

## Purpose

Their purpose is to generate, together with the mechanical wheel brakes, the required braking forces as a function of the size of the brake cylinder and the input pressure.

## Please note

In this case only brake chambers are used at modern vehicles. They have lower inner friction than piston brake cylinders, due to their design. The result is a more favourable response level and high resistance to wear, because there is no friction between the diaphragm and the chamber.

Due to the lower diaphragm hub, the wheel brakes must often be adjusted if brake chambers are used. The use of automatic slack adjusters is recommended here.

## Design types

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### Brake chambers for S cam brakes

Available with or without bellows. Some brake chambers can be adjusted for different installations by shortening the passing threaded rod.

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### Brake chamber for expanding wedge brakes

Can be delivered with flange fixation or thread on the piston pipe.

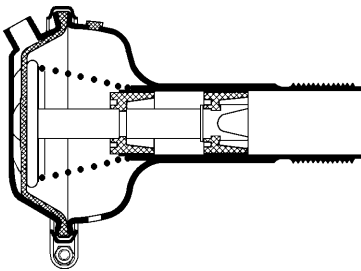
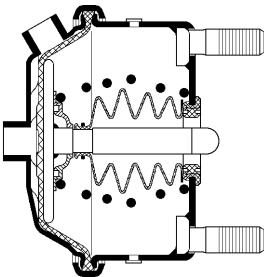
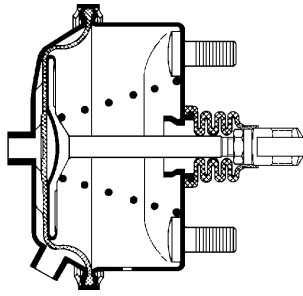
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### Brake chamber for disc brakes

The cylinders are meant to be mounted directly on the brake calliper of modern pneumatic brake disks (for example: WABCO PAN 17 - 22).

### Operation



As soon as compressed air enters the brake cylinder, the force on the piston is transmitted through the push rod onto the brake lever or the actuator, and thus the wheel brake.

The output force of the brake chamber depends on the injected pressure and the active diaphragm surface, the size of which varies according to camber.

When the pressure is released, the spring pushes the piston (or the diaphragm) back to its running condition.

### Maintenance

No maintenance is required beyond the checks required by law.

### Testing

The cylinder must be subjected to impermeability and tightness test, and the cylinder hub must be checked when the brakes are fully applied. With properly adjusted wheel brakes, the height of the diaphragm's stroke should be between 1/3 and a maximum of 1/2 of its possible total stroke.

The brake chamber is designed for a response pressure of between 0.2 and 0.3 bar. If the response pressure exceeds 0.5 bar, an internal inspection is necessary.

### Spare

When replacing a brake chamber, the bracket must be checked for any damage and replaced if necessary, following the axle manufacturer's recommendations.

The open drain/breather hole must point downwards. Any additional drain holes must be plugged. Tighten fastening nuts with 180 to 210 Nm.

## Purpose

Tristop spring brake actuators (combined spring-loaded and diaphragm brake chambers) are used for linkage-free emergency and parking braking systems. The diaphragm brake chamber at the actuator's front end allows the service braking system to be actuated independently from the emergency and parking braking system. The type specifications (example: Type **24/24**) indicate the active piston surface (in square inches) in the diaphragm and spring brake actuator part.

If the service and the parking braking systems are switched on simultaneously, the brake forces are compounded in the wheel brake. If this is to be prevented, an overload protection valve or a two-way valve needs to be installed between the two systems.

## Design types

### 425 3..



#### a. Tristop Spring Brake Actuator for wedge brakes.

The various series refer to types **9/9** to **24/24**. Some variants are equipped with a quick-release facility.

### 925 32. / 925 4..



#### b. Tristop brake actuator for S cam brakes

The various series refer to types **12/12** to **36/30**. They can also be used on disc brakes with external lever (example: WABCO 1000/1300 VG).

