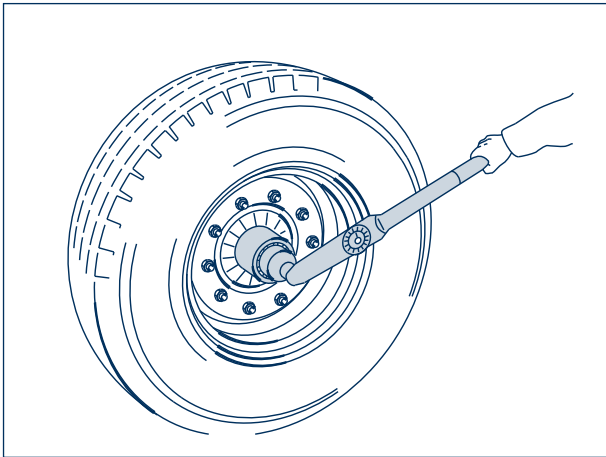


Figure 25

Repair Guide:



Mark wheel hubs and bearings together so that they are not interchanged during assembly.
It is imperative that the bearing cups are used with bearing cone back into the same wheel hub.

Repair Guide:



The assembly of the wheel hub and brake unit is carried out in the reverse order of disassembly.
Tightening torques and bearing clearance adjustment can be found in the following Workshop Manual - Agricultural Bearings BPW-WH-Agrar 55021702e.

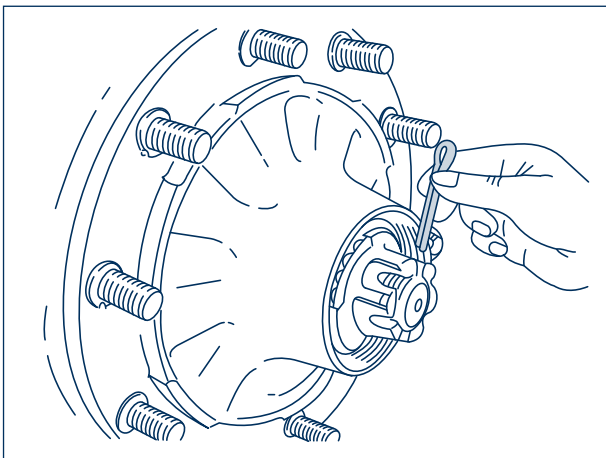


Figure 26

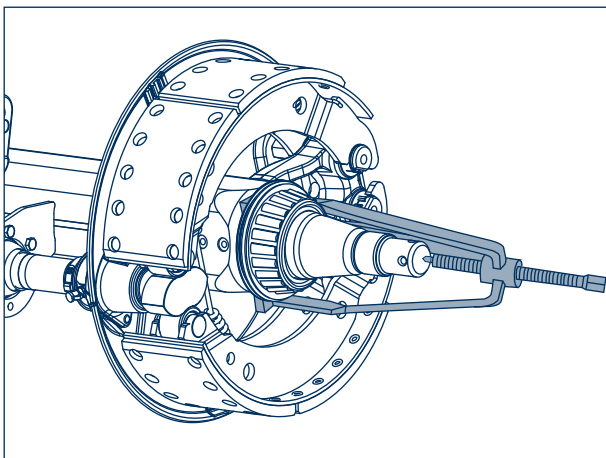


Figure 27

11.2 Disassembly of the hub and brake drum

Central Tire Inflation System with KM axle nut:

- [1] Remove wheels. Screw the air pressure connection out of the wheel hub cap or the axle stub.



Note:

Refer to the operating instructions of the control system manufacturer.

- [2] Unscrew the hub cap.

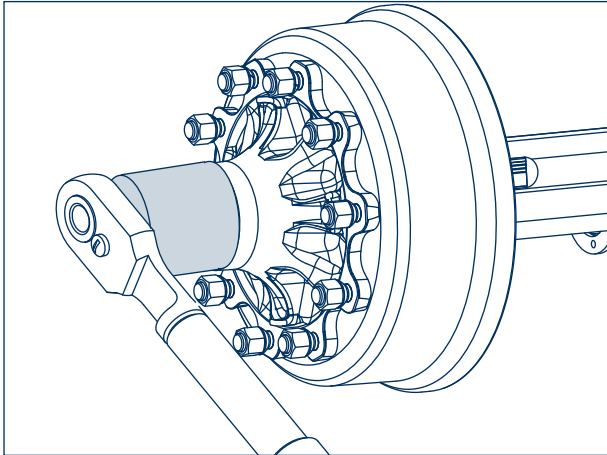


Figure 28

- [3] Screw down the outer KM axle nut and remove the retaining plate.



Repair Guide:

Reuse of the disassembled locking plate is prohibited!
It must be replaced!

- [4] Unscrew the inner KM axle nut and remove the washer.
Pull off the wheel hub unit, the tapered roller bearing and sealing elements with a suitable puller from the axle spindle.

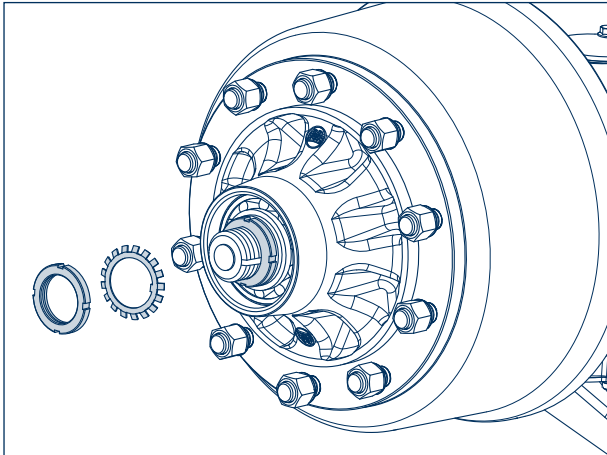


Figure 29



Note:

The wheel hub brake drum unit must be secured against falling.



Repair Guide:

Mark the hubs and bearings so that they are not mixed up during assembly!
It is imperative that the bearing inner rings with rollers are reinserted in the same hubs.

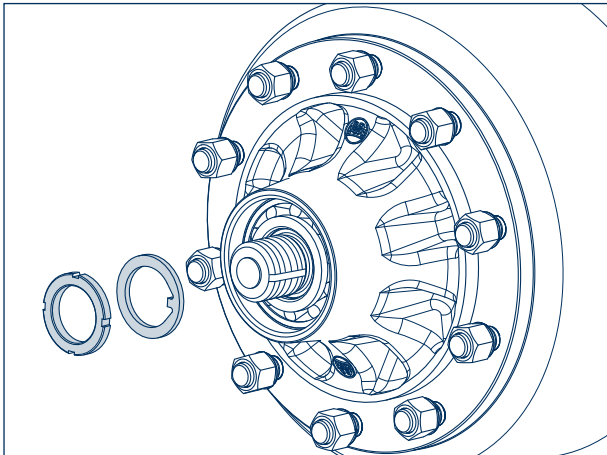


Figure 30



11.3 Replacement of brake linings

- [5] Turn back the slack adjusters through the adjusting screw with wrench counter-clockwise until it reaches the zero position of the brake camshaft.
- 👉 See Fig. 31.

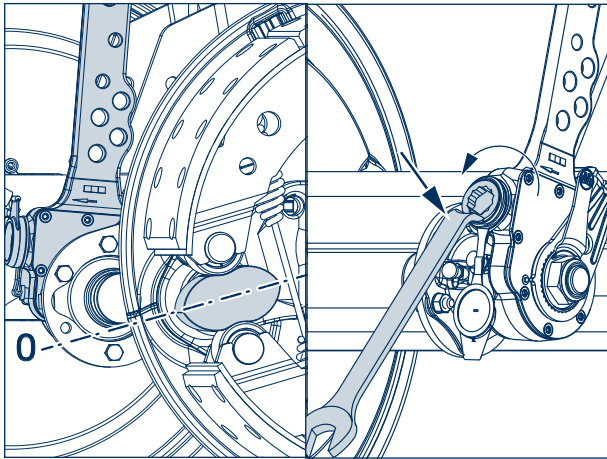


Figure 31

- [6] Hook out of the positioning springs with a screwdriver.
- 👉 See Fig. 32.

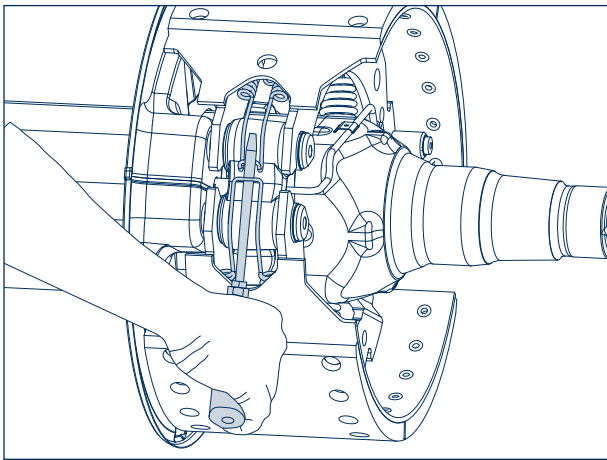


Figure 32

- [7] Raise the upper brake shoe by means of a crow-bar according to Fig. 33.



Repair Guide:

Protect sensor and sensor cable from damage.

- [8] Remove the brake shoes.

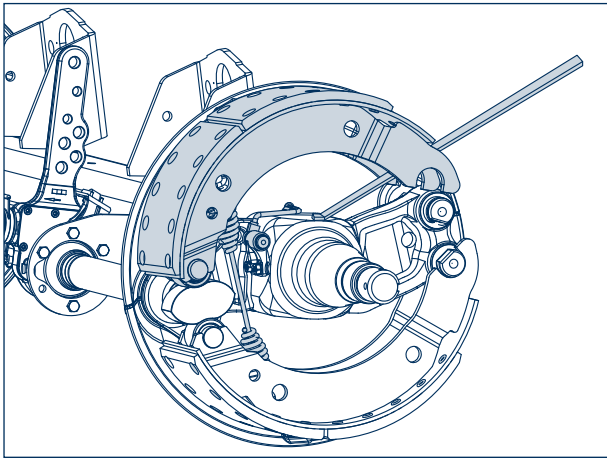


Figure 33

- [9] Remove tension spring (1) from the brake shoes.

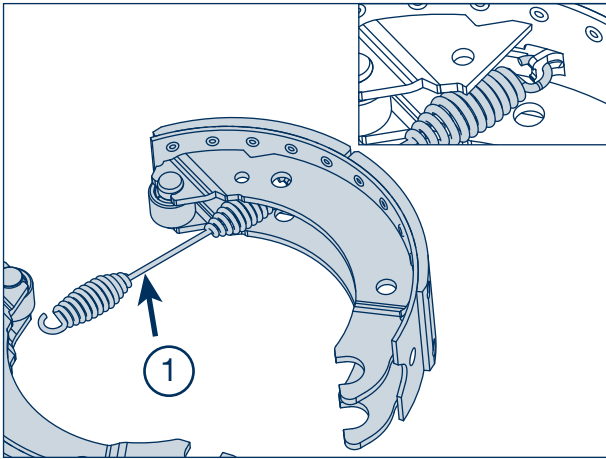


Figure 34

- [10] Remove the positioning spring (2) from the brake shoes.

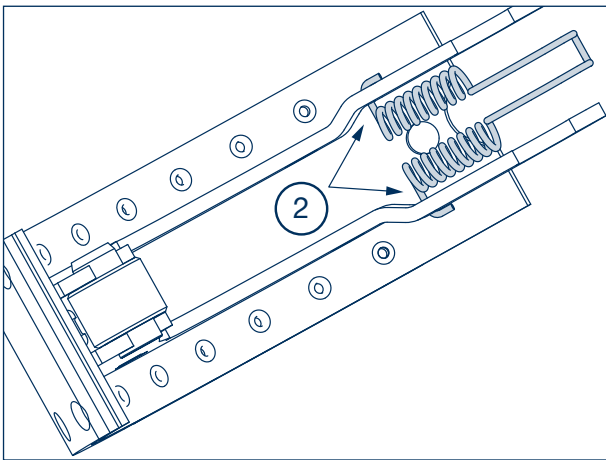


Figure 35

- [11] Clean the contact surface of the brake shoes - it must be free of rust and be flat.

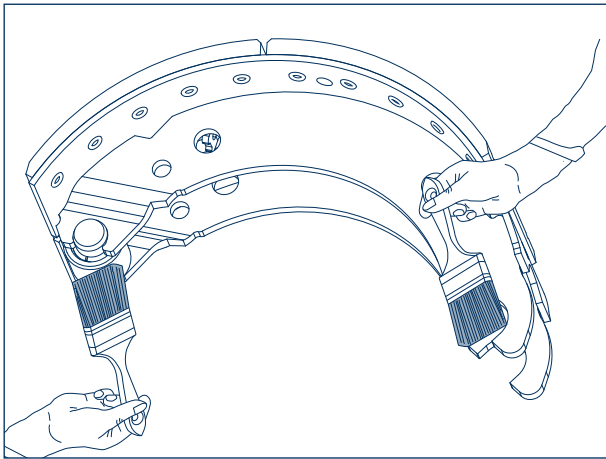


Figure 36

11.3 Replacement of brake linings

[12] Remove old brake lining and clean the brake shoes. The surface must be free of rust and be smooth.

Repair Guide:

The rivets should always be pressed out using a riveting machine, preferably with hydraulic actuation. The applied equipment must be suitable for the rivet diameter. Modern rivet punches can universally accept hollow and semi hollow rivets. The use of unsuitable rivet punches may damage the brake shoe.

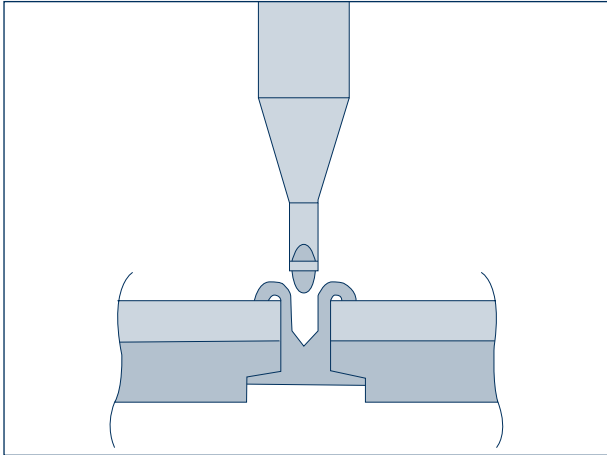


Figure 37

If there is no riveting machine available:

Remove the closed head using a 8.6 mm diameter drill bit (No.2) or drive out the rivet with a punch (No.1).

See Fig. 38.

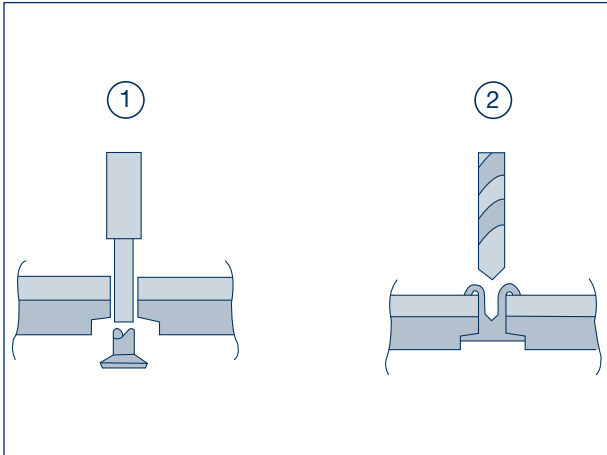


Figure 38

[13] Check the diameter of the rivet hole using a rivet hole gauge. The diameter is not allowed to be more than 0.6 mm larger than the rivet diameter (DIN 7513).

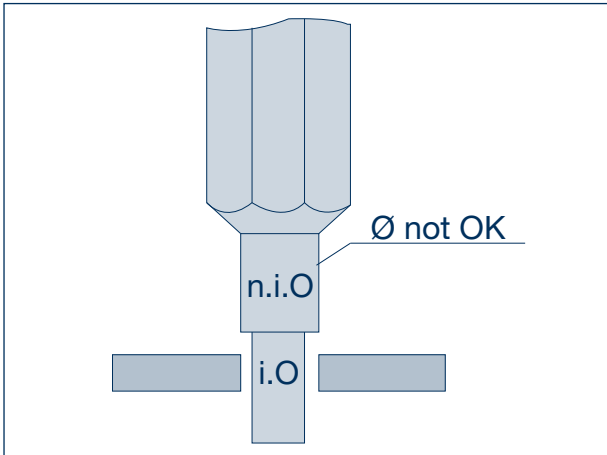


Figure 39

Note:
The re-usability of brake shoes must be checked. The damaged and worn parts must be replaced.

Common errors:

- 1 Loose rivets indicate enlarged rivet holes
- 2 Rivet hole damaged during drilling
- 3 Damaged platform edge
- 4 Worn shoe support
- 5 Deformed shoe web
- 6 Rivet hole deformed during drilling
- 7 Rivet hole damaged by riveting machine
- 8 Corroded platform area
- 9 Damaged shoe web end
- 10 Worn shoe roller bush
- 11 Cracked welding seam
- 12 Damaged platform surface
- 13 Corroded welding seam
- 14 Deformed platform surface

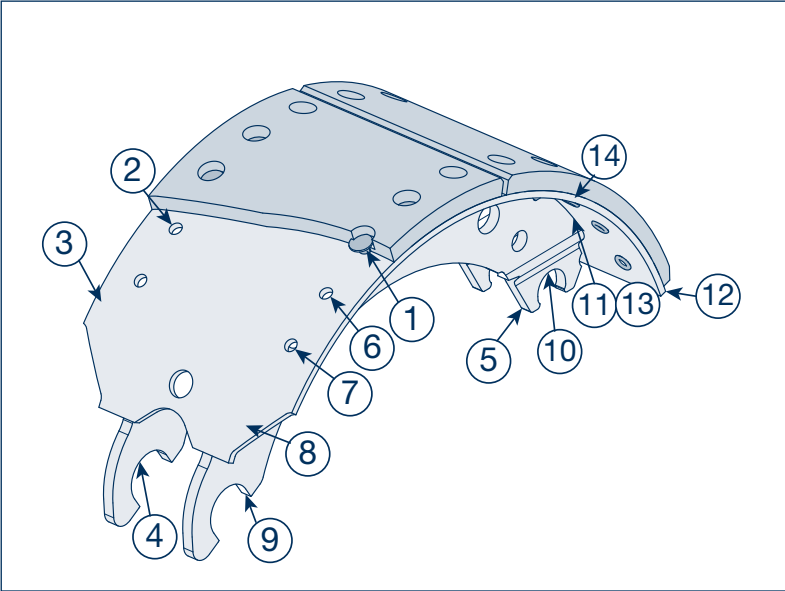


Figure 40

[14] Insert all rivets and hold in position by crimping edges. Rivet brake lining into place taking care to follow the correct riveting order.

Repair Guide:
Observe the position of the brake linings. The wear edges on linings face the centre of the brake shoe. See Fig. 41.

Rivet as shown from the inside out.

See Fig. 41.

Riveting force: **21000 N** (20000-22000 N)

Rivets: Semi-tubular rivets, galvanized steel
8 x 15 mm meeting DIN 7338 B

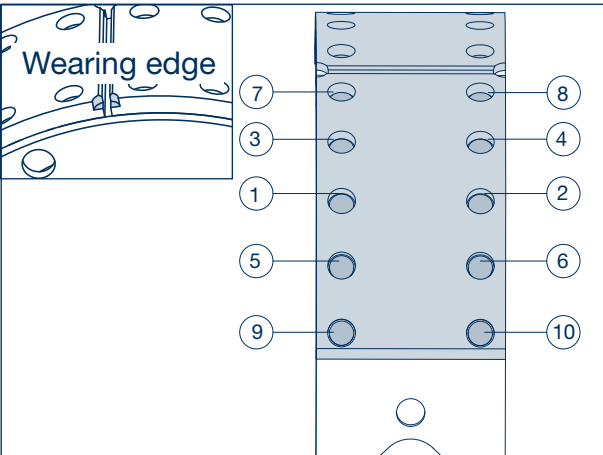


Figure 41

11.4 Control of riveting

Repair Guide:

Observe the correct position of the rivet.

