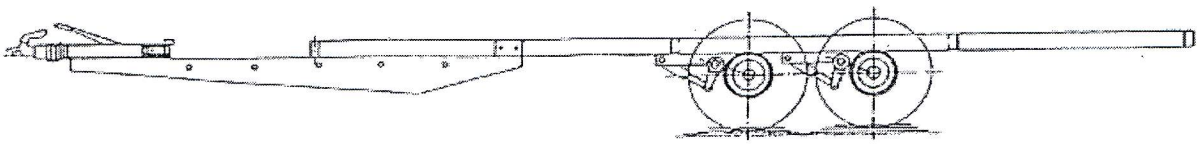
WAP

Fahrzeugtechnik GmbH

Operation instructions



Mounting, adjustment and service instructions for the WAP-overrunning type brake installation, equipped with reversing automatic feature. Spare parts list as appendix.

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WAP-overrunning type brake installation

A brake system from the discoverer of the reversing automatic feature

1. Characteristics

WAP–wheel-brake installation is approved and tested according to EU-directive 71/320 for a driving speed up to 130 km/t.

Servo-brake system operates with only a very small movement, max. 40 mm. This allows fast response of the wheel brakes (no dead movement) and shall ensure braking and drive of the trailer without abrupt.

The adjusting nut placed on the outside of the wheel-brake support makes the simple adjustment and readjustment of the wheel-brake possible.

2. Components of the complete brake installation

A complete brake installation comprises thrust equipment, power transmission equipment and an axle equipped with wheel-brakes. These three main components integrate together to a balanced aggregate. Combination of usable parts manufactured by other suppliers is allowed only with a previous approval given and required by WAP.

The calculations of the brake system for TÜV-approval can be ordered from the company free of charge.

2.1. Axle equipped with torsion bar suspension

Each one square form spring bar (torsion bar) of the WAP-torsion spring axle –one per axle head - is suspended tight between the centre holder of the axle pipe and the centric holder of the guide pipe The guide pipe is equipped with two sleeve bearings and installed in the axle pipe.

From the wheel to the lever arm and the guide pipe transmitted wheel-forces, independent of the direction, shall die via the torsion bars against the axle pipe. Thus generated strong linear spring characteristic suits very well for the constant loaded vehicles and is almost maintenance-free. The hardness of the spring can be adjusted individually for a certain axle load by adding a required quantity of spring leafs to the torsion bar. An additional shock absorber can to be installed or retrofitted to he axle for reaching of a high driving comfort.

2.2. Thrust equipment

WAP-thrust equipment is fitted with a hydraulic shock absorber (11) and quadratic case (25), which can be installed to profile or tubular towing bar.

2.3. Power transmission equipment

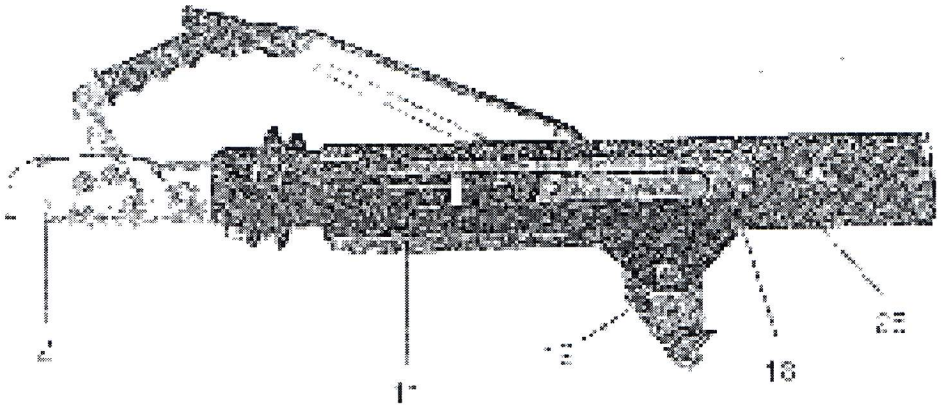
The power transmission equipment for thrust force transmission from the thrust equipment to the wheel-brakes can be delivered as adapted individually to the characteristics of the trailer.

