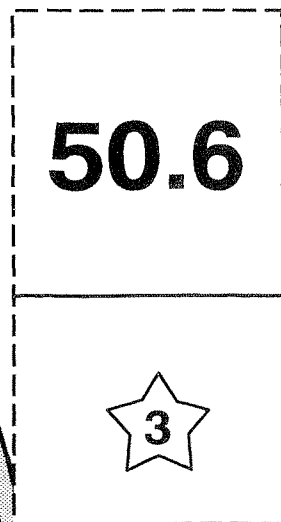
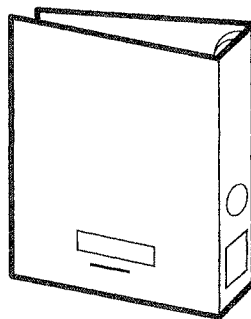
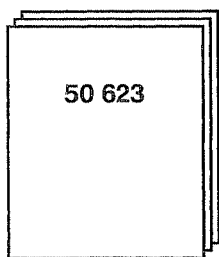


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LUCAS D LISA BRAKES

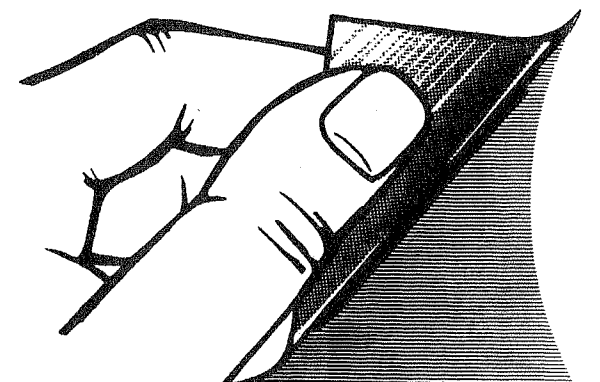






































BRAKES	VEHICLES
LUCAS D LISA BRAKES	MAGNUM 04/97 → ... PREMIUM 06/97 → ... AGORA 11/97 → ...