- Figure 42., Pos. 1:
Rivet length correct, the hole inner wall and strength are correct.
- Figure 42., Pos. 2
Rivet too short, no inner hole recess and poor closing head formation.
- Figure 42., Pos. 3
Rivet too long, inadequate closing head, crack formation.

Further examination of the brake linings:

- A feeler gauge can be used to check for cavities under the lining. The cavity of more than 0,1 mm beyond the first row of rivet holes can lead to noise problems.
 See Fig. 43.
- Finally, the linings should be checked for cracks in the area of the rivets which would indicate incorrect riveting.

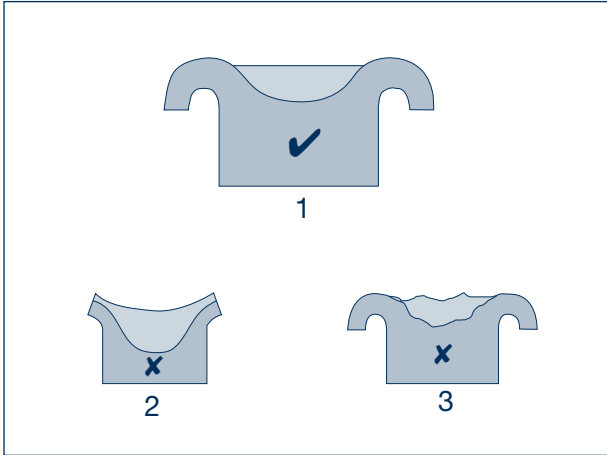


Figure 42

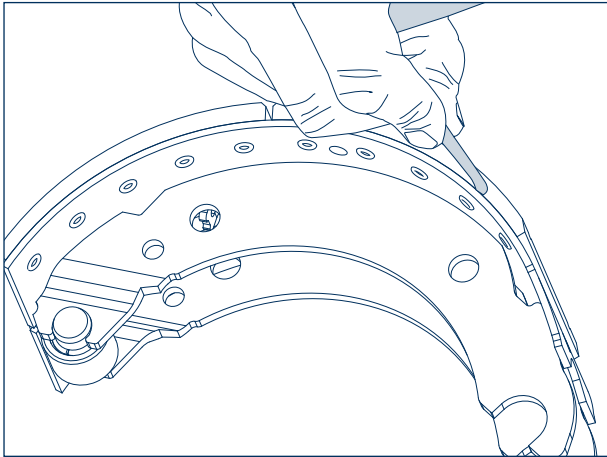


Figure 43

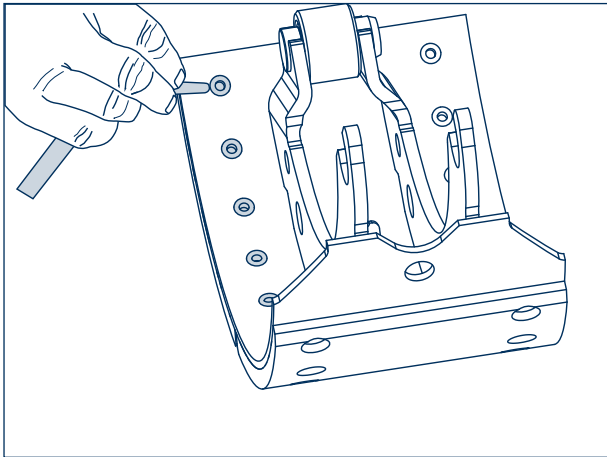


Figure 44

Brake shoe mounting 11.5

- [15] Check roller (1) for wear, replace as appropriate. Remove bearing bolts (2).

Repair Guide:

In the event of wear, exchange roller bush bolts and rings.

- [16] Clean roller bush and apply BPW special longlife grease ECO-Li 91 (4 g).

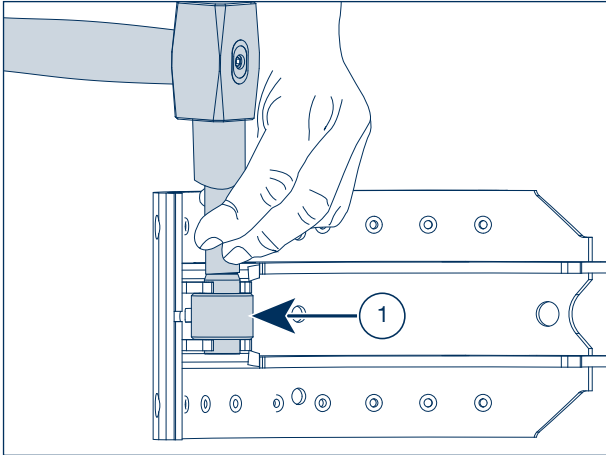


Figure 45

- [17] Insert the new roller (1) with two rings (3) into the brake shoe webs.
 See Fig. 46.

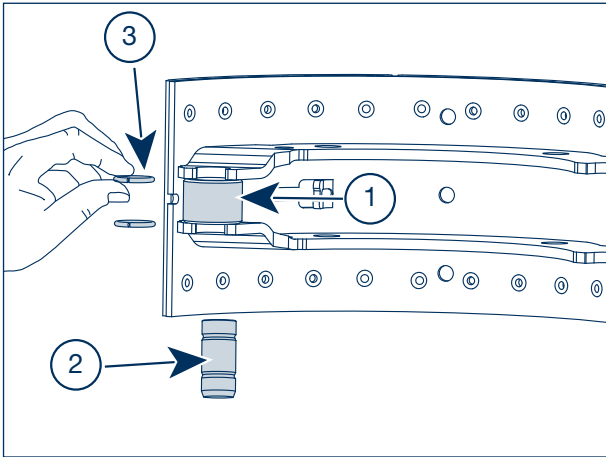


Figure 46

- [18] Drive in bearing bolt with the tapered end facing down, until both rings sit into the grooves of the bearing bolt.
 See Fig. 47.

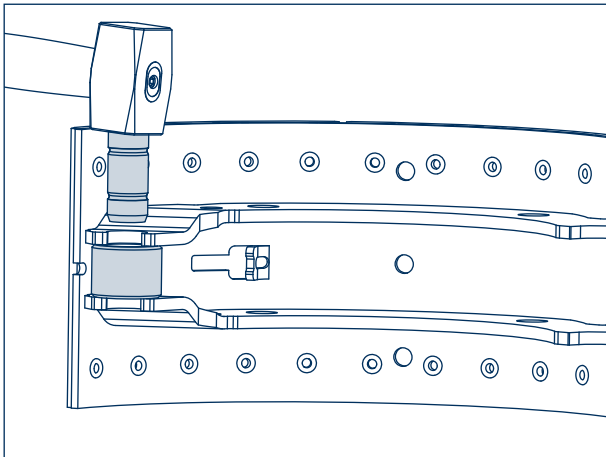


Figure 47

11.5 Brake shoe mounting

Repair Guide:

Insert new return springs every time the brake linings are changed.

- [19] Insert the return spring (1) into the lugs of the brake shoes.
(The lugs are formed from the base plate of the brake shoe by pressing.)

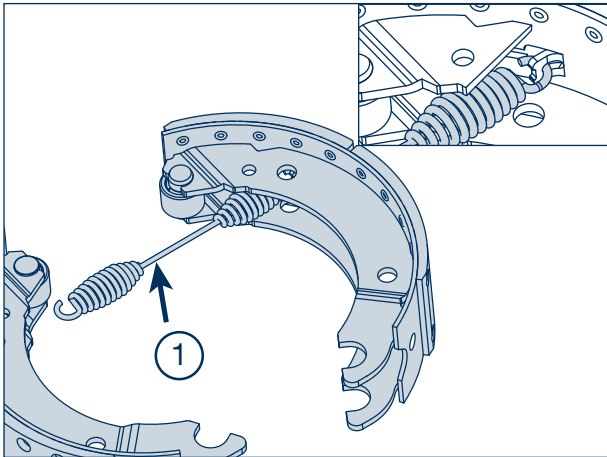


Figure 48

Note:

Pay attention to the correct position.

- [20] Hook the positioning springs (2) into the brake shoes.

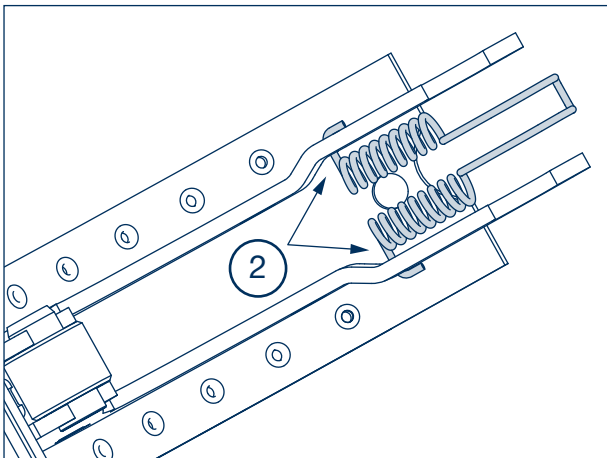


Figure 49

Only for models with ABS:

- ⦿ Check sensor (3) for damage and displacement (displacement force 100 - 200 N).
- ⦿ If necessary, smear clamping bush (4) and sensor with special silicon grease (replace clamping bush).
- ⦿ Before fitting hubs, always press clamping bush and sensor up to end stop.
- ⦿ When fitting the hub, the sensor will be pushed back into the appropriate position by the exciter ring.

See Fig. 50.

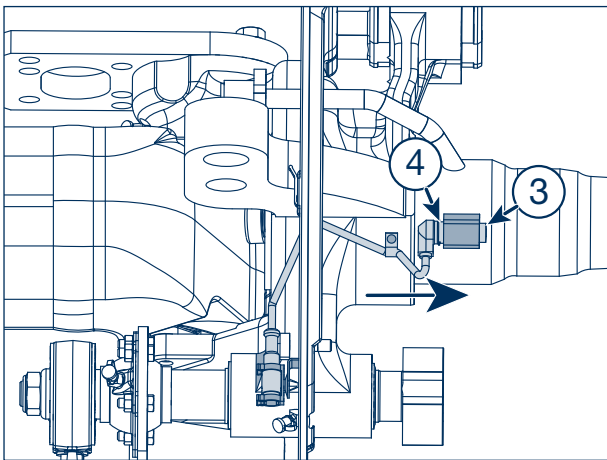


Figure 50

Mounting the brake shoes 11.6

Check C-clips (1) on the brake anchor plate for wear and seating, replace if necessary.

Repair Guide:

The C-clips must be exchanged at the latest when changing the brake linings.

- [21] Remove cover plates from the axle.
- [22] Remove the C-clips (1) by means of a screwdriver from the brake anchor plate.

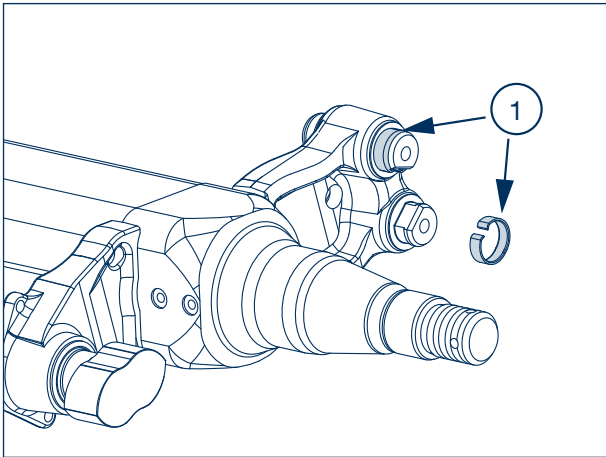


Figure 51

- [23] Clean the contact surface for pin the C-clips thoroughly.
- [24] Drive up the new C-clips (1) by means of an iron pipe and a bronze hammer on to the brake anchor pin in the correct position then smear the surfaces with BPW special longlife grease ECO-Li 91.

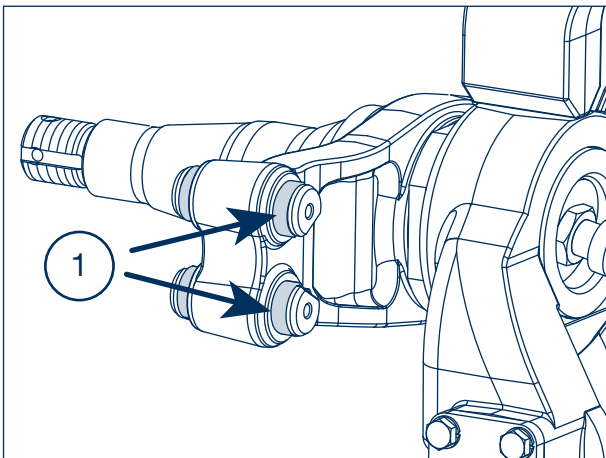


Figure 52

11.6 Mounting the brake shoes

[25] Put the upper brake shoe in position, resting one end of the brake shoe on the anchor pin and the other end on the camshaft.
(Camshaft to be in zero position.)

[26] Fasten the upper brake shoe on the C-clips with the help of a plastic hammer.

See Fig. 53.

i

Note:

Do not knock the brake linings, because it can cause damage.

[27] Turn over the lower brake shoe on place, thereafter fix the lower brake shoe on to the C-clips with the help of a plastic hammer.

See Fig. 54.

[28] Connect the retaining springs with each other using a screwdriver, then check the appropriate position of the brake shoes on the C-clips.

See Fig. 55.

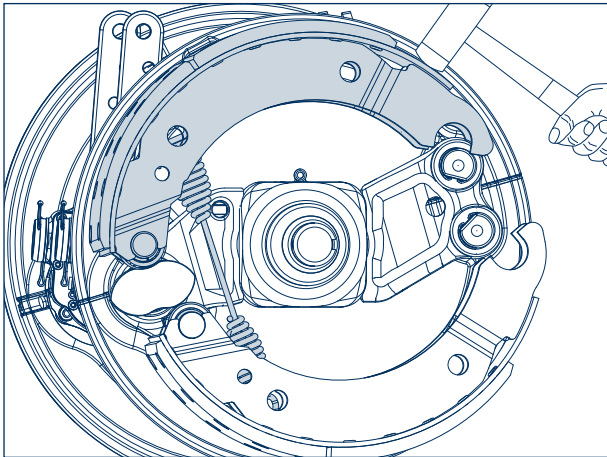


Figure 53

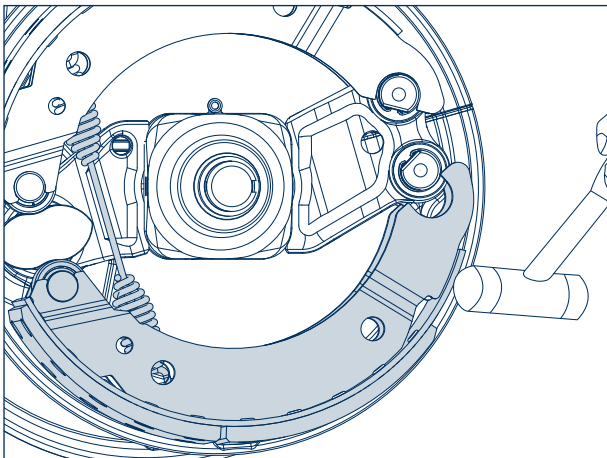


Figure 54

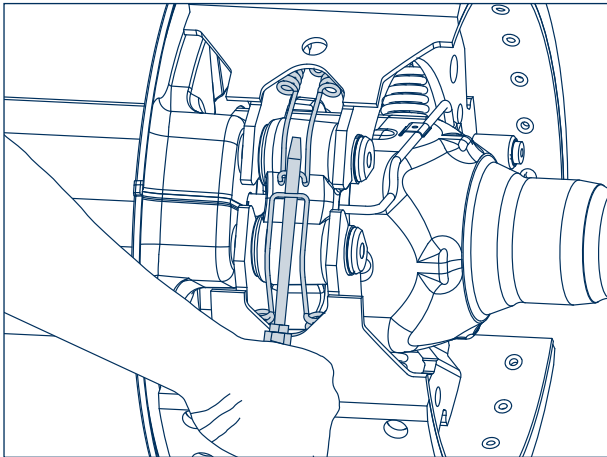


Figure 55

i

Note:

The new brake linings must be arc grinding in order to achieve the appropriate diameter and contact surface between the brake drum and brake lining.

[29] The dimension of the turning (b) (FL brake system Fig. 56 and N brake system Fig. 57) must be adjusted with the help of the slack adjuster.

Nominal diameter Ø	Arc grinding diameter (a)	Adjusting measure (b)
420	421,2	70,5
410	409	64
400	400,2	38
310	310,2	37,5
300	300,2	26,5
340	340,2	38

[30] Using a brake lathe grind down the brake linings to fit the brake drum diameter until an even wear surface has been obtained.
After brake grinding the brake shoes must be measured for size and parallelism.

!

Health and safety precautions!

Brake dust contains large volumes of respirable fine dust and is hazardous to your health, even in case of non-asbestos material. Safety regulations prescribe extraction systems with a suction power between 40 and 50 m³/h. Wheel brakes must never be cleaned using compressed air or cleaned with a dry brushes.
It is strongly recommended to use clean water without chemical additives or a special vacuum cleaner machine to clean the brakes. The use of detergents might impair the braking effect.

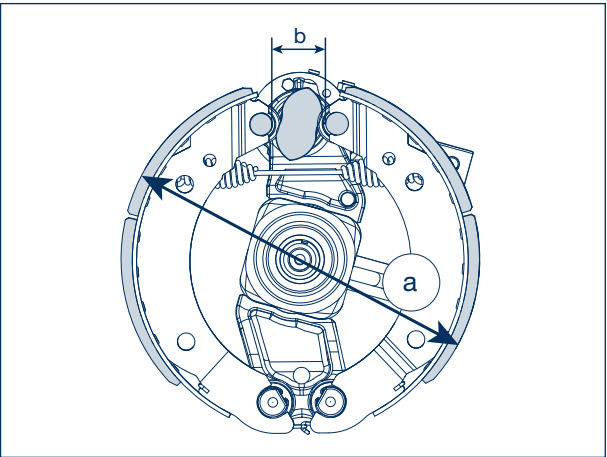


Figure 56

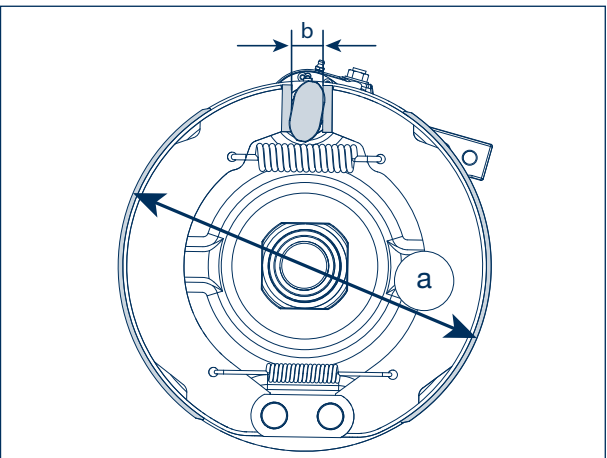


Figure 57

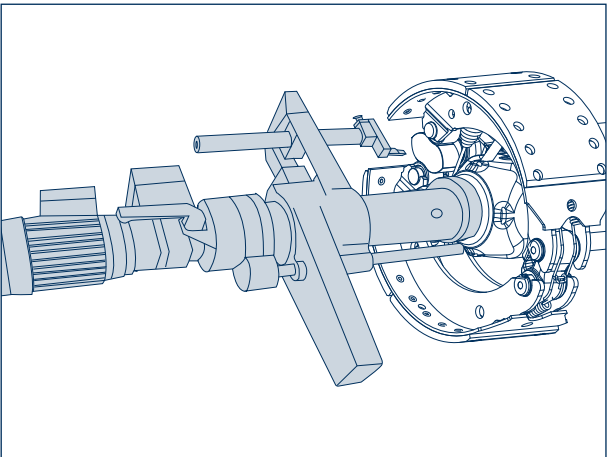


Figure 58

11.7 Checking the brake drum

- [31] Inspect the brake drum condition for further usability. The brake surface should be free of scoring, excessive heat checks and free of cracks.
- [32] The brake drum is provided with wear indicator. Measure and make ensure there is brake surface diameter is within the permitted maximum diameter.
The following chart shows the maximum permissible wear and resurfacing diameters. If any portion of the brake surface exceeds the maximum diameter it must be discarded.