### 925 4..



#### c. Tristop Spring Brake Actuator

The cylinders are meant to be mounted directly on the brake calliper of modern pneumatic brake disks (example: WABCO PAN 17 - 22).

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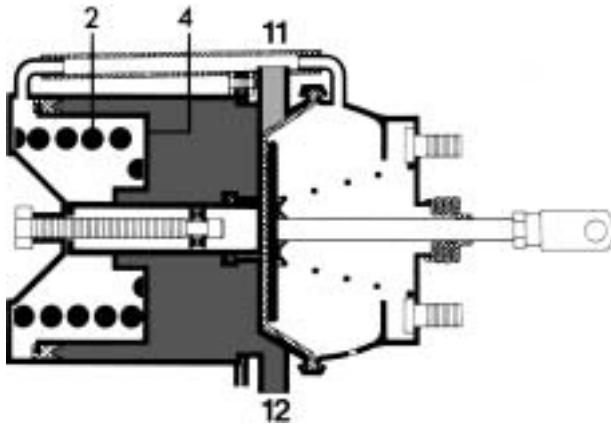


### d. Tristop brake actuators TSL for trailers

The cylinders are specially equipped with spring brake actuator FBA for mounting on trailer axles, and offer, with a maximum of 75 mm hub, the required distance reserve also for vehicles without automatic slack adjusters.

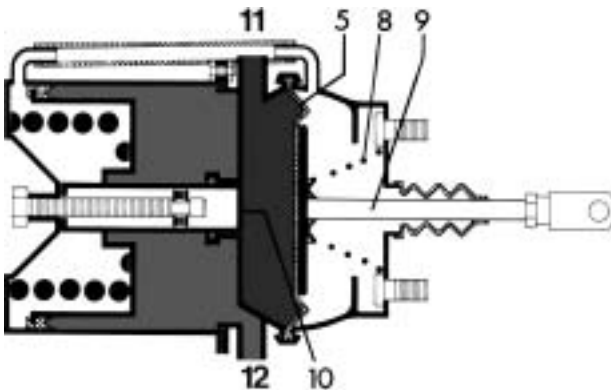
**Operation of a Tristop Spring Brake Actuator:**

**a. Release position**



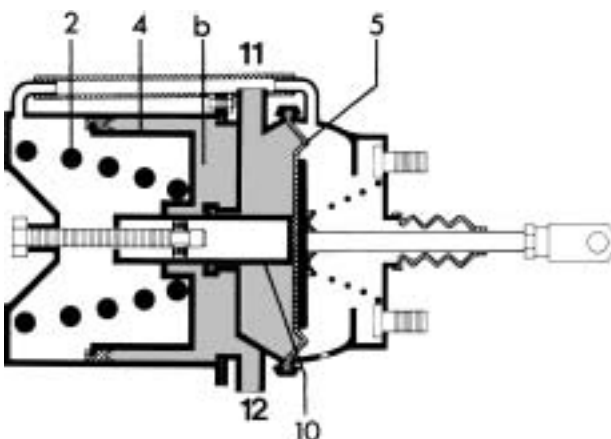
In the release position, port (12) of the spring-loaded portion receives full air pressure. This enables the pressurized piston (4) to preload the spring (2), thereby releasing the spring-loaded portion. At the same time, port (11) of the diaphragm brake chamber is pressureless, and the service brake released.