**CONTENTS**

<b>SECTION</b>	<b>DESCRIPTION</b>	<b>PAGE</b>
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H	Brake disc	H1 - H3
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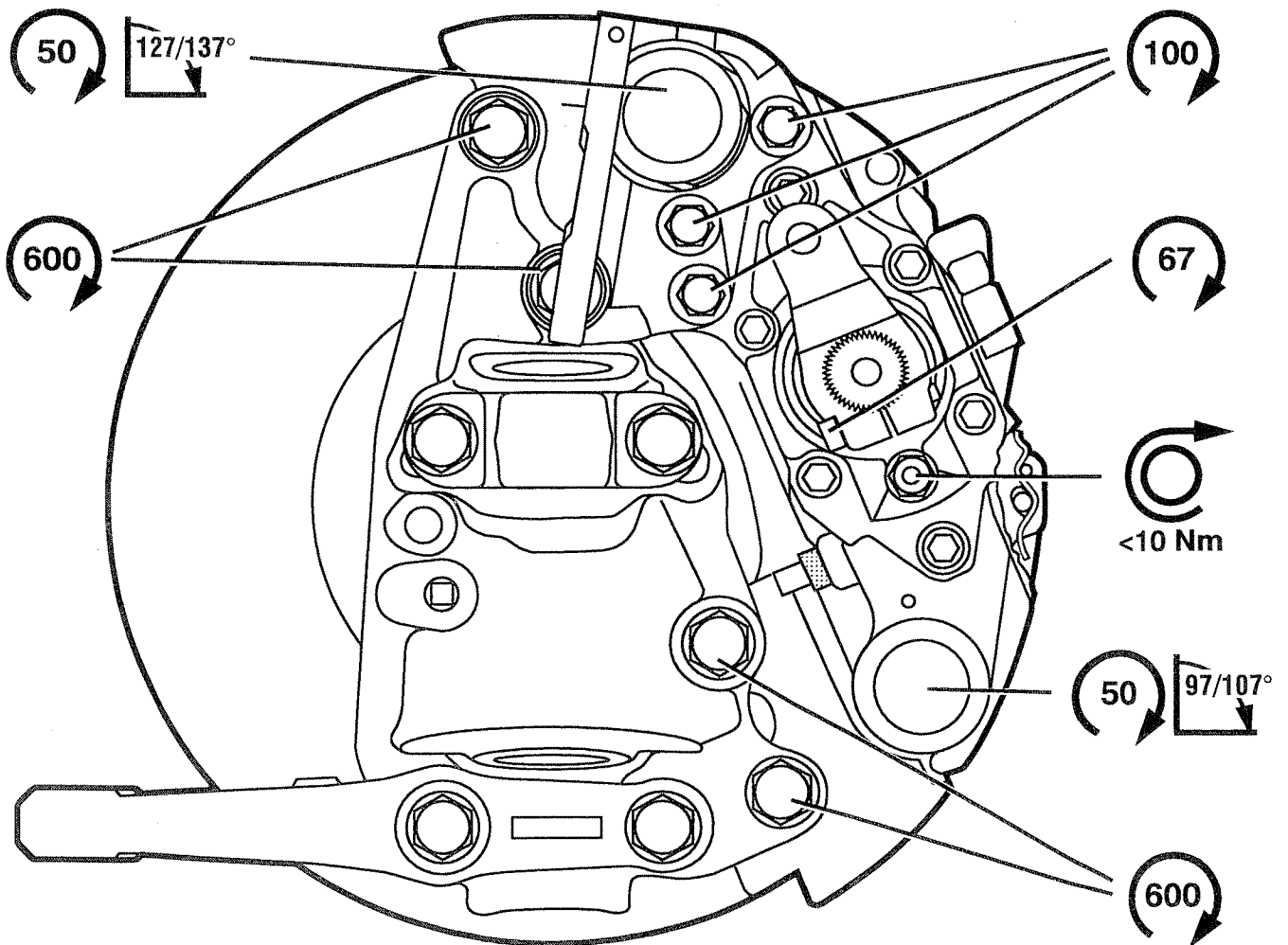
CONVENTIONAL SYMBOLS