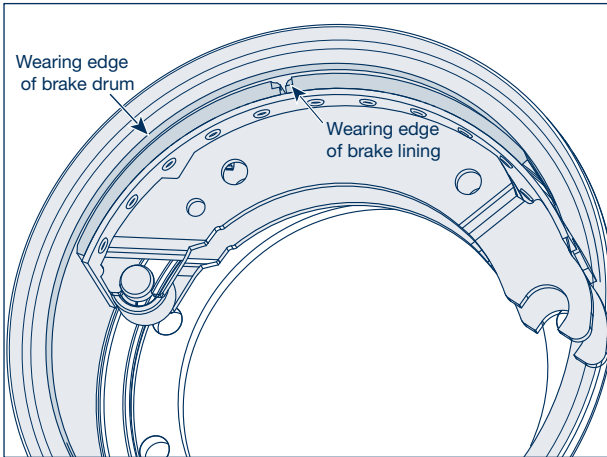


Figure 59

Max. amounts of wear, measured at the position with the greatest wear:

Brake typ.	Nominal diameter (mm)	Shoe width (mm)	ØMax. amount of wear (mm)	Ø Max. resurfacing diameter (mm)
SN 4220	420	200	425,5	424
FL 4112 / 4118	410	120 / 180	413,5	413
N 4008-4	400	80 / 120	404	403
N 3411-1	340	110	343	342
N 3108-3	310	80	313	312
N 3006-3	300	60	303	302
S 3008	300	80	301	---
S 3006-7	300	60	303	---



Note:
The wear indicator is formed on brake drum on the FL and SN brake systems.
The wear indicator is visible if you remove the dust covers or brake drum.

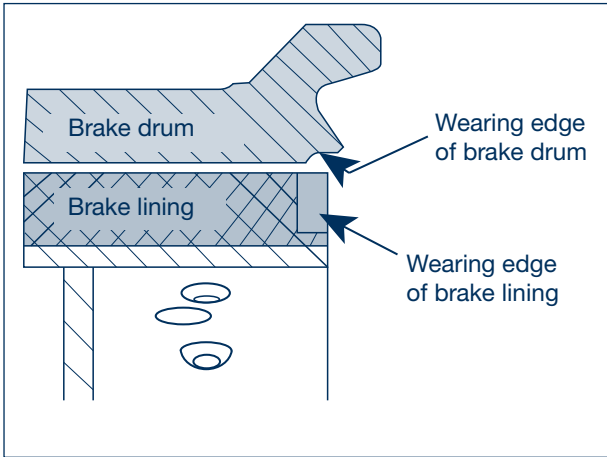


Figure 60

Dust Cover Plate 12

Disassembling:

- [1] Unscrew the lock screw (WAF 13) and Allen screw (WAF 8) out of brake anchor plate.
- [2] Remove the dust covers.

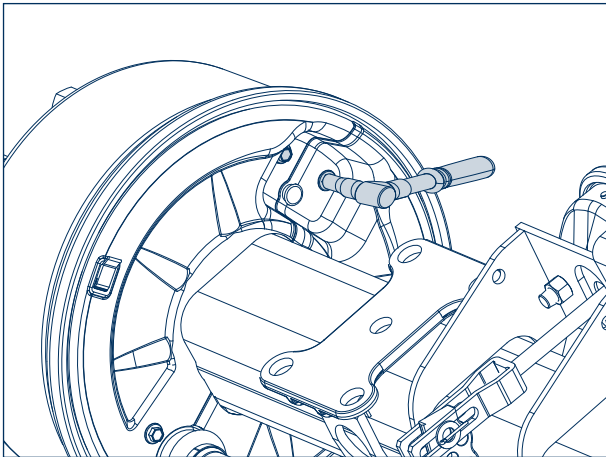


Figure 61

Assembling:

- [3] Put on the dust cover and fasten with the lock screw on the brake anchor plate.
Mount the opposite dust cover, in the same way.

Tightening torque:

- ⦿ Locking screw: 38 Nm
- ⦿ Self-tapping screw: 43 Nm

Repair Guide:



Check cover plate for correct seating on the edge of the brake drum, if necessary slightly readjust it.
Pay attention to ABS sensor cable and insert in appropriate position.

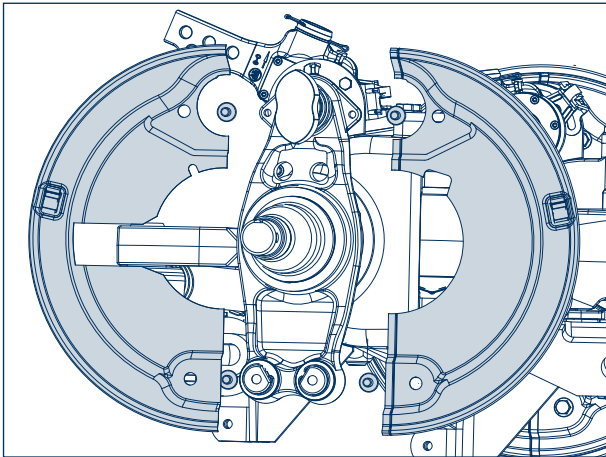


Figure 62

12.1 Mount dust cover plates with tension spring

Disassembly:

- [1] Remove tension spring (1) from front cover plate.

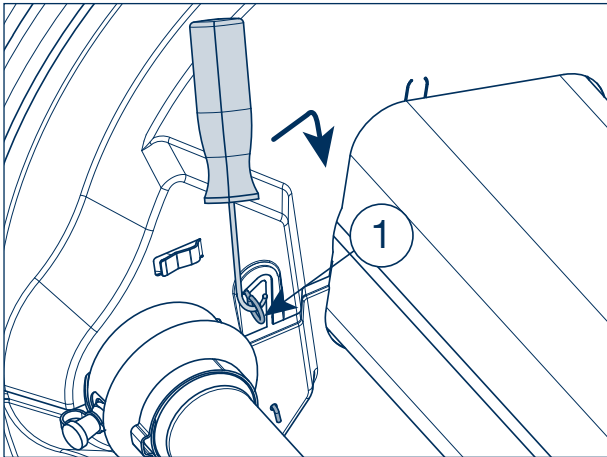


Figure 63

- [2] Unscrew securing screws (2, M10 / SW 13) from the brake anchor plate.
- [3] Remove cover plates.

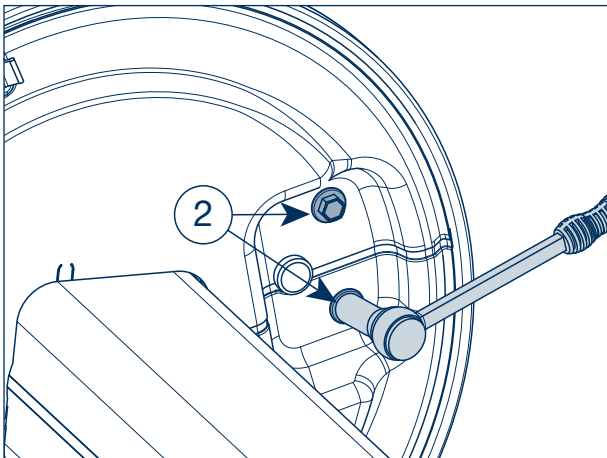


Figure 64

Assembly:

- [4] Check tension spring (1) on cover plate for corrosion, install new one if necessary.

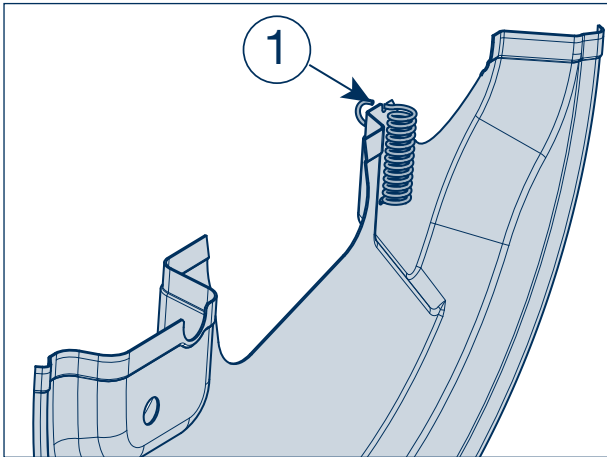


Figure 65

- [5] Insert cover plate with tension spring (1) into the groove (arrow) on the brake anchor plate (camshaft side).

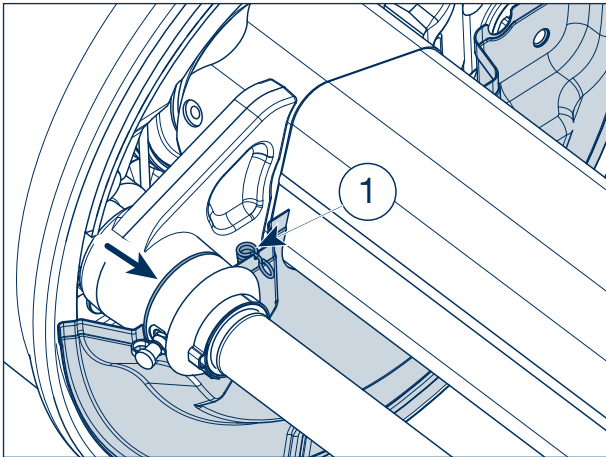


Figure 66

- [6] Fasten the cover plate with the locking screw (2, M10 / SW 13) to the brake anchor plate.

Tightening torque:

$M = 43 \text{ Nm}$

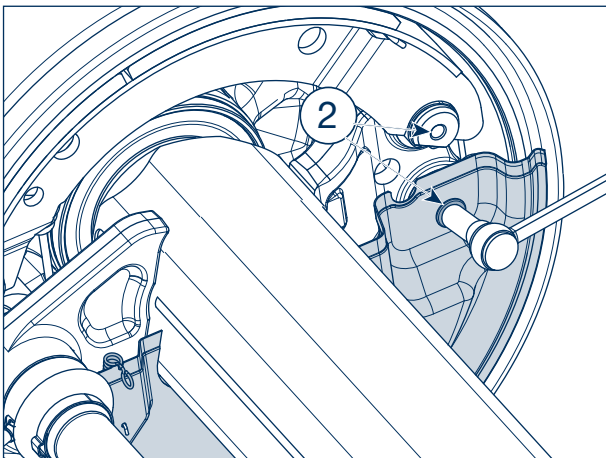


Figure 67

- [7] Mount the opposite cover plate in the same way.
- [8] Hook-in the tension spring (1).

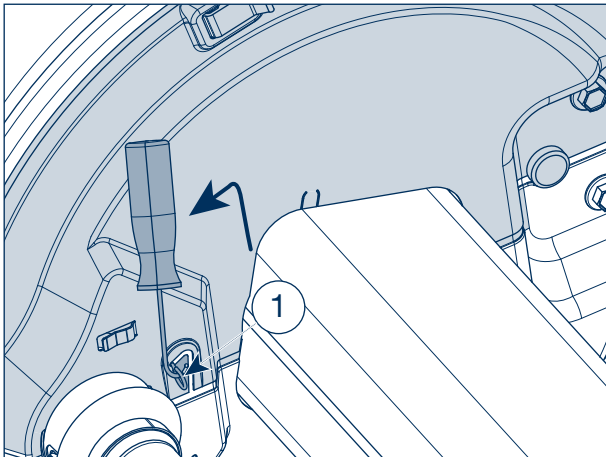


Figure 68

13 Brake camshaft

Dismount:

- [1] Remove the retaining ring (1) from the groove of the camshaft.
See Fig. 60.

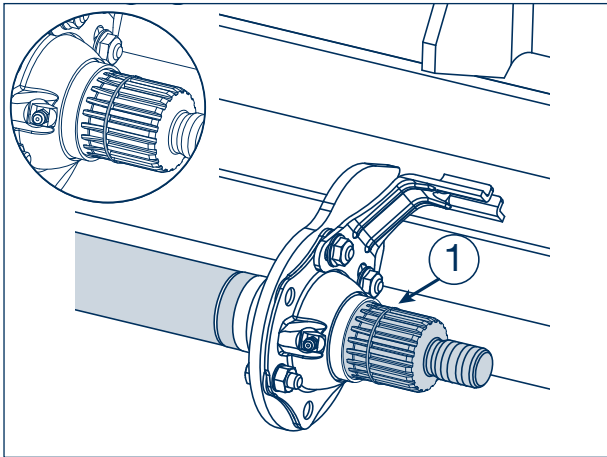


Figure 69

- [2] Unscrew the hex nuts (WAF 13), spring washers and the screws.
- [3] Remove shaped plate (2).

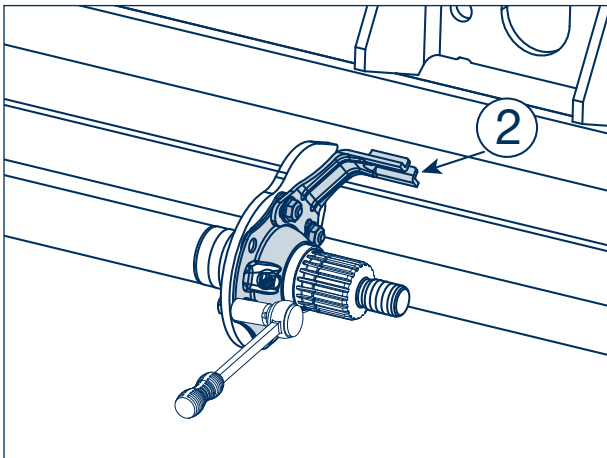


Figure 70

- [4] Remove spherical bearing support plates, then check the spherical bearing (3) and the two sealing rings (4) for wear (max. bearing play 0,8 mm).
See Fig. 71.

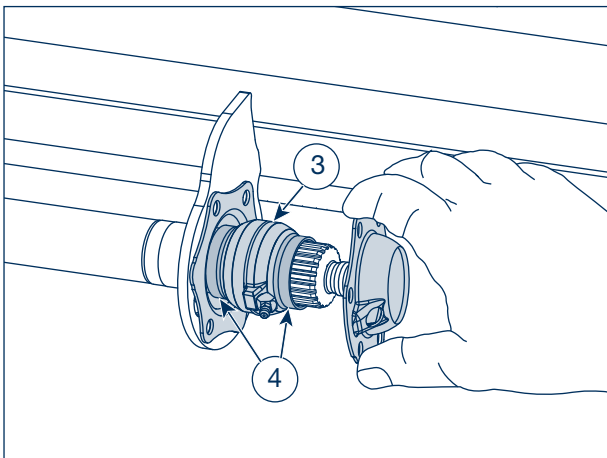


Figure 71

- [5] Open the securing clip (5) of the the rubber seal.
- [6] Move the rubber seal (6) with the securing clip toward the centre of the camshaft.
- [7] Remove circlip (7) from the groove. Take brake camshaft out of the brake anchor plate.

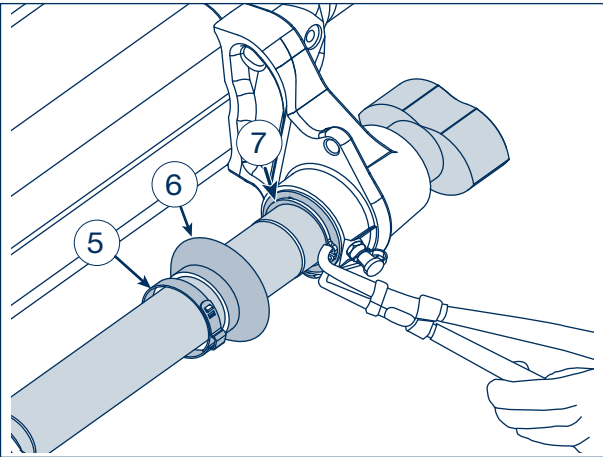


Figure 72

- [8] Check bush (8) in brake anchor plate and if necessary, change it (max. bearing play 0,8 mm).
- [9] Drive in new bush with a mandrel with the ring groove (arrowed) pointing towards the grease nipple.
See Chapter 4.
- [10] On the outside, the bush must stand back $7,2^{+0,5}$ mm. Only apply light strokes when driving in and out, apply counter-pressure to brake anchor plate if necessary.

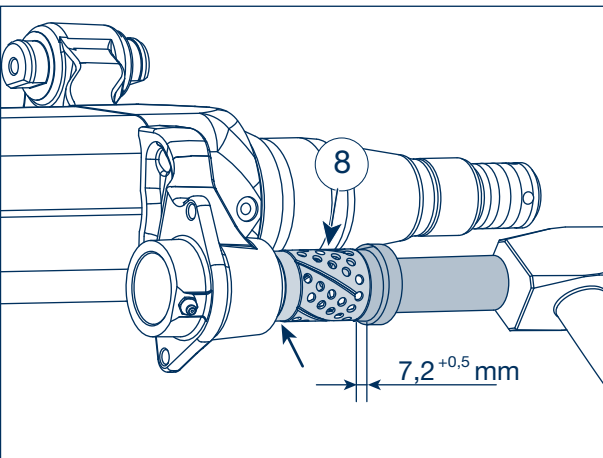


Figure 73

13 Brake camshaft

Assembly:

- [1] Brake camshaft FL series:
Push combined seal (1) and O-ring (green, 2) up to the bearing seat.
- [2] Insert O-ring (black, 3) into the groove of the brake camshaft.
- [3] Grease bearing with BPW special longlife grease ECO-Li 91.

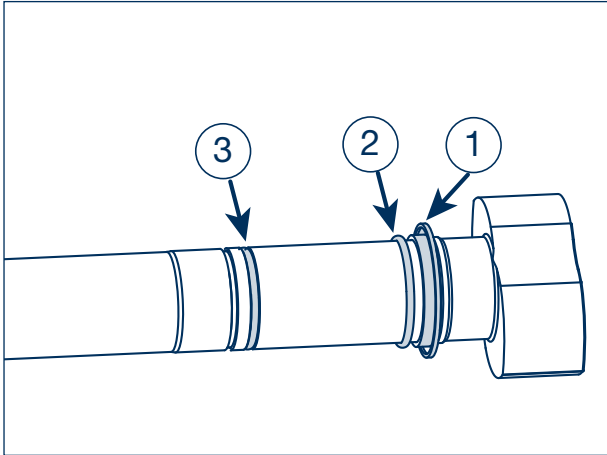


Figure 74

- [4] Insert the brake camshaft halfway into the brake anchor plate.
- [5] Push on the plastic ring (4) with the domed side pointing towards the middle of the axle, circlip (5), rubber seal (6) and the clamp (7) onto the brake camshaft.

👉 See Fig. 75.

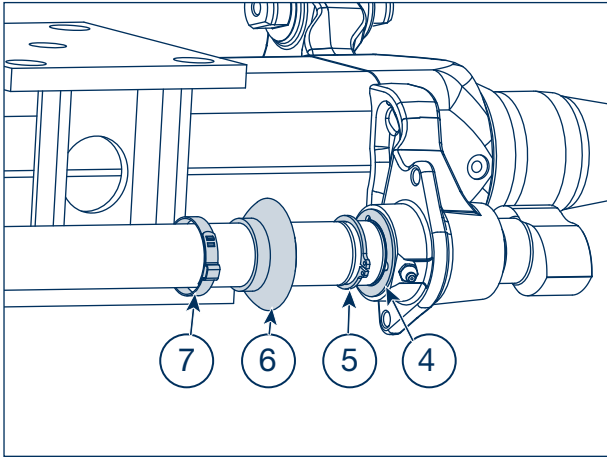


Figure 75

- [6] Push the brake camshaft to the stop on the brake carrier.
- [7] Place the plastic ring (5) until it contacts the brake carrier.
- [8] Insert the circlip (5) in the groove of the brake camshaft.
- [9] Place the rubber seal (6) and secure with clamp (7).