**b. Actuating the Service Braking System**



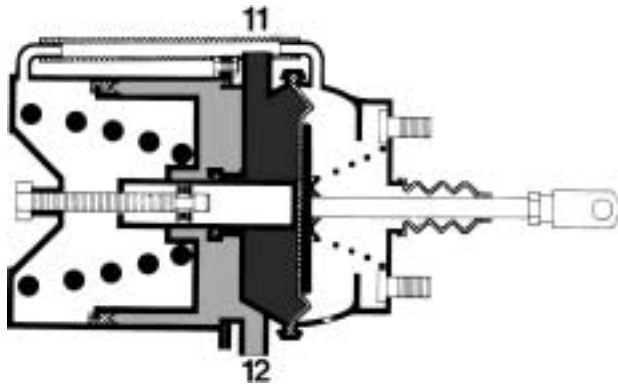
When port (11) is pressurized, the diaphragm (5) overcomes the force of the spring (8). As it rises from the push-rod of the spring-loaded portion, the force generated is transmitted to the wheel brake via the push-rod (9) of the brake chamber. When the service brake is released, the pressure in port (11) falls, allowing the restoring force of the wheel brake, together with the force of the spring (8), to return the diaphragm (5) to its original position.

**c. Actuating the Emergency or Parking Braking System**



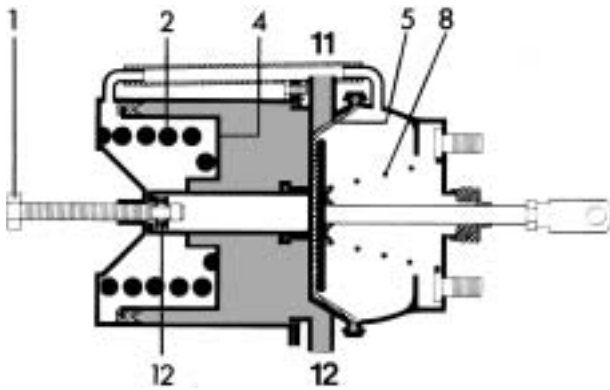
By actuating the hand brake valve, port (12) of the spring-loaded portion is vented, this process being sensitively gradable. When the drop in pressure has reached the response range of the spring-loaded portion, the force of spring (2) overcomes the residual pressure in chamber (b), allowing that force to be transmitted to the push-rod (10) via the piston (4). The force thus generated by the spring-loaded part is picked up by the diaphragm (5) and transferred - as described under "b" above - to the wheel brake. The spring brake is released as described under "a" and "b".

**Please note**



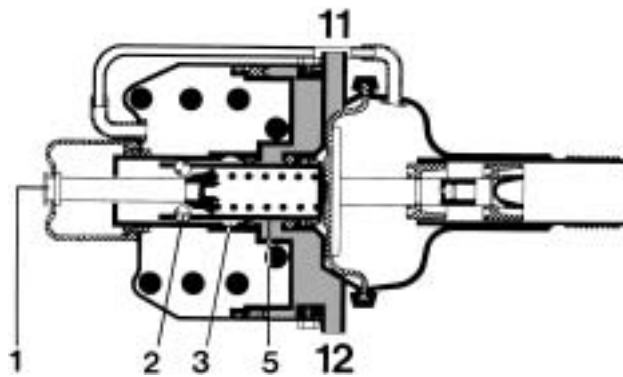
If the driver, for whatever reason, additionally actuates the service brake, the forces of the parking and service braking systems are compounded. If the components of the wheel brake are not designed for this compounding of forces, an overload protection valve must be fitted. For its location, please refer to the description of "Overload Protection Valves".