3. Operation of force-dependent brake system equipped with reversing automatic feature

3.1. Forward drive

When braking the drawing vehicle, the trailer tries to push the drawing vehicle. In that case the pull rod (18) of the thrust equipment pushes in to the case (25).

Figure 1.



The pull rod inside the case, which is equipped with two sleeve bearings, presses the lever arm (19) hinged to the case. The movement of the lever transmits the pressing force with the help of the transmission equipment (i.e. with the actuating rods) via the balancing lever to the wheel-brakes as a pulling force. The pull of the wheel-brake wires transmits the force to the widening lock (21) wheel-brake. The widening of the lock presses the primary-brake shoe (11) (pushing shoe) in the brake drum and presses it against the drum surface in the pulling direction. At the same time the other end of the brake shoe shall press the roller (9), which is equipped with an adjusting clamp (15), and further the secondary-brake shoe (19) (pulling shoe). This leans on the counter support (W), welded on the brake support and presses equally against the drum surface.

3.2. Reverse drive

When reversing the drawing vehicle, the pull rod of the thrust equipment penetrates in to the case. Thus the pull rod generates the similar force transmission from the thrust equipment to the wheel-brakes as when braking the drawing vehicle in forward drive. The brake drum, which is rotating to the opposite direction acts however so, that the primary brake shoe presses the widening lock and the loading on the roller of the adjusting clamp disappears. Thus the secondary brake shoe does not press the brake drum. The thrust force, which is transmitted to the wheel-brake and the counterforce of the primary brake shoe to the widening lock, caused by the rotation direction will eliminate each other.

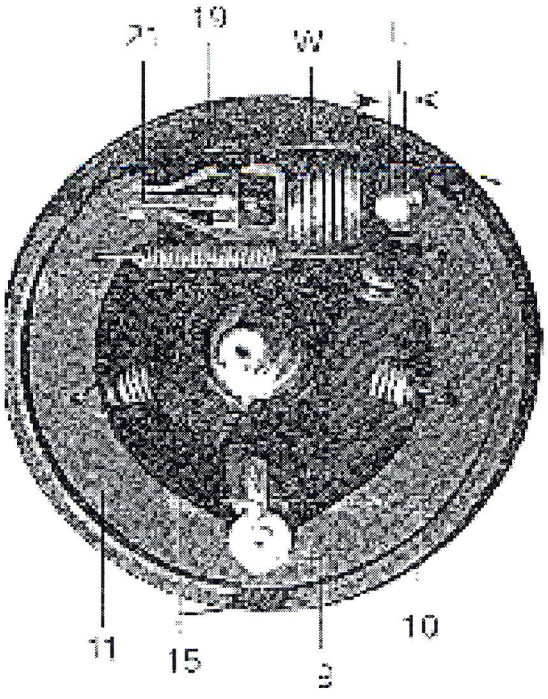


Figure 2

The small residual braking force of the widening lock leans via the pre-loaded disc spring packet (19) to the counter support and the clearance (L) between the bolt, screwed to the widening lock, and the distance piece

closes. Thus the brake drum remains free and the trailer could be reversed without problems.
Only in the extreme conditions (reversing uphill or during an abrupt reversing) the disc spring packet may squeeze together and causes so an overload to the wheel-brakes, which may lead to the momentary malfunction. In that case the push rod of the thrust equipment penetrates up to the stop in the case, although the disconnection of the wheel-brakes do not even then become more difficult.