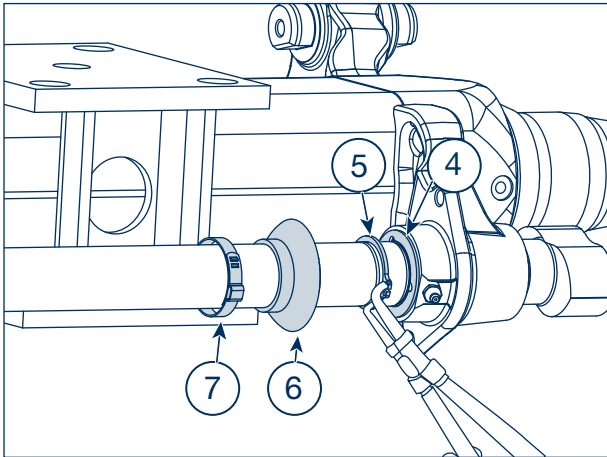


Figure 76

- [10] Install spherical bearing (8) with the two greased sealing rings (9) inner and outer, to the support bearing holder.



Repair Guide:

When mounting, the grease nipple must face the brake lever.

- [11] Replace the self-tapping bolts with hexagon bolts.
- [12] Mount the hex nuts (WAF 13) towards the slack adjuster and tighten it with the prescribed tightening torque 23 Nm.

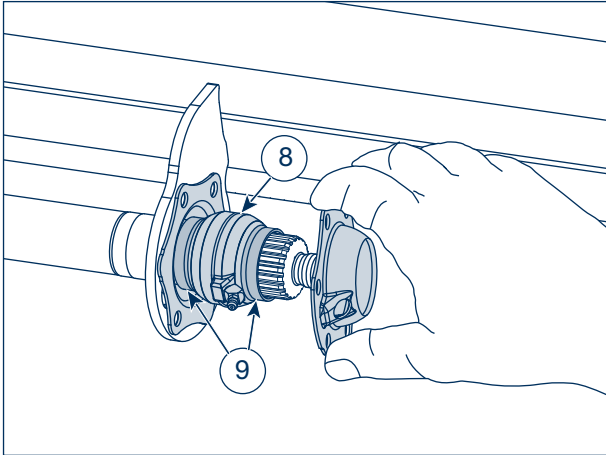


Figure 77



Repair Guide:

Tighten hexagon nut crosswise with torque wrench to the tightening torque.

- [13] Check that the brake camshaft rotates freely.
- [14] Place the rubber seal (6) to the surface of the brake carrier.
- [15] Install the securing clip (7).

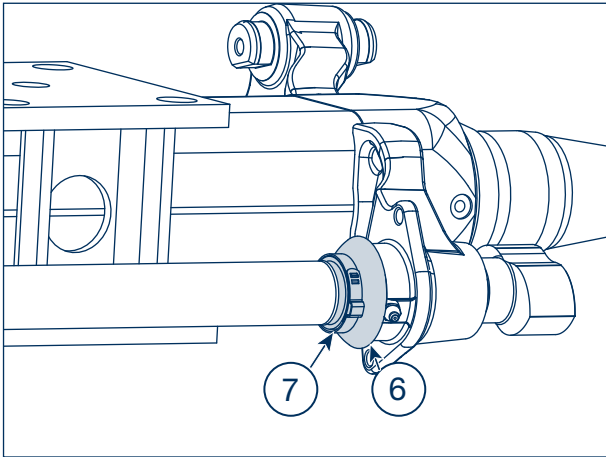


Figure 78

- [16] Place the locking ring (10) into the groove of the camshaft.



Repair Guide:

Should be renewed the Locking ring.

- [17] Grease all bearing surfaces of the brake camshaft via the grease nipples, apply BPW special longlife grease ECO-Li 91.
- [18] Check the brake camshaft again to ensure it can move freely.

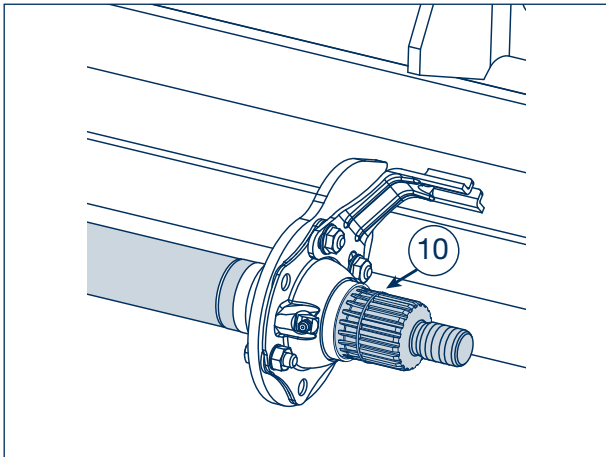


Figure 79

14 Brake Chambers

14.1 Diaphragm Chambers

Maintenance:

Statutory inspections must be carried out. No other particular maintenance work is required.

The brake chambers should be removed and cleaned at least every 2 years. Only new wearing parts are to be fitted when installing brake cylinders.



Danger!
DANGER OF FATAL INJURY!

It is not possible to strip down the spring brake section!
Never apply force in an attempt to open it.

Preparations for assembly:

- During conversion or retrofitting work, make sure there is no damage on the brake chamber bracket or the contact surface.
- BPW brake chambers must be installed using the fixtures supplied by BPW. No other parts such as washers, plates, retaining rings, etc. may be used.

Installation diaphragm cylinder:

- [1] Screw the lock nut (WAF 24) and clevis onto the cylinder push rod.
- [2] Set the specified push rod length in relation to the cylinder base (maintain a clearance of min. 40 mm see Fig. 72). Initially screw the lock nut on to secure the clevis.
- [3] Reset the slack adjuster.
- [4] Fit the brake chamber to the mounting bracket. Check the required brake lever length to appropriate hole in the slack adjuster arm.

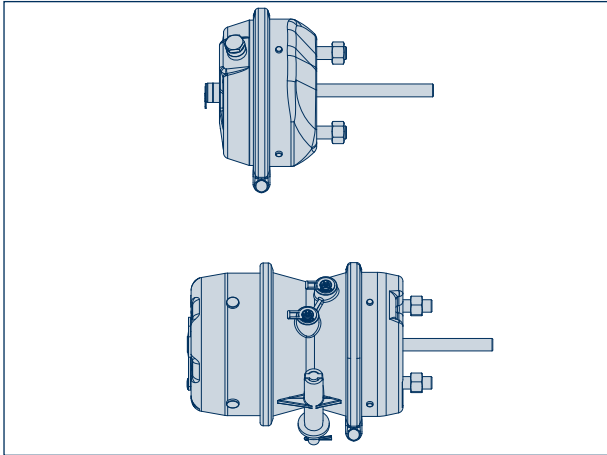


Figure 80

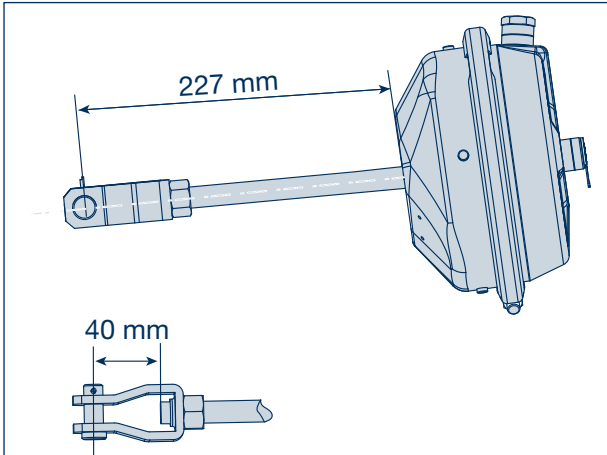


Figure 81

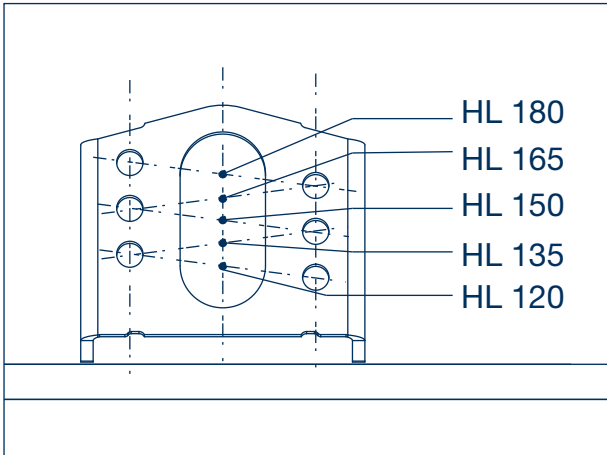


Figure 82

- [5] Fit the mounting nuts on (1) until tight.
- [6] Tighten alternative sides to 180 - 210 Nm using a torque wrench.
- [7] Tighten the lock nut (2) on the clevis to 80 Nm.

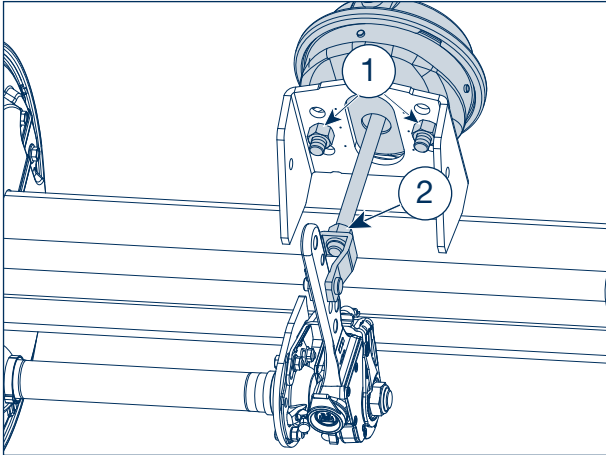


Figure 83



Note:

At BPW brake cylinders with round hole clevis, the external return spring is omitted.

- [8] An outer return spring is required if slot-type clevis is used. This must be taken into account in the EC brake calculation.
 - [9] Remove the plug from the drain hole at the lowest point at the brake chamber.
- See Fig. 84.

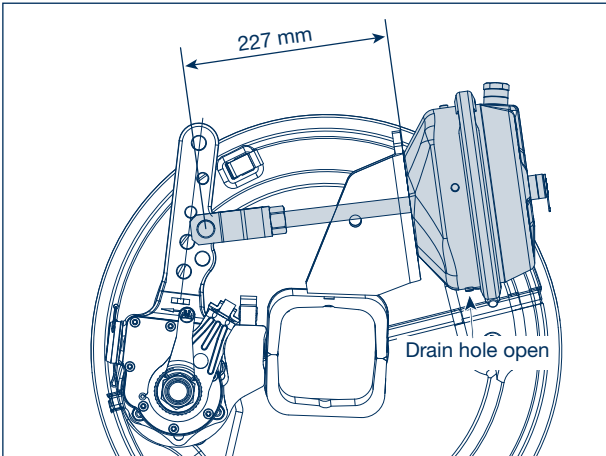


Figure 84



Repair Guide:

Comply with the installation instructions for the slack adjuster or Chapter 8 when connecting the push rod or yoke to the slack adjuster.

Do not pull the push rod out of the brake cylinder during installation or adjustment work.

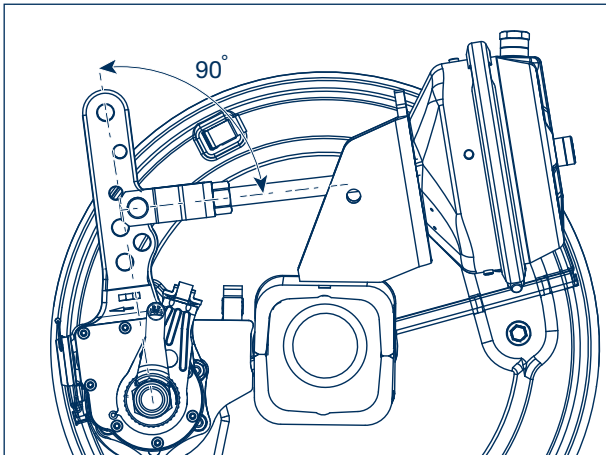


Figure 85

14.2 Double diaphragm spring brake actuator

- [1] Remove the release stud assembly from the side pocket. The release stud assembly consists of the release stud (1), washer (2), nut (3) and split pin (4).
- ⓘ For new versions, a protection cap with thread replaces the split pin.

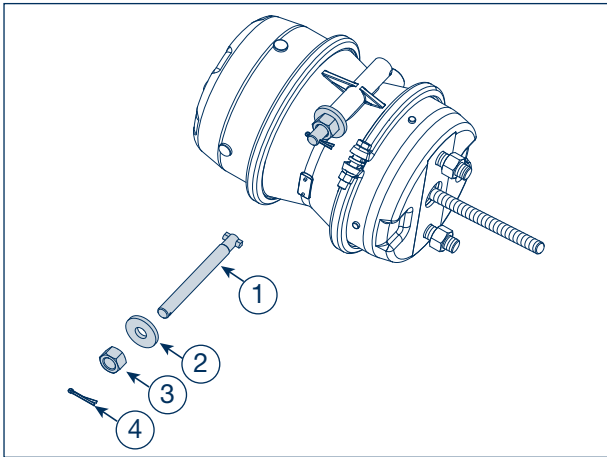


Figure 86

- [2] Fold open the plug (5) on top of the double diaphragm spring brake actuator.
 - [3] Apply min. 6 bar to compressed air connection.
 - [4] Insert the release stud (1) into the cylinder and clip it into place.
 - [5] Fit the washer (2) and hexagon nut (3) onto the release stud and use a ring spanner (WAF 24) to fully compress the spring. (Brake off position.)
- 👉 See steps [1] - [9] for further assembly steps for diaphragm cylinder.

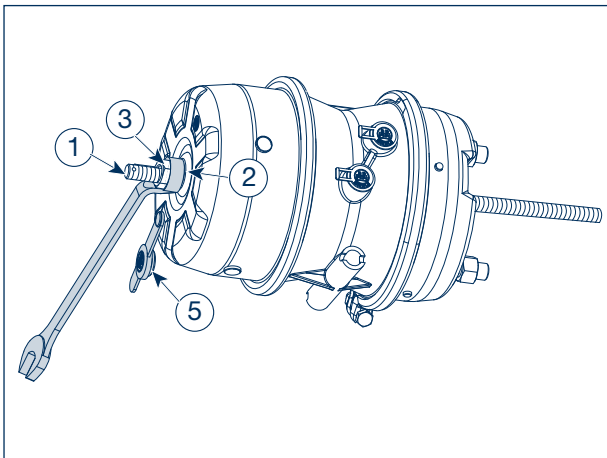


Figure 87

- [6] Remove the release stud to release the spring after installing the cylinder and insert it into the side pocket.
- [7] Tighten the nut to 20 Nm.
- [8] Insert the plug (5) back into the brake cylinder.
- [9] Secure and adjust the slack adjuster according to Chapter 8.
- [10] Tighten the compressed air connections (WAF 24) and the plug to 45 Nm.

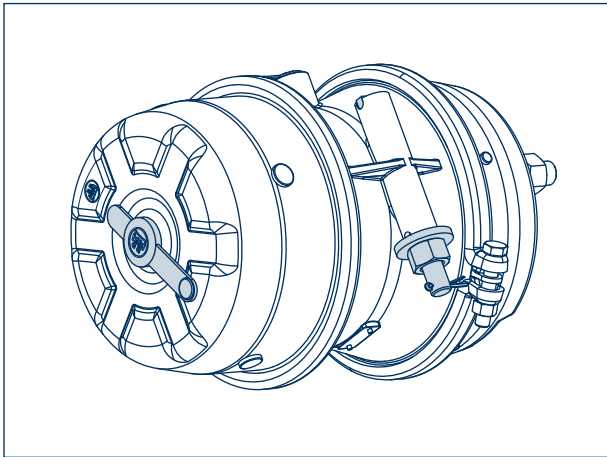


Figure 88



Note:
BPW recommend that only installing same brand of brake chambers installing on any particular vehicle!



15 Overrun brake system S 3006-7

15.1 Dismantling the hub unit



Warning!

Prevent the vehicle from rolling away!
Release the park and service brake
only after lifting!

- [1] Use a jack to raise the vehicle until the tyres are off the floor.

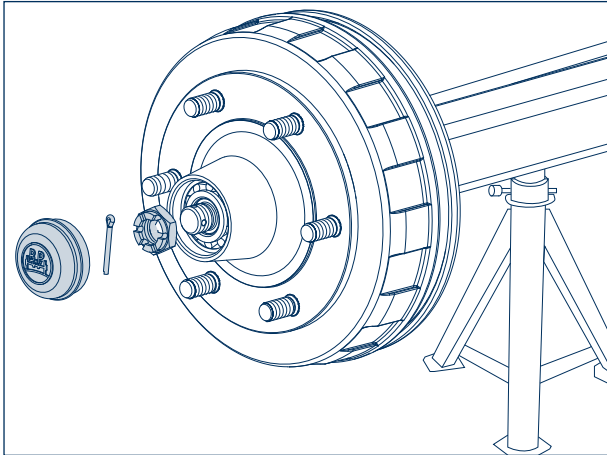


Figure 89

- [2] Remove cap from the wheel hub, pull out the cotter pin from the hole and unscrew the castle nut.

See Fig. 80.

- [3] Before removing the brake drum, the brake shoes must be set back to basis position by turning the adjusting bolt counterclockwise.

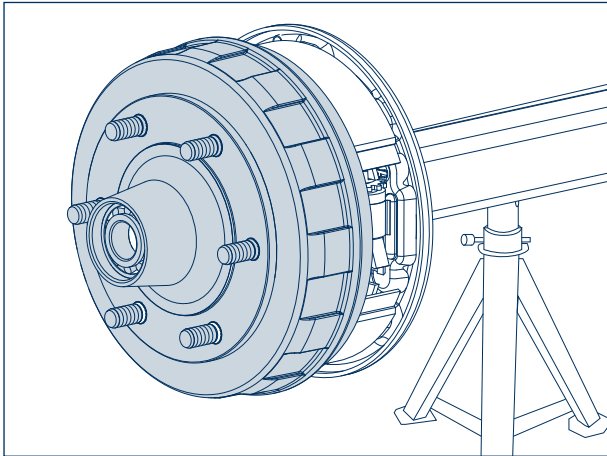


Figure 90

Repair Guide:

Mark wheel hubs and bearings together so that they are not interchanged during assembly.
It is imperative that the bearing cups are used with bearing cone back into the same wheel hub.

Repair Guide:

The assembly of the wheel hub and brake unit is carried out in the reverse order of disassembly.
Tightening torques and bearing clearance adjustment can be found in the following Workshop Manual - Agricultural Bearings BPW-WH-Agrar 55021702e.

Dismantling the brake shoes 15.2

- [4] Push the tension plate (1) by means of a screwdriver, meanwhile push to the side and remove it.

See Fig. 91.

Note:

The brake shoe must be secured against falling down!