**d. Actuating the mechanical release mechanism**

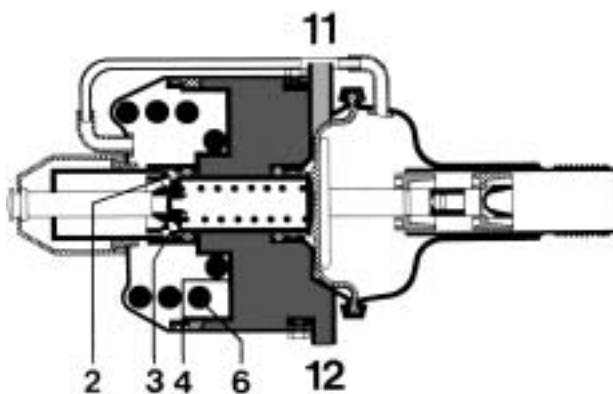


If a defect causes the compressed air for the spring-loaded part to fail, the actuator automatically responds as described under "c" above. To be able to release the brakes in situations of this kind, the spring-loaded portion has a release mechanism consisting of a hexagon head cap screw (1) and a needle bearing (12). This system consists of the hexagon flange bolt (11) and the needle bearing (12). To release the spring-loaded part, the screw (1) is simply turned anti-clockwise. This causes the spring (2) to be prestressed once more via the needle bearing (12), taking the piston (4) with it. The restoring forces of the wheel brake and the force of spring (8) return the diaphragm (5) to its original position.

**e. Tristop Spring Brake Actuators with Quick-Release Facility**



To actuate the quick-release mechanism, the bolt button (1) is actuated using a hammer blow. This releases the balls (2) from the catch (3), and the push-rod (5) is returned through the restoring forces of the wheel brake. On actuators which are not mounted on the vehicle, a suitable tool is used to apply pressure on the piston rod in order to generate the restoring forces.



When the cause for the loss of pressure has been remedied, port (12) is pressurized once more. The retracting piston (4) once again prestresses the spring (6). At the same time, the balls (2) are pushed back into the catch (3), where they are locked.

## Maintenance

No maintenance is required beyond the checks required by law.

## Testing

The diaphragm brake chamber is designed for a response pressure of between 0.2 and 0.3 bar. If the response pressure exceeds 0.5 bar (port 11), an internal inspection is necessary. With properly adjusted wheel brakes, the height of the diaphragm's stroke should ideally be 1/3 of its possible total stroke.

The release pressure of the spring-loaded portion is 6.0 bar. When the pressure falls below the release pressure, the spring-loaded portion must respond.