3.3. Parking brake/disconnection brake

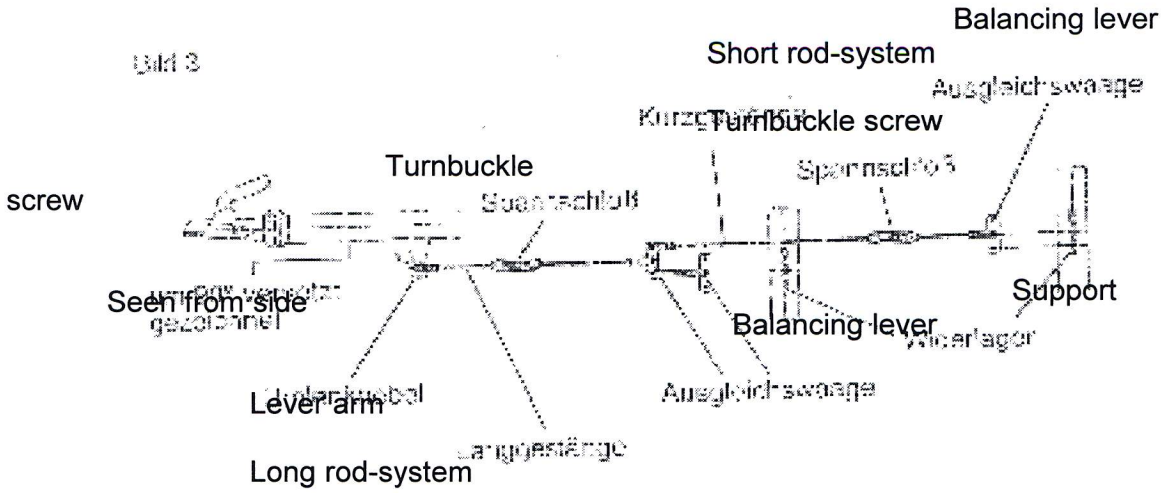
The use of the parking/disconnection brake presses the both brake shoes against the brake drum as when braking in forward drive. Because of the longer coupling travel of the parking brake (13) compared to the travel caused by the thrust equipment, the disc spring packet squeezes together so, that the clearance between the widening lock's bolt and distance piece increases. This prevents the disconnection of the wheel-brake caused by the rotation direction, as described in the part concerning reversing the trailer, for example in that case, when the trailer starts moving backwards by accident.

4. Mounting and adjusting instructions

Mounting of the brake installation to the trailer

a) Mount thrust installation and axle(s) to the trailer body.
b) Screw brake pulling wire system to the support (welded on the axle tube).
c) Fix the balancing lever of the force transmission rods to the wire ends of the brake wires.
d) Connect the fore transmission rod to the lever arm of the thrust equipment.
e) Draw parking brake lever to the 2nd tooth.
f) Tighten the turnbuckle screw of the force transmission rods so much that there is not free gap in the brake installation. Secure the turnbuckle screws with a locking nut.

Figure 3



Attention!
Pay attention that the balancing lever stays, especially in the tandem-force transmission between 1st and 2nd axle, vertically to the line of the force transmission rods. If not, correct the position of the lever by adjusting short and long turnbuckles.

4.1. Adjustment/readjustment of the wheel-brake

It is important in the adjusting/after-adjusting of the wheel-brake that the pull rod of the thrust installation is fully drawn out and the lever of the parking brake is disengaged. Prevent the moving of the trailer with stopper wedges. Loosen the pre-tension of the force transmission installation by using the turnbuckle. Lift the wheel by using a jack. Adjust with setting nut (outside of the brake support) by rotating the wheel forward at the same time until the wheel stops. Then the both brake shoes are pressed centralized on the brake drum. Loosen then the setting nut until the wheel is turning fully free. Adjust all wheels alike. When the disc brakes of all wheels are adjusted as described above, shall the turnbuckle screw to be tightened again until there is no free gap in the installation.

Attention!
Too tight adjusting of the disc brakes and/or the force transmission rods will hinder the release of the brakes when reversing.

4.2. Brake test

A brake test should to be done for the loaded trailer as a final adjustment inspection of the brake installation. In case of a factory-new trailer and after the replacement of the brake shoes, a short test drive should to be done with the parking brake slightly loaded. This operation smoothes and settles the brake shoes on the brake drums. The brake adjustment is in order when the pull rods of the brake installation travel abt. half of the max. travel distance of 40 mm in heavy braking.