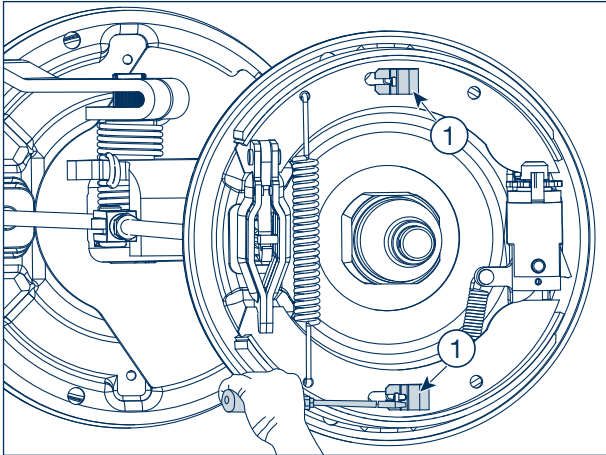


Figure 91

- [5] Detach the locking pin from behind then take off the brake shoe.

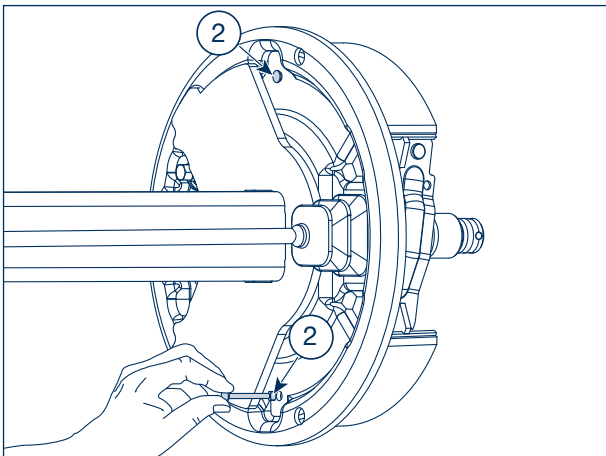


Figure 92

- [6] Remove the expander clutch from the brake shoe then unhook the spring of the brake shoe eyelets.

Repair Guide:

The return spring of the automatic reverse system must be replaced.

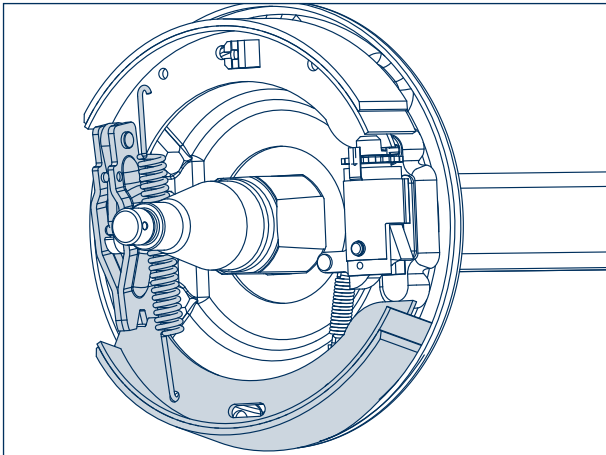


Figure 93

15.3 Mounting the brake unit - Adjustment nut

Disassembly:

- [7] Remove the retaining clip (1) using a screwdriver. Check for wear and damage, replace if necessary.
- [8] Remove adjusting nut (2) from support.



Note: Check the teeth of the adjusting nut for wear and damage, replace if necessary. Lightly grease the thread (M18) of the nut with BPW special longlife grease (ECO-Li 91).

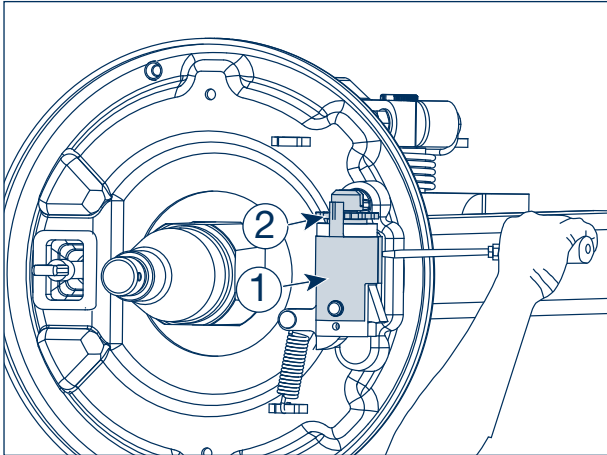


Figure 94

- [9] Unhook the return spring (3) of the auto-reverse lever and remove the bolt (4).



Note: The return spring of the automatic reverse system must be replaced.

- [10] Remove the pivot bolt (5) and the auto-reverse lever (6).

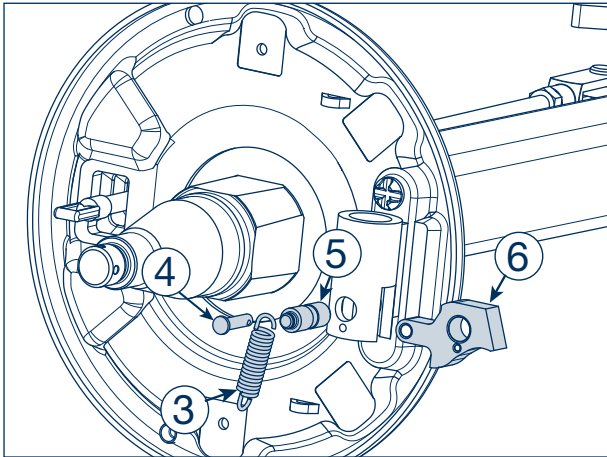


Figure 95



Repair Guide: Check the contact surface of the auto-reverse lever for wear, replace if necessary.

- [11] Check adjusting screw (7) for wear and damage, replace if necessary. To do this, remove the lock ring (8) from the outside and remove the adjusting screw.

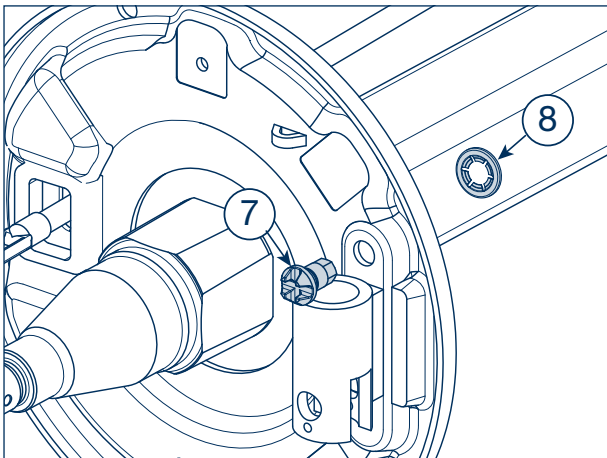


Figure 96

Assembly:

- [12] Insert the auto-reverse lever in a correct position and fix it by means of fastening bolts. Pay particular attention to the smooth operation of the auto-reverse lever.



Note: The auto-reverse lever is different in the axles, which are fitted without automatic reverse system.

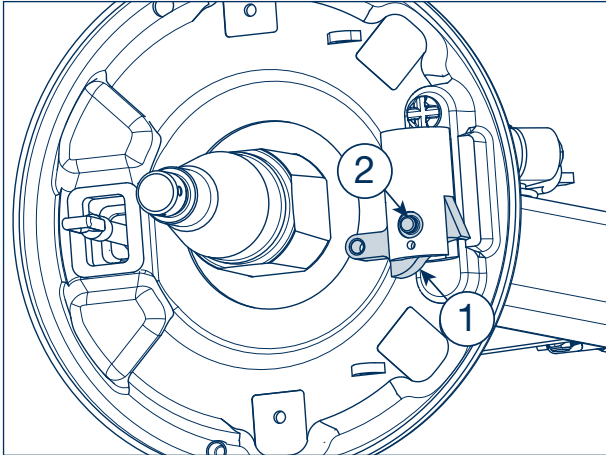


Figure 97

- [13] Insert the bolt (4) and mount the new return spring (3) of the auto-reverse lever.

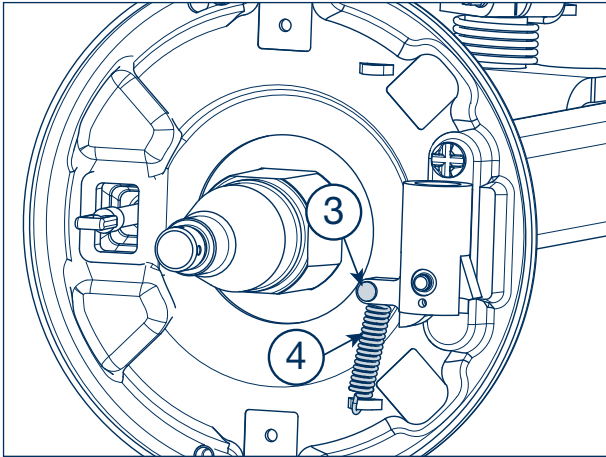


Figure 98

- [14] Insert the adjusting nut and install the retaining clip correctly.



Note: Prior to insertion, the adjuster nut (outside) should be greased with BPW special longlife grease (ECO-Li 91).

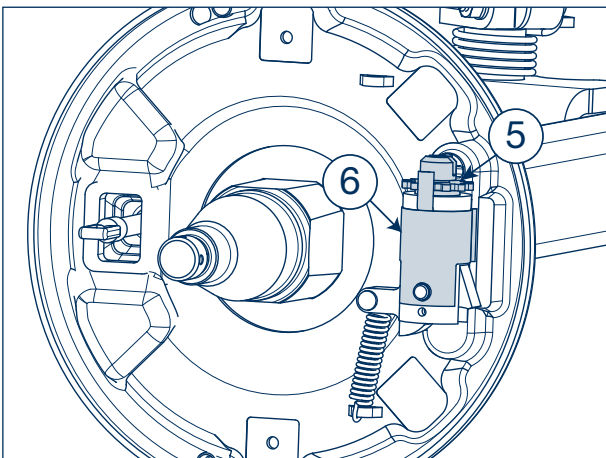


Figure 99

15.4 Mounting the brake shoes

[15] Lightly grease the contact surfaces of the brake shoes on the brake carrier (arrows) with BPW special longlife grease (ECO - Li 91).



Note:
Clean brake dust off from the brake carrier.

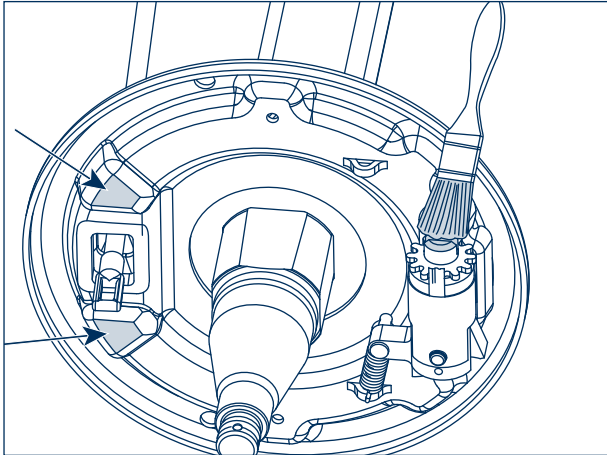


Figure 100

[16] Grease the contact surface of the brake shoes too.

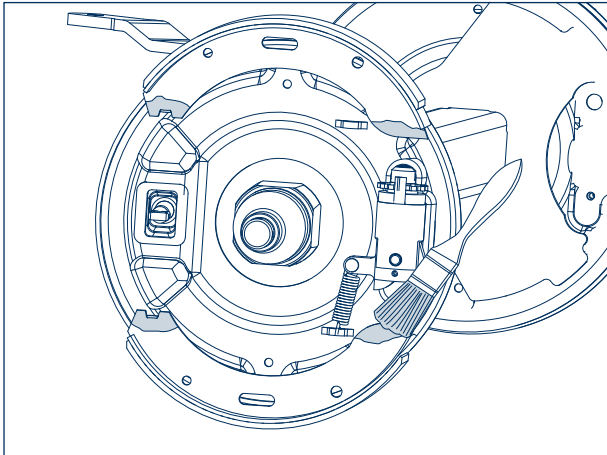


Figure 101

[17] The components are assembled in reverse order. Lift upper brake shoe in place and fasten it.



Note:
Before the brake shoes are installed, the function of the automatic reverse system must be checked. Pay particular attention to the smooth operation of the auto-reverse lever.

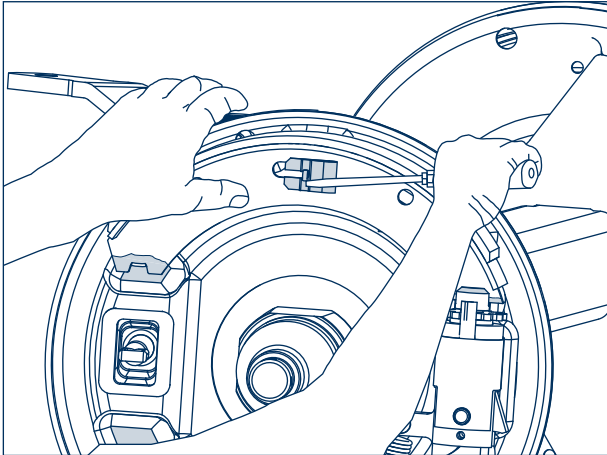


Figure 102

[18] Insert the new tension spring into the eyelets of the brake shoes.



Repair Guide:
A new tension spring must be used at every brake lining replacement. The tension spring of the brake shoes should be installed facing forward. The attachment points of the tension spring should be lightly greased.

[19] Place the expander clutch in the correct position, as shown in the picture. The moving hook of the expander clutch is always in the same plane as the adjusting nut.



Repair Guide:
Pay attention to the correct installation of the expander clutch.

[20] Insert the lower brake shoe.

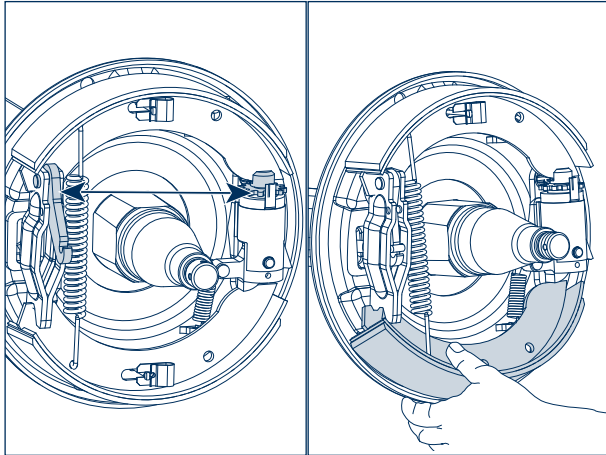


Figure 103

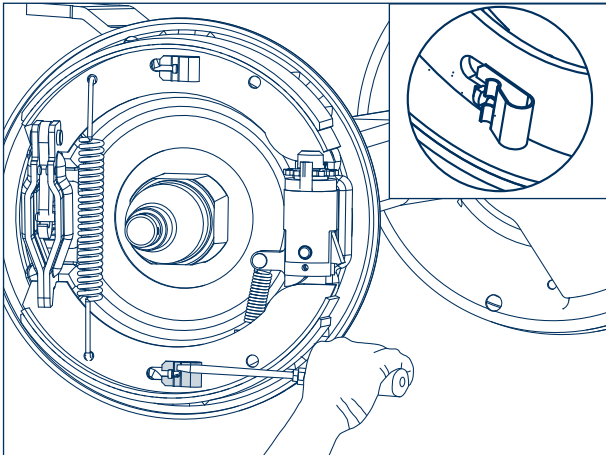


Figure 104

[21] Insert the bellow in the backing plate of the brake in order to protect from contamination.

[22] Install wheel hub and adjust brake.

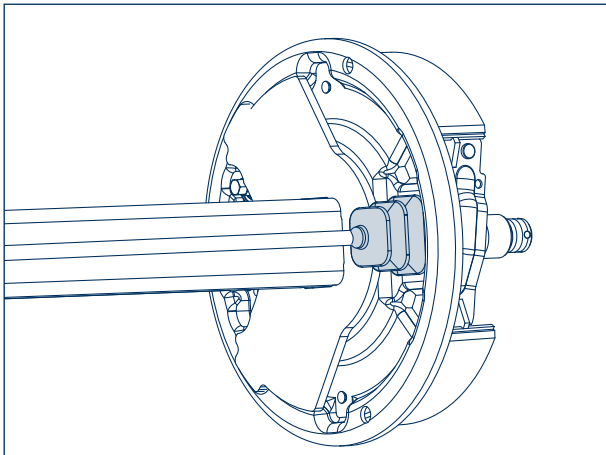


Figure 105

15.5 Mounting the brake unit - Brake lever

Disassembly:

- [23] Loosen and unscrew the securing nut (1) (WAF 17). Remove the washer (2) and pull out the screw (3).
- [24] Detach the eyelet of the torsion spring (top) using a screwdriver.

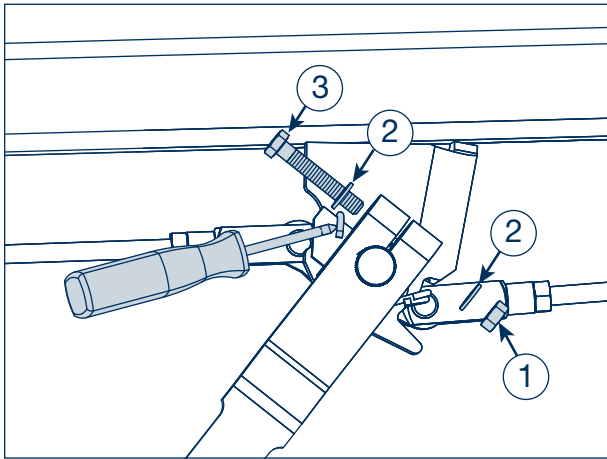


Figure 106

- [25] Take off the brake lever and if necessary dilate the groove of the brake lever with a screwdriver.

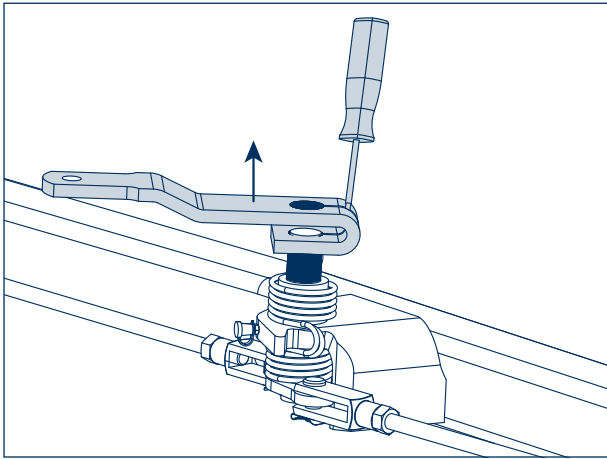


Figure 107

- [26] Remove the torsion spring and the distance ring.
- [27] Unhook the tension spring (below) then remove together with turn buckle.

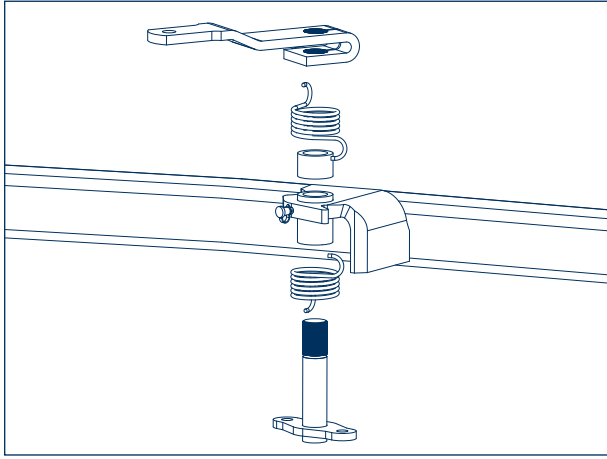


Figure 108

Repair Guide:

Before removing the brake lever, the angular position of the lever must be marked, in order for easier assembly.

Assembly:

- [28] Place the torsion spring on the carrier of the axle and hook the eye of the torsion spring in place.
See Fig. 109.