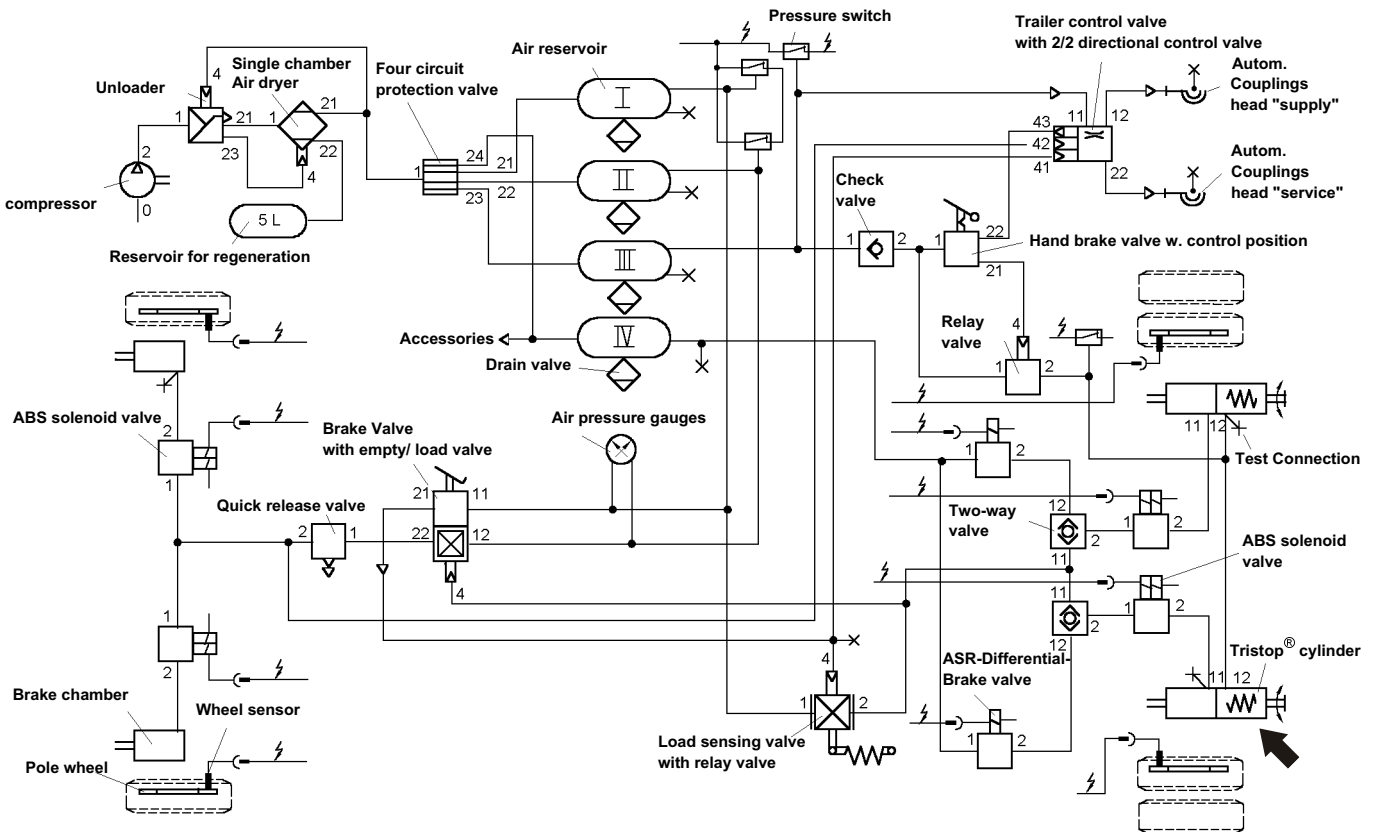
## Spare

When replacing a brake chamber, the bracket must be checked for any damage and replaced if necessary, following the axle manufacturer's recommendations.

The open drain/breather hole must point downwards.

Tighten fastening nuts with 210<sub>-30</sub> Nm.

## Schematic for Testing and Installation



## Tristop Spring Brake Actuators on Trailers

### Please note

Nowadays more and more Tristop spring brake actuators are used on trailers instead of the mechanical parking braking systems used previously.

Following the schematic below, the separate air reservoir which used to be mandatory becomes dispensable. Instead of the relay valve with overload protection, the inexpensive two-way valve can be used to prevent compounding of the brake forces from the service brake and the spring-loaded portion.

### Tristop Spring Brake Actuator Type "TSL" 925 37 . for Trailers

The "TSL" series has a stroke of 75 mm, and has been specifically designed for trailers. Actuators types 24/30 and 30/30 are used.

The "TSL" type is designed as a double-diaphragm chamber (see sectional view).

### Operation



Other than the emergency release mechanism mentioned above, it works like the Tristop spring brake actuators described previously.

The release screw is located in a depository hole on the side of the housing. To actuate the emergency release mechanism, the protective cap in the hole on the actuator's housing is removed, the screw inserted and locked into position by turning it clockwise.



**Maintenance**

No maintenance is required beyond the checks required by law.

**Testing**

The brake chamber is designed for a response pressure of between 0.2 and 0.3 bar. If the response pressure exceeds 0.5 bar (port 11), an internal inspection is necessary. With properly adjusted wheel brakes, the height of the diaphragm's stroke should ideally be 1/3 of its possible total stroke.