5. Service instructions

5.1. After abt. 50 driving kilometres

a. Check the tightness of the fixing nuts and tighten if needed with 95 Nm moment.
b. Inspect the setting of the brake installation. Check thrust travelling distance. Check disengaging of the wheel-brakes in reverse driving. Check the synchronous operation of the wheel-brakes. Readjust the brakes, if needed.

Attention! Do never set the brakes by adjusting only the brake leverage. Adjust always first the wheel-bakes as described earlier and thereafter the force transmission rods.

5.2. After abt. 500 driving kilometres

a) Check the sideways gap of the wheel bearings and adjust, if needed.
b) Check the setting of the brake installation and adjust, if needed.

5.3. Always after 3000 driving kilometres.

a) Lubricate the bearings of the pull rods and the bearings of the lever arms of the thrust installation through the lubricating nipples on the torsion spring axles.
b) Check clear moving of all moving parts and lubricate them, if needed.
c) Check the gap of the wheel bearings and the settings of the brakes and adjust, if needed.
d) Check the weariness of the brake shoes. The brake shoes can be clearly seen from outside. The thickness of the wear surface on the brake shoes should be at least 1,3 mm; otherwise the brake shoes have to be replaced (thickness or a new brake surface = 5 mm).

5.4. Adjusting of the gap of the wheel bearings

Axles are equipped with high-quality compact bearings. Setting of the bearing gap can be done easily by tightening the axle nut. Tightening moment is 280 Nm. Further

adjusting is not needed because of compact structure of the bearing.

6. General instructions

When adjusting the ball coupling, the installation-, adjusting and service instructions of the manufacturers to be followed.

When engaging and disengaging the trailer to/from the drawing vehicle, the instructions of the manufacturer of the coupling and the trailer to be followed, as well.

The statutory regulations (ABG) for the approval of the trailer structural parts request ,that the alterations to the structure is only allowed to be done by the manufacturer inside restrictions of the rules (AGB). The conventional welding afterwards is principally not allowed. Concerning the alterations to the parts manufactured by us, please contact us or a well-known vehicle repair shop or a service station, which we are pleased to inform you.

7. Troubleshooting

Abbreviations: C = Cause, R = Remedy

Abrupt driving and braking

C = Play of the brake installation, the pull rod moves too far.
R = Readjust the entire brake installation according to the installation– and service instructions.

C = The pull rod moves to and fro by hand without resistance, shock absorber is faulty.
R = Replace shock absorber

Too weak braking effectiveness

C = Play of the brake installation
R = Readjust the entire brake installation

C = The disc spring packet of the wheel-brake is stuck and do not go back to it's releasing position.
S = The force transmission installation moves difficulty, the leverage is stuck and/or rubbing. The brake wires of the wheel-brakes are stuck and/or bent.
R = Release the leverage, lubricate the brake wires or replace the bent wires.

C = The pull rods of the thrust installation move difficulty.
R = Lubricate pull rods thoroughly according to the service instructions.

C = The brake shoes are worn out, oily or greasy.
R = Replace the brake shoes or if they are oily, check that the wheel bearing gaskets are in order.

Unsynchronised braking

C = The wheels braking is unbalanced.
R = Adjust the balancing lever of the force transmission system and the wheel-brakes according to the mounting-, adjusting and service instructions.

C = One brake wire operates difficulty or is faulty.
R = Lubricate the brake wire or replace. If needed.

C = The brake shoes of one wheel-brake are oily or worn out.
R = Replace the brake shoes of the both wheel-brakes.

The trailer cannot be reversed or it is reversing difficulty.

C = The force transmission leverage and/or the wheel brakes are adjusted too tight.
R = Loosen the turnbuckle screw of the force transmission installation and/or readjust the wheel brakes according to the mounting- and adjusting instructions.

C = The pull wire of the brake is stuck or bent and do not move back to it's initial position.
R = Lubricate the brake wire or replace it, if needed.

R = Release the spring packet and lubricate it lightly, if needed.

Reservation for mistakes and changes retained!