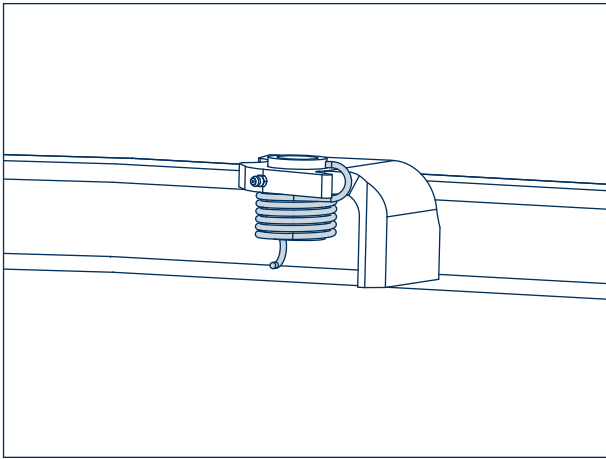


Figure 109

- [29] Assemble the lever shaft, hook the smaller spring eye on the lever shaft then pull this up about 30° and turn in the appropriate position while pressing and move the shaft to endstop.
See fig. 110.
- [30] Grease the splines of the levers with BPW special longlife grease (ECO-Li 91).

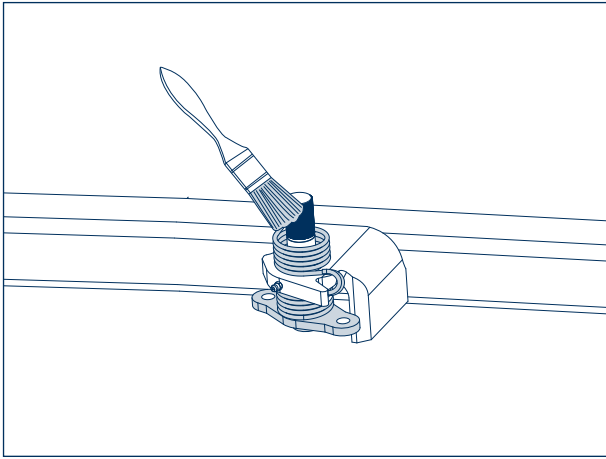


Figure 110

- [31] Mount the brake lever with the distance ring. Pay attention to the angular position of the brake lever.

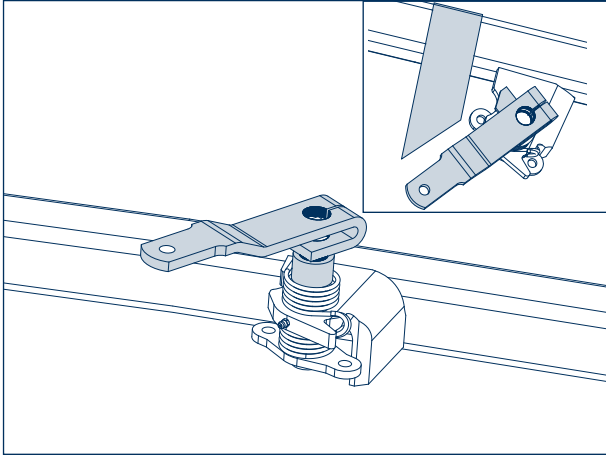


Figure 111

15.5 Mounting the brake unit - Brake lever

[32] Mount the brake lever through by tapping with a plastic hammer to the endstop.

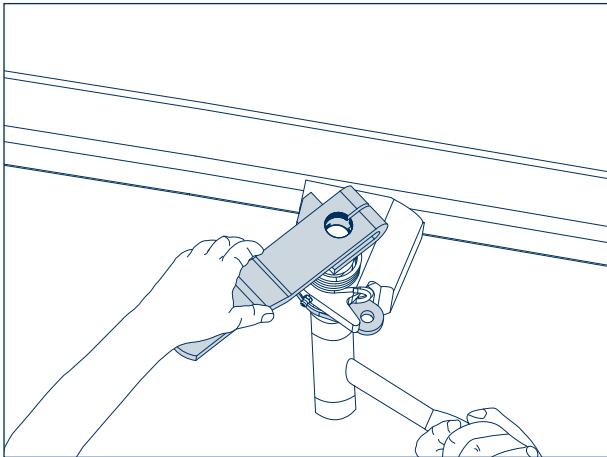


Figure 112

[33] Hook the torsion spring into the eyelet of the brake lever with a screwdriver.

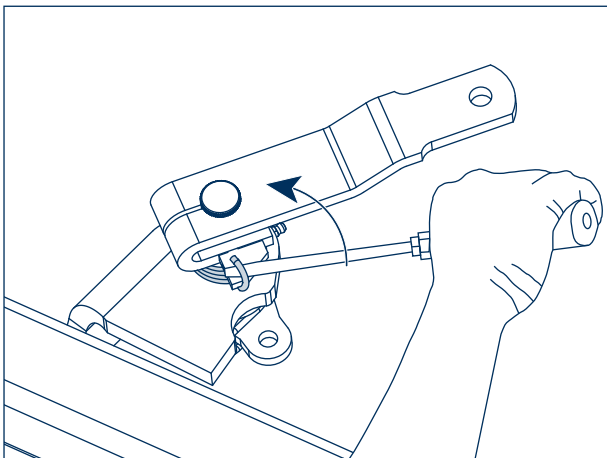


Figure 113

[34] Mount the brake lever by the screw and locknut (WAF 17) and tighten them to the prescribed tightening torque 38 Nm.

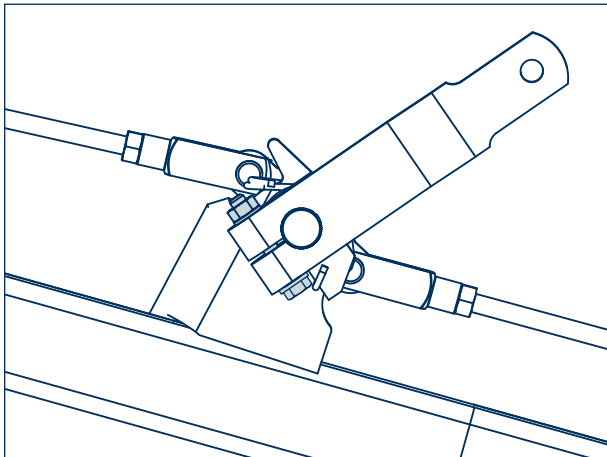


Figure 114

Adjustment of the wheel brake 15.6

⦿ after every 200 working hours, at every brake lining replacement.



Note:
To ensure the proper functioning of the brake, the brake must be adjusted before. Prior to the adjustment of the brake, the transmission device must be loose and free of tension.

[1] Disconnect drawbar device from overrun device and handbrake lever. Remove the securing clip (2) then take out the pivot bolt (1).

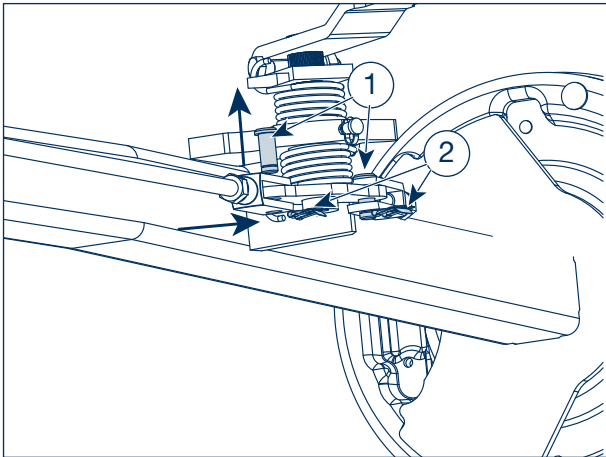


Figure 115

[2] Lock the automatic reverse lever of the wheel brake with the help of the mounting stud Ø4 mm (3) from outside via the adjusting hole (push it in at least 30 mm deep).

[3] Rotate the adjusting nut in the wheel brake by means of the ratchet wrench (WAF 12) via adjusting bolt (4) in the direction of travel until the running of the wheel is tight slightly.

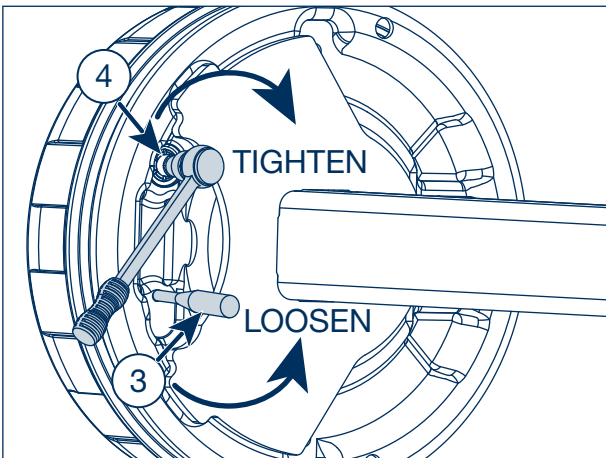


Figure 116

[4] Center the brake shoes by pressing the brake lever several times.

[5] Turn the adjusting screw back about one turn (rearward facing) until the braking effect is slightly felt on the running of the wheel in the direction of travel.



Note:
Remove the mounting stud (Ø 4 mm) of the automatic reverse lever after adjustment.

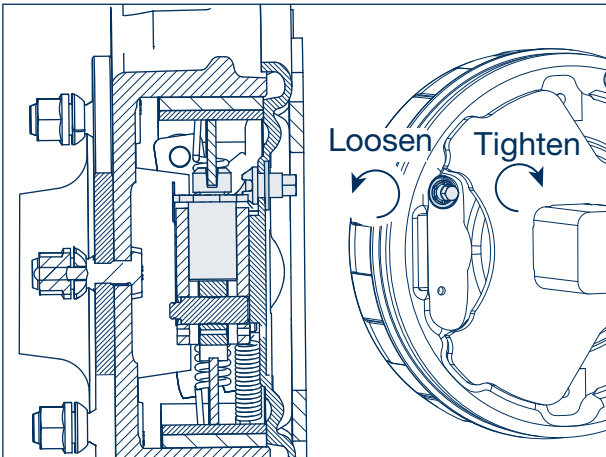


Figure 117

15.6 Adjustment of the wheel brake

[6] Set the drawbar device to the overrun device and adjust them without free play. Reassemble the pivot bolt and secure it with the securing clip.

Note:

At the basic settings it must be taken into account, that the drawbars must be set with approx. 2-3 mm pretension against the spring force of the reversing lever. It is also important to ensure, that the bore of clevises coincide precisely with the bores of reversing lever, taking account of the pretension (drawbar 2-3 mm shorter).

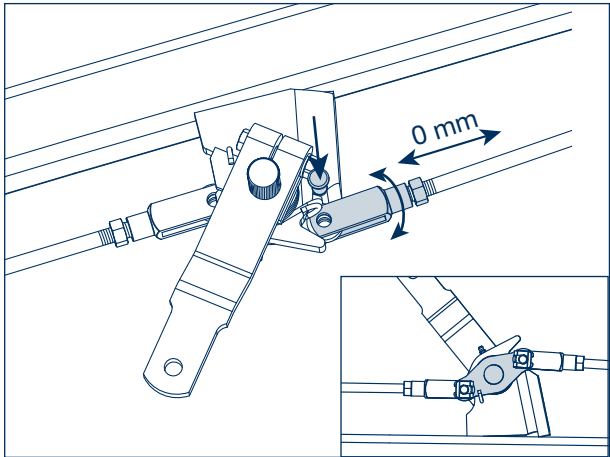


Figure 118

Note:

When the parking brake is activated, check the position of the brake equaliser compensator. Positioned at right angles to the drawbars even play on both wheel brakes. Readjust brake if necessary. To test, slightly tighten the parking brake and check the same braking torque (in the direction of travel) on the left and right of the wheels.

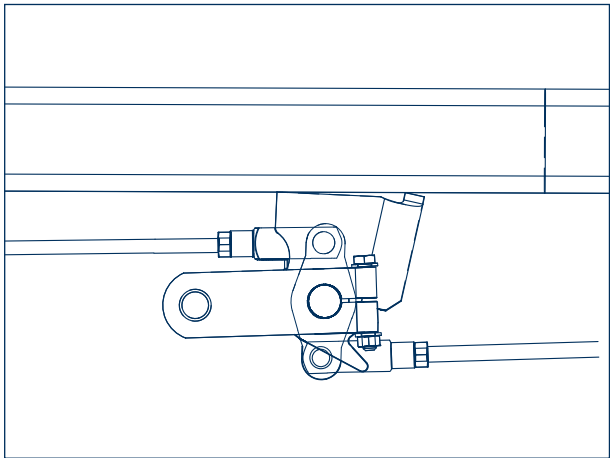


Figure 119

Note:

The brake must always be adjusted before the transmission device is adjusted.

- [7] With the transmission linkage supported, adjust it so that there is no play or tension on the turn-buckle or the equalising compensator.
- [8] All the equalising compensators must be at right angles to the brake linkage. tighten all the lock-nuts on the brake transmission system.
- [9] When the brake is applied in reverse (Fig. 110), check the position of the brake lever relative to the support bearing group (brake lever parallel to the axle body). If necessary re-adjust the brake.



16 Overrun brake system S 3008 (3081)

16.1 Dismantling the brake shoes.

- [1] Remove wheel hub, tapered roller bearing as well as sealing elements, see page 50.
- [2] Depress the spring pin (1) with a tool, and pull out the pin (2) in the direction of the arrow from the rear.

**Repair Guide:**

The brake shoe must be secured against falling down.

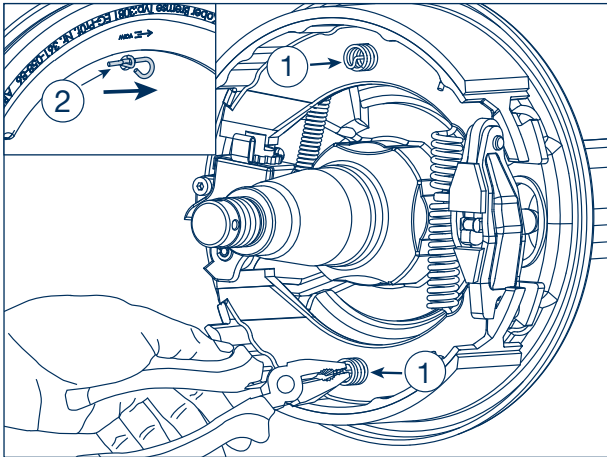


Figure 120

- [3] Detach tension spring and remove brake shoes.

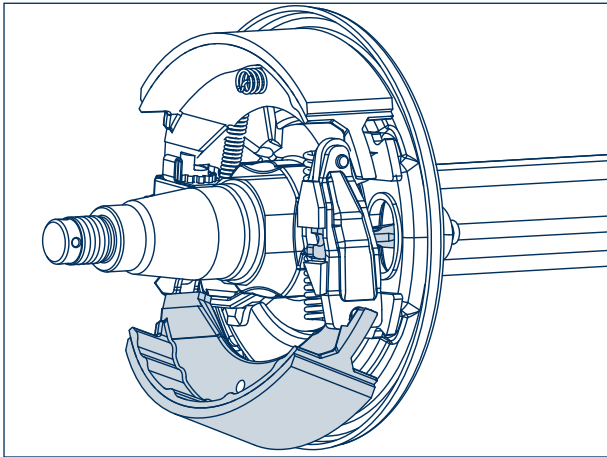


Figure 121

- [4] Remove the expander clutch then unhook the tension spring from the eyes of the brake shoes and remove the parts.

**Repair Guide:**

Tension springs should be replaced!

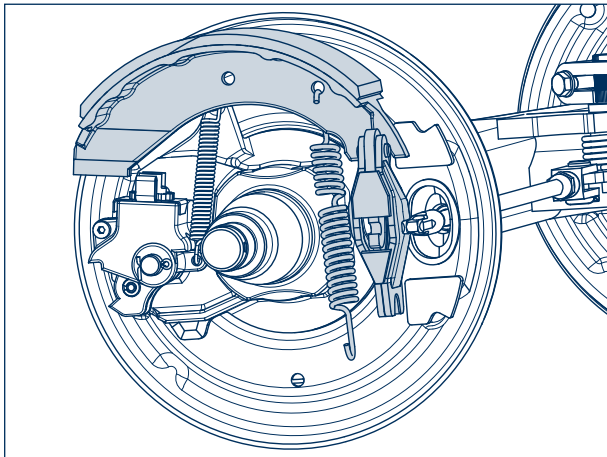


Figure 122

Mounting the brake unit - Adjusting nut 16.2

Disassembly:

- [5] Remove the adjusting nut (1) from the support and take off the securing clip (2).

**Note:**

Check the teeth of the adjusting nut for wear and damage, replace if necessary. Lightly grease the thread (M18) of the nut with BPW special longlife grease (ECO-Li 91).

- [6] Disconnect the return spring (3) from the automatic reverse lever.

**Note:**

The return spring of the automatic reverse lever must be replaced.

- [7] Remove the cotter pin (4) and the fastening pin (5) then take off the auto-reverse lever (6).

**Repair Guide:**

Check the contact surface of the auto-reverse lever for wear, replace if necessary.

- [8] Check the lever (7) for damage and smooth operation, replace if necessary.

Assembly:

- [9] Insert the auto-reverse lever (6) in the correct position and fix it by means of fastening bolts (5). Pay particular attention to the smooth operation of the auto-reverse lever, then insert the splint pin (4) and bend it up.

**Note:**

In case the axle is manufactured without auto-reversing system, this component part is differently designed.

- [10] Connect the new return spring (3) of the automatic reversing lever.

- [11] Insert the securing clip (2) correctly, then place the adjusting nut (1) too.

**Note:**

Prior to insertion, grease the adjusting nut (from outside) with BPW special longlife grease (ECO-Li 91).

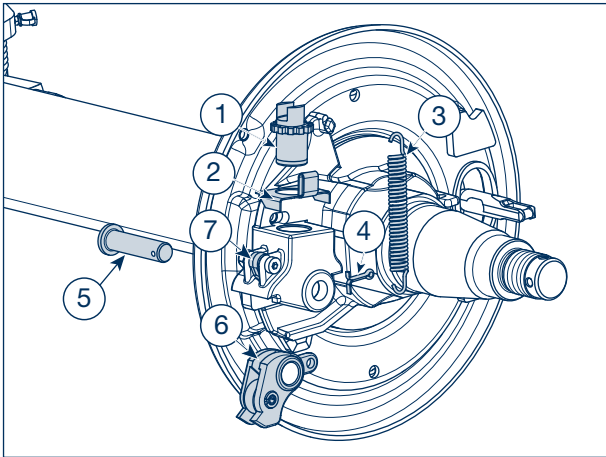


Figure 123

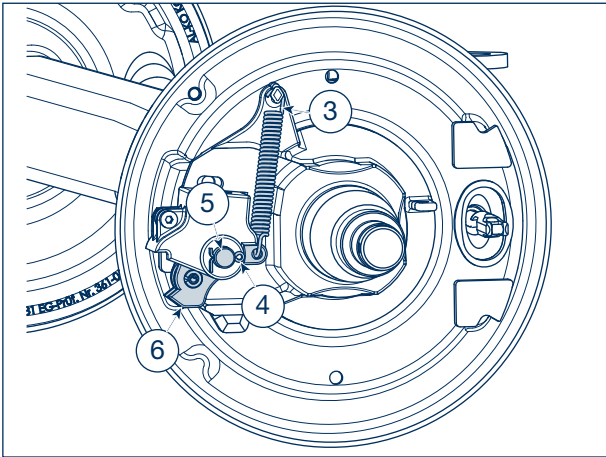


Figure 124

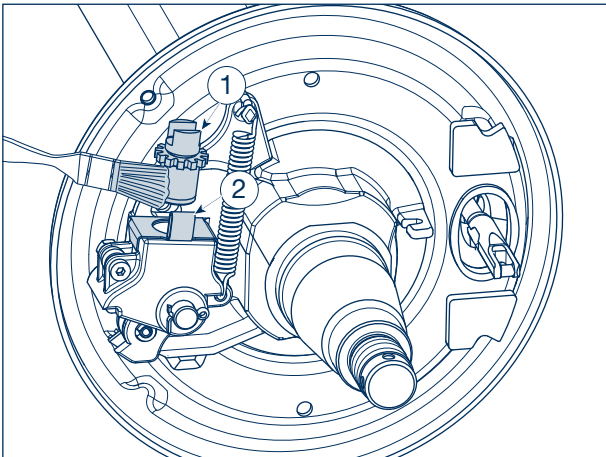


Figure 125

16.3 Mounting the brake shoes

[12] Lightly grease the contact surfaces of the brake shoes on the brake holder (arrows) with BPW special longlife grease (ECO-Li 91).