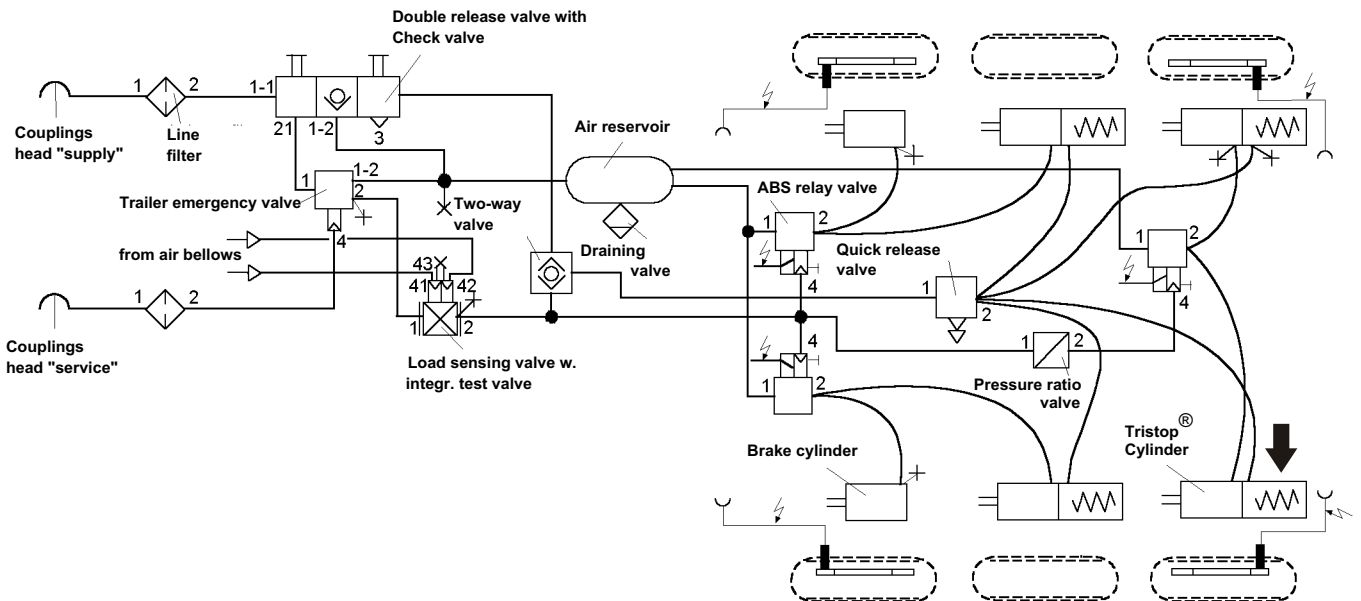
The release pressure of the spring-loaded portion may not exceed 6.0 bar. When the pressure falls below the release pressure, the spring-loaded portion must respond.

The tightening torque of 210 Nm for the fastening nuts must be checked at the maintenance intervals laid down by the axle manufacturer.

**Please note**

If the emergency release mechanism has had to be actuated, the release screw must be returned to its depository hole on the side of the actuator's housing, and the opening on the actuator's cover closed with the cap fixed to the actuator.

**Schematic for Testing and Installation**



### Purpose

Slack adjuster with S cam actuation are used in drum brakes. The brake shaft needs to be manually or automatically adjusted to compensate lining wear, to ensure that the brake cylinder always operates as closely as possible within a certain stroke range.

### Design types:

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a. **Slack Adjuster** (manual adjustment)



433 571 ... 0 to 433 578 ... 0

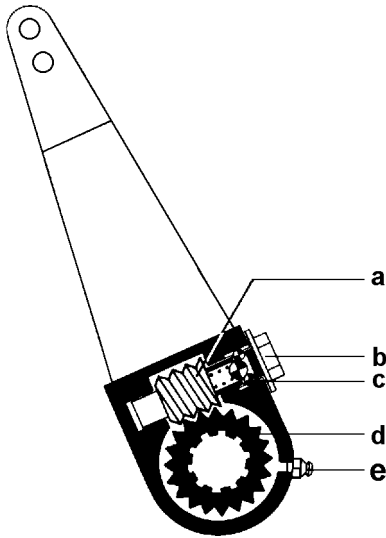
b. **Automatic Slack Adjuster NAGS**  
(automatic adjustment)