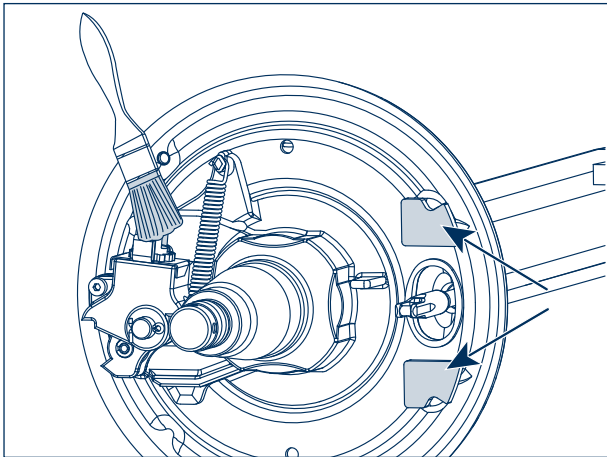


Figure 126

[13] Grease the contact surfaces of the brake shoes.

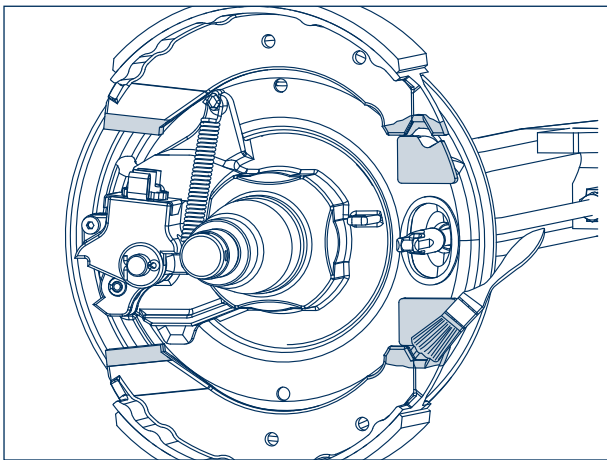


Figure 127

[14] Lift on the upper brake shoe and secure it by pushing the brake shoe pressure spring (1) together with the securing pin (2).

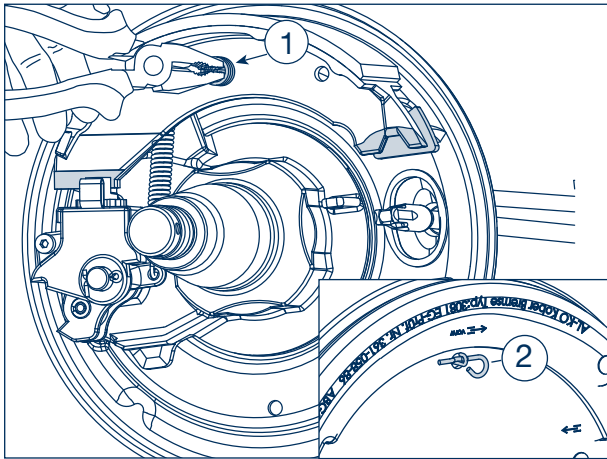


Figure 128

Repair Guide:

In the position, as seen in the picture, place the contact surface of the brake shoe in the groove of the adjusting screw.

[15] Hook the tension spring (3) into the eyelet of the upper brake shoe, and set it on the brake holder.

Repair Guide:

A new tension spring must be used at every brake lining replacement. The tension spring should be used, as shown in the picture. The attachment points of the tension spring should be lightly greased.

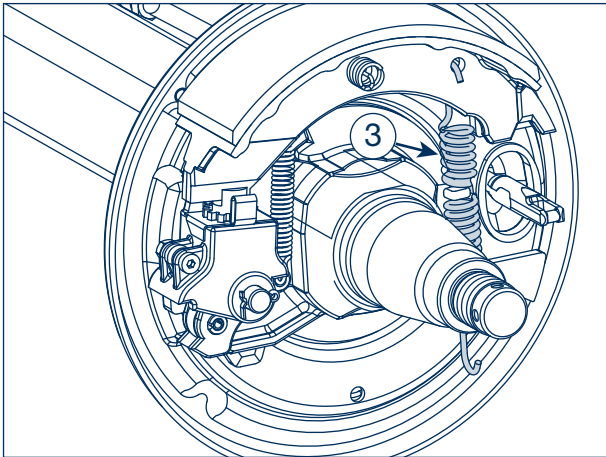


Figure 129

[16] Place in the lower brake shoe, hook the tension spring, mount the expander clutch (4) and fasten it with brake shoe pressure spring (1) and securing pin (2).

Repair Guide:

Pay attention to the correct installation of the expander clutch.

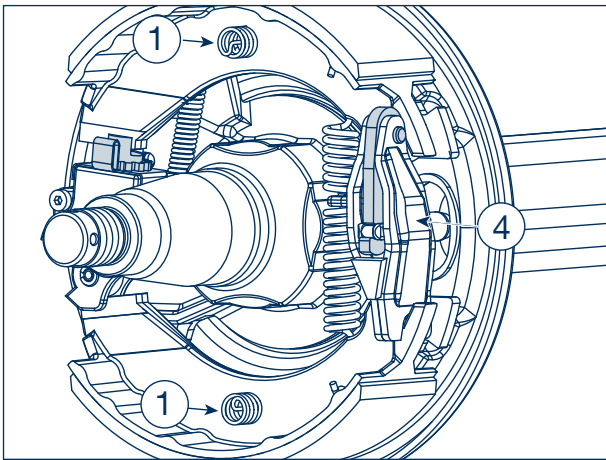


Figure 130

[17] Insert the bellow (5) in the backplate of the brake in order to protect from contamination.

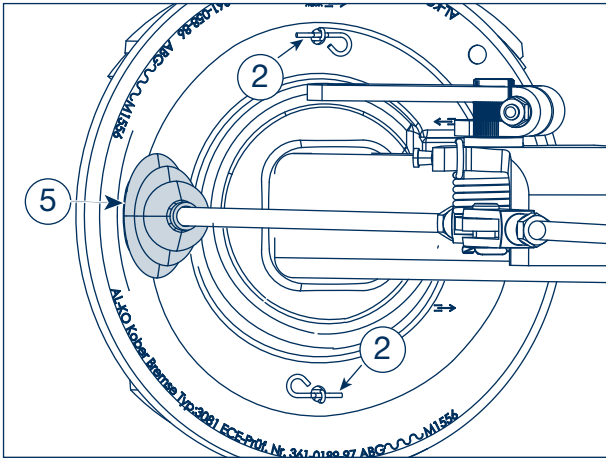


Figure 131

16.4 Adjustment of the wheel brake



Warning!

Prevent the vehicle from rolling away!
Release the park and service brake
only after lifting!

- [1] Loosen the drawbar device off the overrun device.
- [2] Centralise the brake shoes by repeatedly pressing the handbrake lever.
- [3] Loosen the pull rod off the brake lever. Remove the securing clip (2) then take out the pivot bolt (1).
- [4] Turn the adjustment screw (3) with a screwdriver in the direction of the arrow until the rotation of the wheels becomes tight in the running direction.
- [5] Remount the pull rod and adjust for the end play. Loosen the locknut (4) (WAF 19) of the clevis on the pull rod, rotate the clevis in or out by hand until the holes on the clevis and brake lever hole coincide. (Adjust without end play.)



Repair Guide:

Lever shaft (5) must stand in „0“ position!

- [6] Install the pivot pin and secure with the securing clip. Tighten the locknut. (Angular position of the brake lever should be about 40-50°.)
- [7] Turn back the adjusting screw until the wheel runs freely in the forward direction. Carry out the adjustment on all wheels.
- [8] Connect lever shaft (5) and set it up without clearance.



Repair Guide:

Lubricate the Bowden cables with oil (not with grease) approximately quarterly.

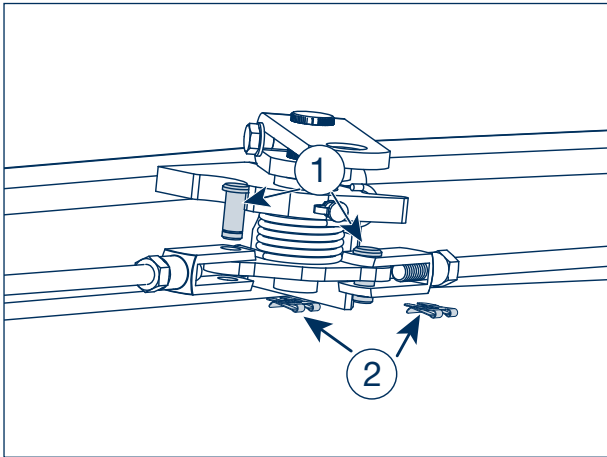


Figure 132

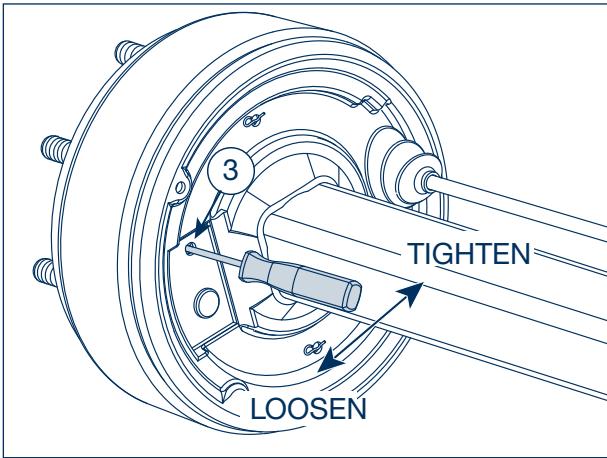


Figure 133

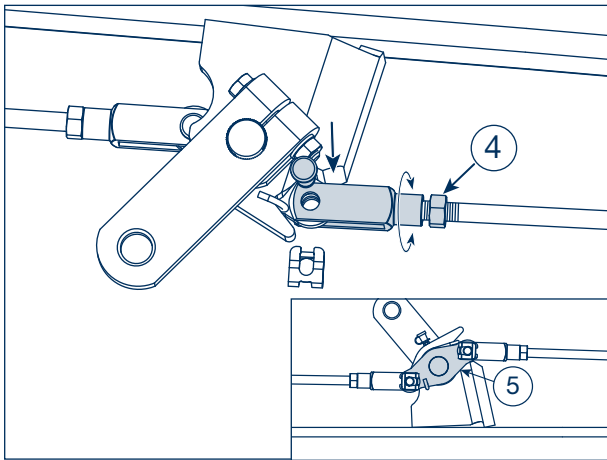


Figure 134



17 Cam-Brake

17.1 Dismantling the brake shoes



Warning!

Prevent the vehicle from rolling away!
Release the park and service brake
only after lifting!

Disassembly:

[1] Dismantling the wheel hub and brake drum assembly.

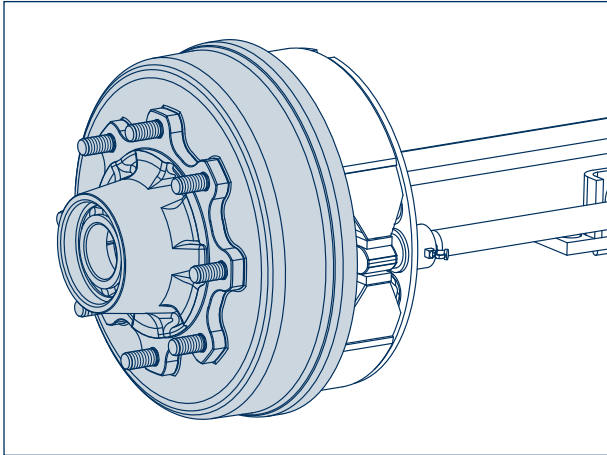


Figure 135

[2] Remove the brake shoes with tension springs.

[3] Unhook tension spring from the eyelets of the shoes.

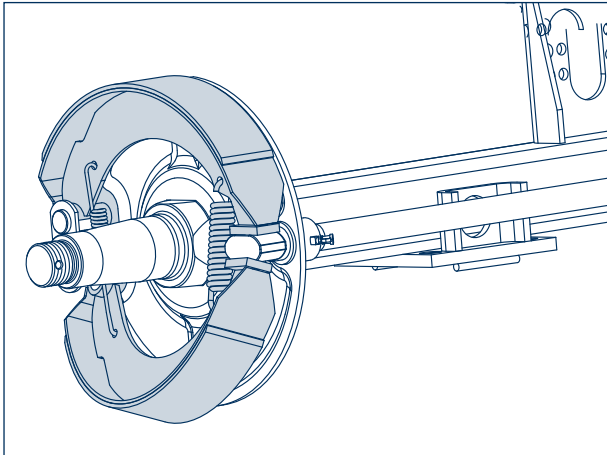


Figure 136

[4] Clean the brake of contamination.

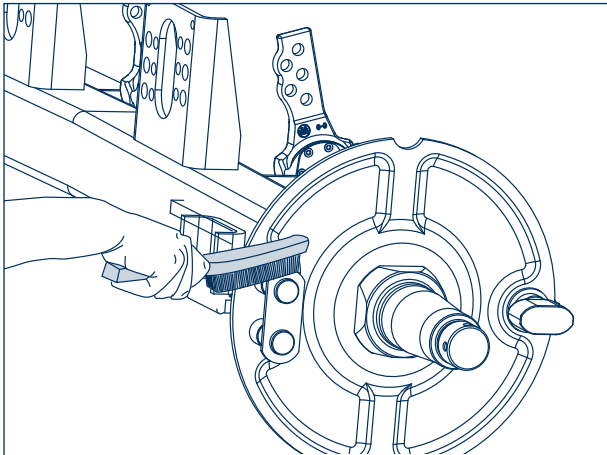


Figure 137

Mounting the brake shoes 17.2

[5] Grease the contact surfaces of the brake shoes with BPW special longlife grease ECO-Li 91.

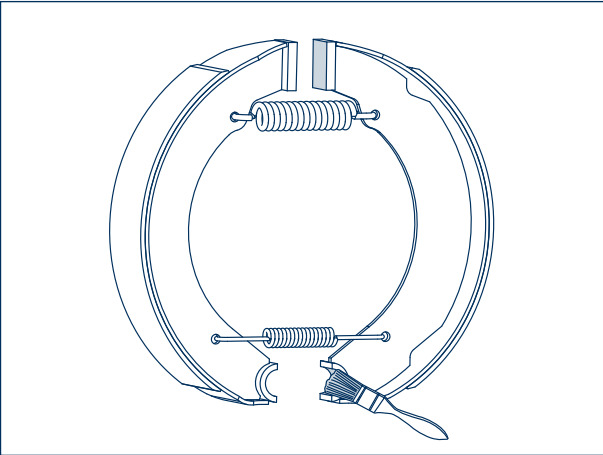


Figure 138

[6] Hook the tension springs into the eyelets of the shoes.



Repair Guide:

A new tension spring must be used at every brake lining replacement. The tension spring should be used, as shown in the picture. The attachment points of the tension spring should be lightly greased.

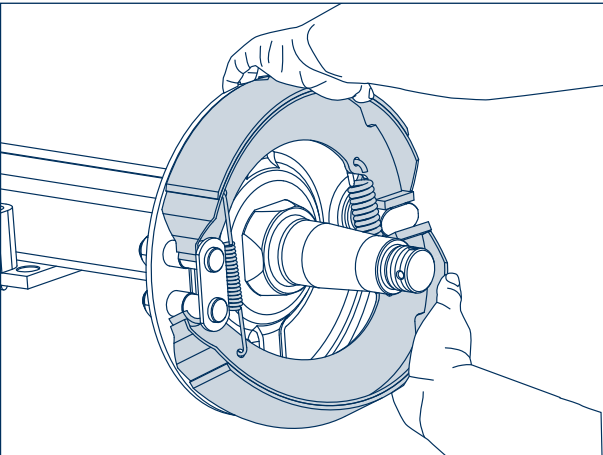


Figure 139

[7] Place the contact surface of the upper brake shoe on the brake camshaft, then push the lower brake shoe onto the correct place.

 See Fig. 139.



Repair Guide:

The longer spring is installed on the side of the brake pin and the shorter spring on the side of the brake camshaft.

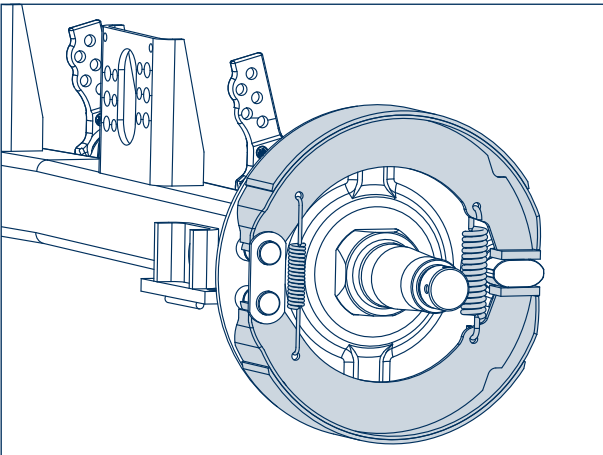


Figure 140

17.3 Mounting of the back plate

Repair Guide:



The brake shoes should be centralized, so that the same wear patterns are achieved when the brake linings are grinding up.

Disassembly:

- [1] Loosen the lock nuts (WAF 36) of the back plate.
- [2] Remove the plain washers and brake anchor pins.

Assembly:

- [1] Install the new brake anchor pins and plain washers and screw the lock nuts with a spanner then tighten them slightly.
- [2] Install the brake shoes and brake drum.
👉 See Pages 72 - 73.

- [3] Actuate brake lever several times and fasten.
- [4] Fasten lock nuts with 400 Nm tightening torque.
👉 See Fig.143.
- [5] Adjust the brake.
👉 See Page 75.

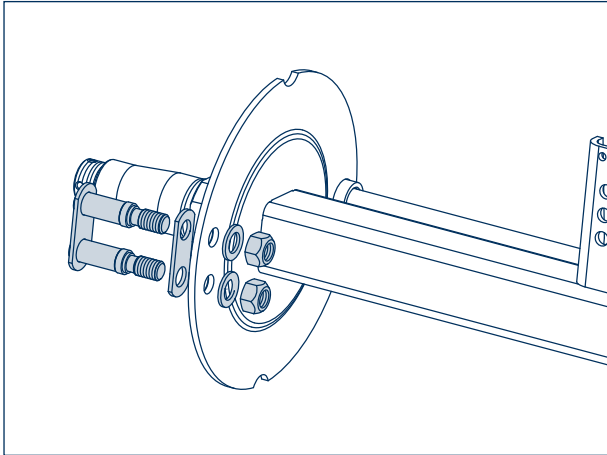


Figure 141

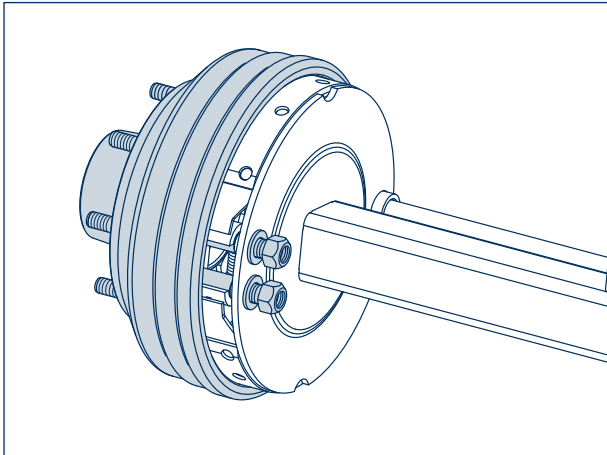


Figure 142

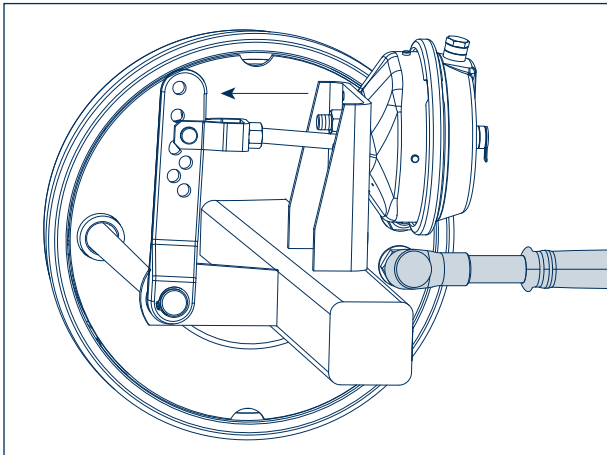


Figure 143

Brake Adjustment 17.4

- every 200 operating hours, re-adjustment is required if 2/3 of the entire stroke length has been used during full braking.



Warning!
Prevent the vehicle from rolling away! Release the park and service brake only after lifting!

Functional check:

Push the slack adjuster by hand in the operation direction. Ensure the slack (push rod travel) **(a)** is within max. 35 mm, if not it must be aligned.

Adjustment:

- [1] When adjusting, the brake lever should be fitted. The idle stroke **(a)** corresponds to 10 - 12% of the connected brake lever length **"B"** e.g. brake lever length 150 mm = idle stroke 15 - 18 mm.
- [2] Remove the cotter pin and clevis pin out of the clevis of the air chamber.
- [3] Take the circlip out from groove of the brake camshaft then remove the brake lever.
- [4] Rotate the brake camshaft (direction of arrow) until the brake linings reach the brake drum surface. Install the brake lever in the correct position. The hole of the clevis pin on the brake lever should exactly match the hole on the clevis, in this correct position slide the brake lever on the brake camshaft as far as possible.

Repair Guide:



When adjusting the lever, if necessary, the brake camshaft must be rotated 180 degrees in order to achieve the correct position. For this purpose the brake drum unit has to be dismantled.

- [5] Insert the bolt in the clevis and secure, then install the circlip into the groove of the brake camshaft.



Warning!
After setting the wheels should run freely and the brake cylinder push rod and the brake lever must form an angle of max. 90° when the brakes are applied.

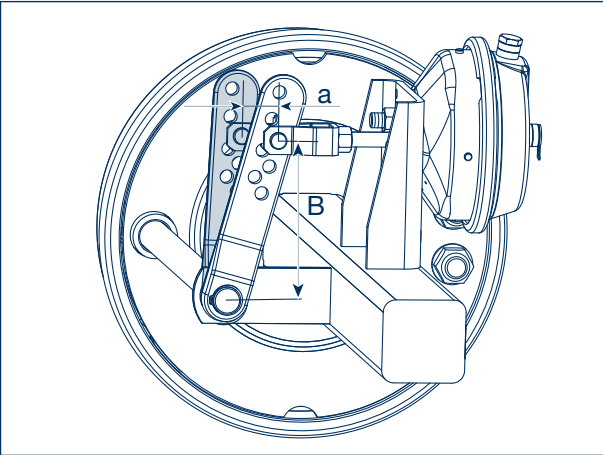


Figure 144

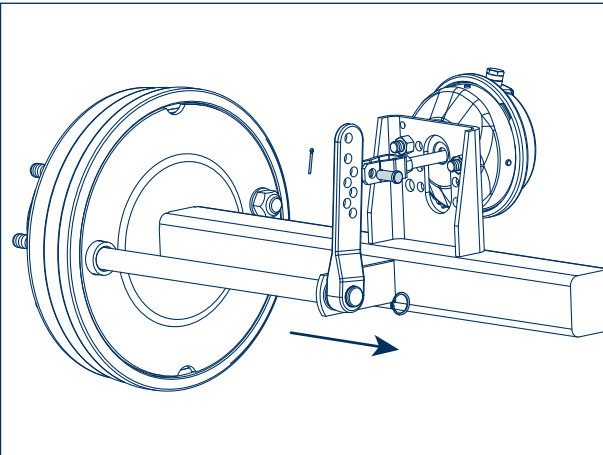


Figure 145

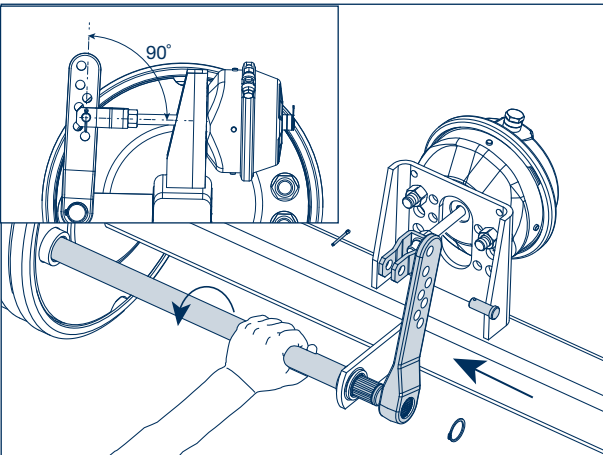


Figure 146

18 Brake (N 4012-4)

18.1 Dismantling the wheel - Hub brake unit



Warning!

Prevent the vehicle from rolling away!
Release the park and service brake
only after lifting!

Disassembly:

- [1] Raise the axle until the tires are off the floor.
- [2] Remove the hub cap from the wheel hub, take out the split pin from the axle nut and unscrew the axle nut.

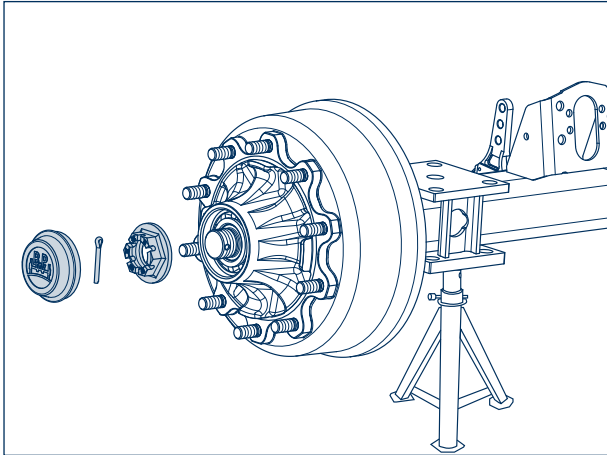


Figure 147

- [3] Remove complete wheel hub unit.

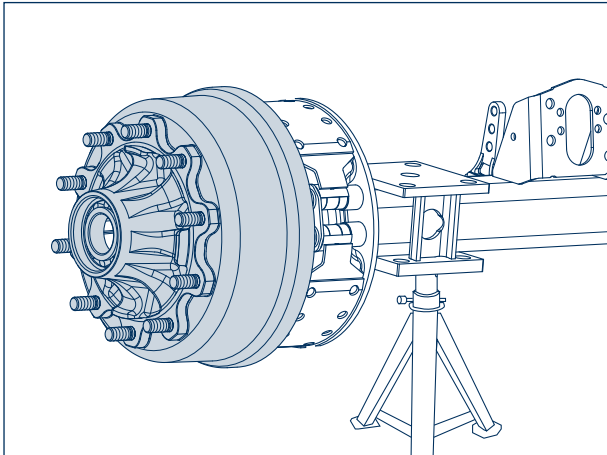


Figure 148

- [4] Pull down the bearing and shaft seal from the axle stub.



Repair Guide:

Mark wheel hubs and bearings together so that they are not interchanged during assembly.
It is imperative that the bearing cups are used with bearing cone back into the same wheel hub.

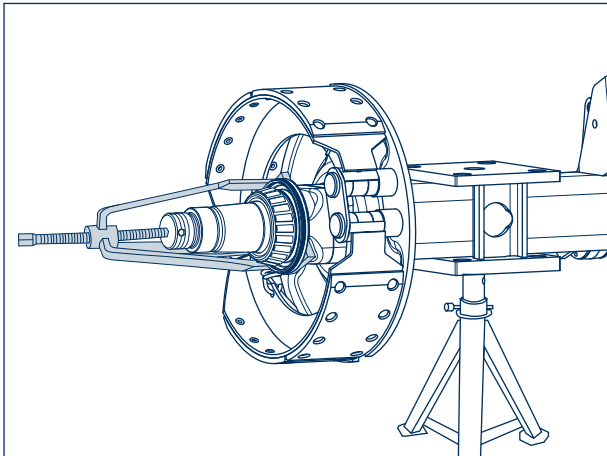


Figure 149

Dismantling the brake shoes 18.2

- [5] Remove the brake shoes together with the return springs from their place.

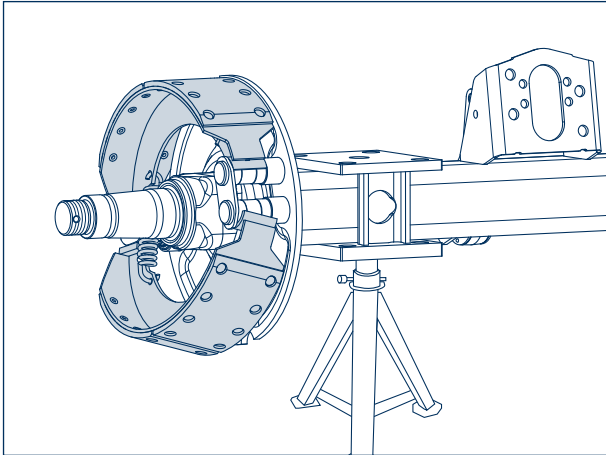


Figure 150

- [6] Pull out the return spring from the eyelets of the brake shoes.



Note:

Each time the brake lining is replaced, new return springs must be used.

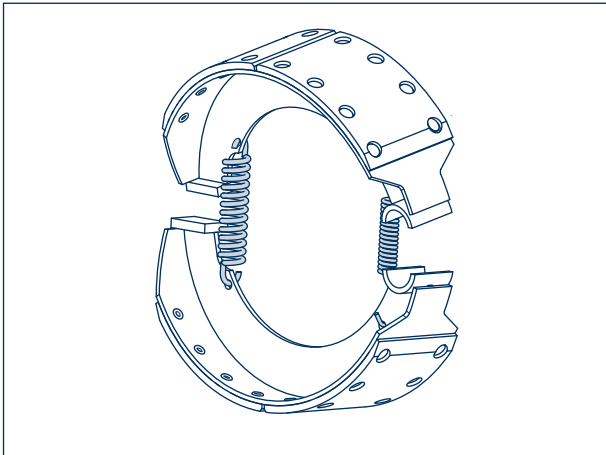


Figure 151

- [7] Thoroughly clean the brake from the dirt.

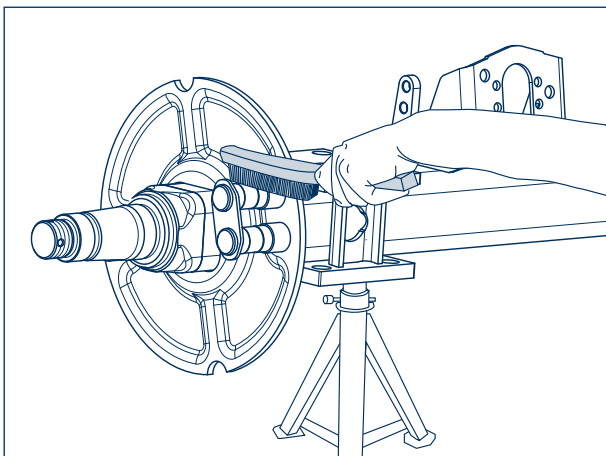


Figure 152

18.3 Mounting the brake shoes

[8] Apply grease on the contact surfaces of brake shoe with the BPW special long-life grease (ECO-Li 91).

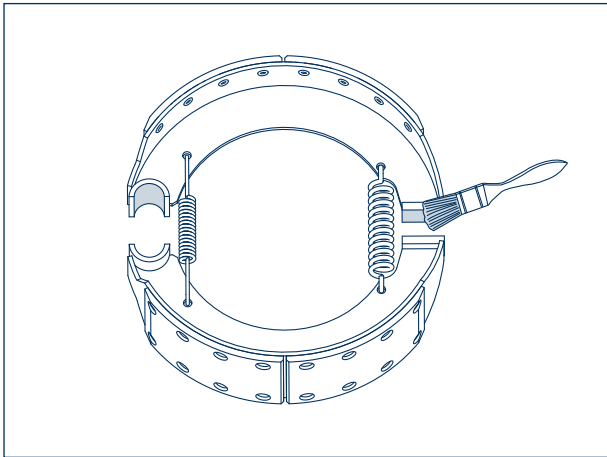


Figure 153

[9] Hook the new return springs into the eyelets of the brake shoes.



Note:
Each time the brake lining is replaced, new return springs must be used. The attachment points of the tension spring should be lightly greased.

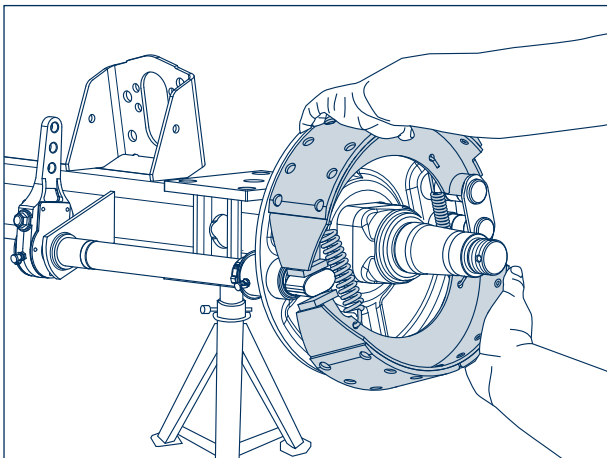


Figure 154

[10] Place the contact surface of the upper brake shoe on the brake camshaft, then push the lower brake shoe onto the correct place.



Repair Guide:
The longer spring is installed on the side of the brake pin and the shorter spring on the side of the brake camshaft.

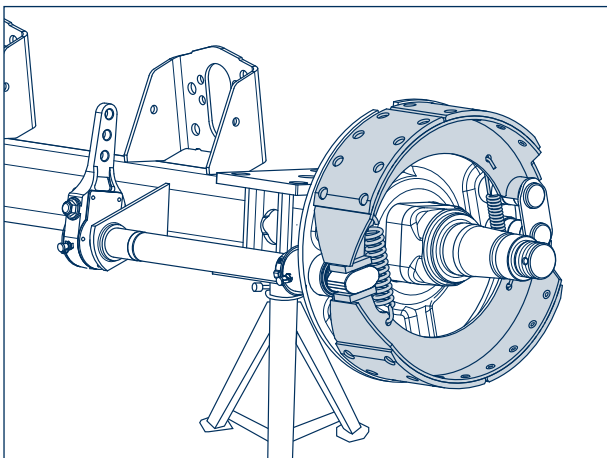


Figure 155

[11] Clean the seats of the bearings on the axle stub (must be metallic bright, dry and free of dirt) and grease all over with BPW special longlife grease (ECO-Li 91).



Note:
Do not over-grease!
Make sure that the sealing elements can be pushed up easily on the axle stub.

[12] Insert the shaft seal with the closed side pointing towards the centre of the axle until it contacts with the axle stub collar.



Repair Guide:
Pay attention to the correct position of the shaft seal ring.

[13] Install wheel hub and brake drum units, adjust wheel hub bearing play.



Note:
When installing the wheel hub, make sure that the shaft seal ring is not pinched.



Note:
Tightening torque as well as bearing clearance adjustment can be found in the workshop manual: Agricultural bearings BPW-WH-Agrar 55021702e.

Installation of the shaft seal 18.4

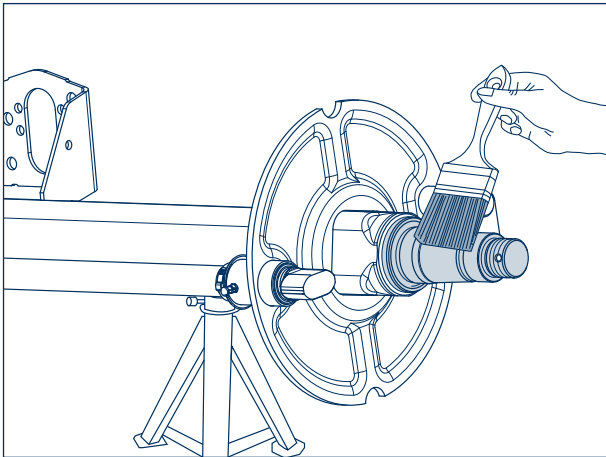


Figure 156

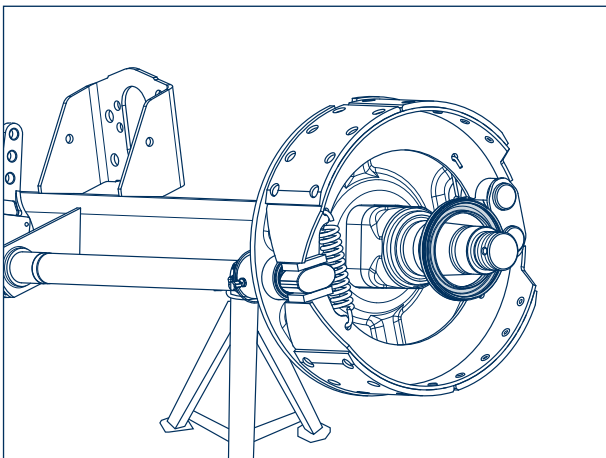


Figure 157

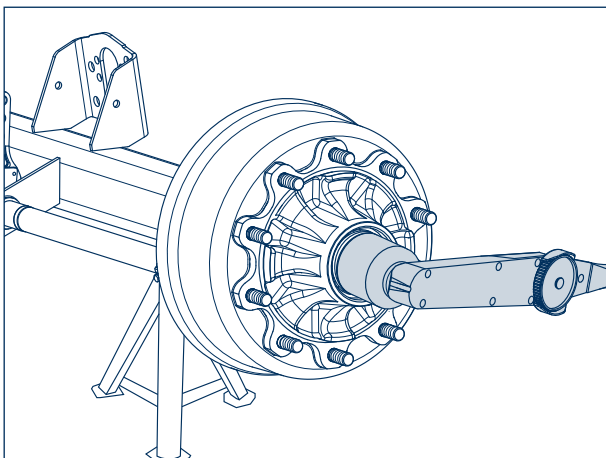


Figure 158

Notes

Notes

Notes

Notes



BPW-WH-Agrar 55081702e

BPW is a globally leading manufacturer of intelligent running gear systems for trailers and semi-trailers. As an international mobility and system partner, we offer a wide range of solutions for the transport industry from a single source, from axle to suspension and brake to user-friendly telematics applications. We thereby ensure outstanding transparency in loading and transport processes and facilitate efficient fleet management. Today, the well-established brand represents an international corporation with a wide product and service portfolio for the commercial vehicle industry. Offering running gear systems, telematics, lighting systems, composite solutions and trailer superstructures, BPW is the right system partner for automotive manufacturers.

BPW, the owner-operated company, consistently pursues one target: To always give you exactly the solution which will pay off. To this end, we focus our attention on uncompromising quality for high reliability and service life, weight and time-saving concepts for low operating and maintenance costs as well as personal customer service and a close-knit service network for quick and direct support. You can be sure that with your international mobility partner BPW, you always use the most efficient method.

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Postbox 1280 · 51656 Wiehl, Germany · Phone +49 (0) 2262 78-0
info@bpw.de · www.bpw.de