### Please note

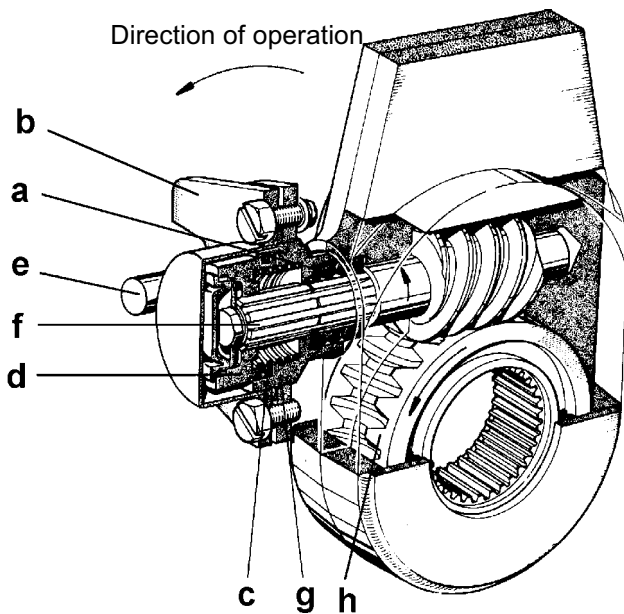
Different variants of slack adjusters are available with different lever shapes and lengths, and different splines.

### Operation of Slack Adjuster 433 50. ... 0



For adjustment, a ring spanner is placed over the hexagon head (b) of the adjusting mechanism. As this is turned, worm (a) moves. The brake shaft and thus the brake cam are readjusted via the worm wheel (d). The ball catch (c) for the hexagon (b) prevents unintentional readjustment of the slack adjuster.

### Operation of Automatic Slack Adjuster 433 57. ... 0



In the release position of the braking system, the lower edge of the mouth of the adjusting plate rests on the bolt (e) serving as a locating point. When the brakes are actuated, the adjusting plate (b) will at most cover the distance between the upper edge of its mouth and the bolt.

If the stroke of the brake cylinder has increased due to lining wear, the upper edge of the mouth of the adjusting plate will push against the bolt and be held there. This causes the coupling piece (g), which is firmly attached to the adjusting plate, to turn on the worm shaft (f) in the winding direction of the rectangular spring (c). At the end of the braking process, the slack adjuster returns to its original position.

In this process, the lower edge of the mouth of the adjusting plate once again rests on the bolt, turning the coupling piece on the worm shaft against the winding direction of the rectangular spring.

The turning motion causes the rectangular spring to untwist, firmly sitting against the hole in the coupling piece and the adjusting ring (d). The resulting high coefficient of friction pulls along the adjusting ring which interlocks with the worm shaft. Via worm shaft and worm wheel, the brake shaft is turned in the sense of actuation, thus achieving the best possible adjustment of the wheel brake.

To make sure that jarring does not cause the coupling piece to twist on the worm shaft, it is pushed against the adjusting ring by the spring (a).

### Before Changing the Linings

Unscrew screws (j and k) from the slack adjuster using a spanner, then remove the adjusting plate (b) with the protective cap (l) from the coupling piece (g). Return the brake cam shaft by turning the adjusting ring (g) until the smallest diameter has been achieved for the brake shoes.

### After Changing the Linings

By turning the adjusting ring, advance the brake linings far enough to achieve a residual piston stroke of approx. 10% when the slack adjuster is pulled back manually until the brake shoes make contact.

Then fasten the protective cap and the adjusting plate on the coupling piece using the hexagon head cap screws - tightening the screws evenly with a torque of 12 Nm!

### Maintenance

WABCO's automatic slack adjuster is oil-filled - and is maintenance-free. On request, however, it is supplied it with a lubricator nipple - lubrication intervals should then coincide with those of the S-cam shaft

### Testing

To make sure the automatic slack adjuster is working properly, check the stroke of the brake cylinder periodically and whenever the brakes are tested. If the stroke check shows any deficiencies, the slack adjuster must be replaced.