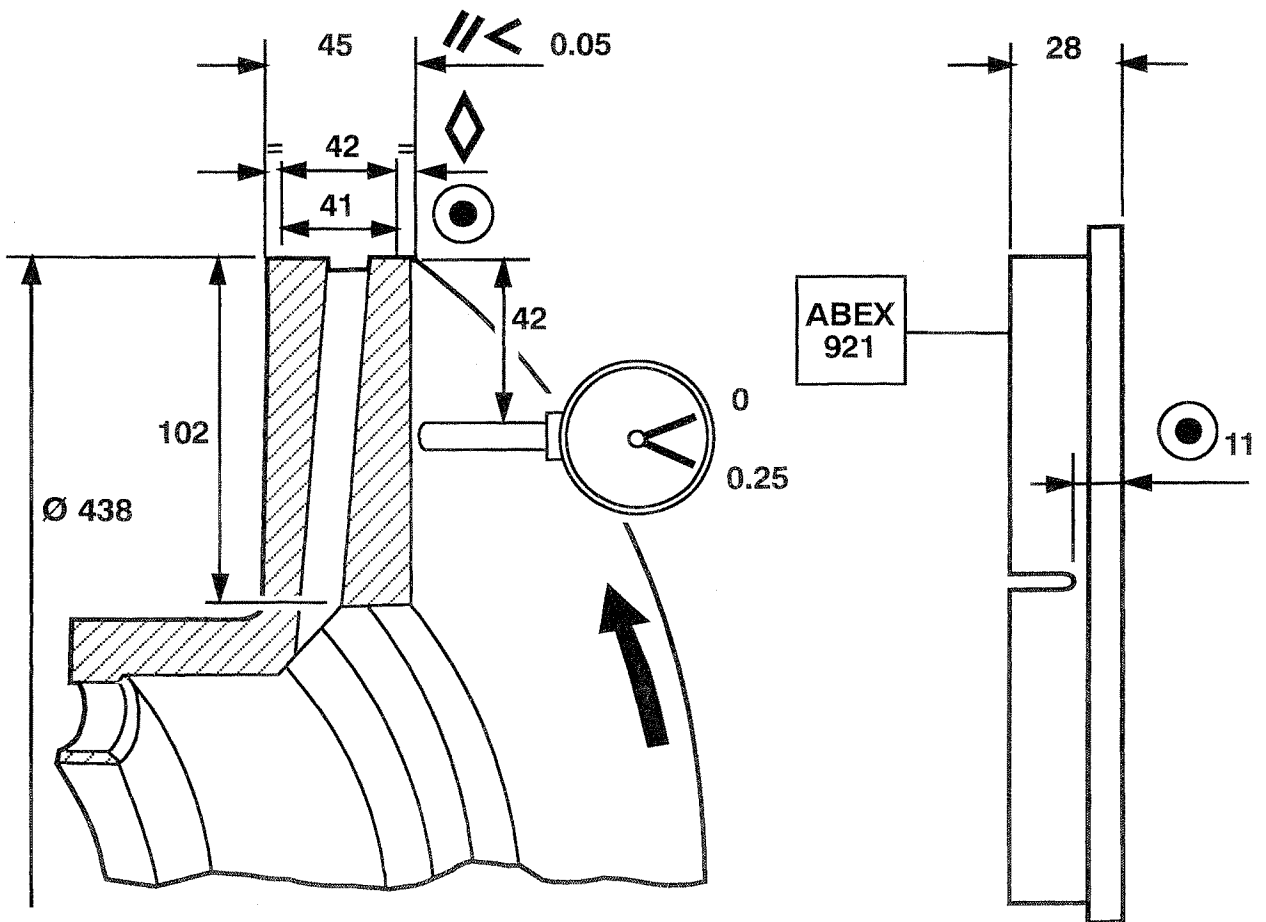
 Tighten to the recommended torque (N.m) (Left hand thread)	 Adjust - Bring into contact
 Tighten to the recommended torque (N.m) (Right hand thread)	 Clearance - Ensure or detect dimension (mm)
 Tighten to the recommended value	 Axis - Vertical
 Slacken to the value indicated	 Radius - Horizontal
 Tightening	 Maximum run-out
 Force to be exerted in a direction (hammer-press)	 Maximum parallelism difference
 Rotational force	 Tolerance limit or machining dimension
 Heat or cool: Temperature in degrees Celsius (example: +80_C)	 ... to ...
 Weld bead	 Equal - one or the other
 Repair time	 ... Less than...
 Exhaust - Outlet	 ... Greater than...
 Inlet - Inlet	 ... Less than or equal to...
 Weight in kg (example 275 kg)	 ... Greater than or equal to...
 Coat (see consumables table)	 Repair dimensions
 Lubricate or oil (see consumables table)	 Parts to be replaced
 Refill to correct level (see specifications and consumables table)	 Wear limit
 Depending on version or option	 Check - check the condition of the parts
 Mark - Fit according to marking	 Danger to people, the vehicle or the equipment

**TECHNICAL SPECIFICATIONS**

Tightening torques for the brake calipers (Nm)



Technical specifications brake disc and pads





**Brake pad: Abex 921 grade**

Original thickness with metal mounting: 28 mm

Minimum thickness with metal mounting: 11 mm

**Brake disc**

External diameter: 438 mm

Nominal thickness: 45 mm

Minimum thickness after regrinding: 42 mm

Minimum thickness: 41 mm

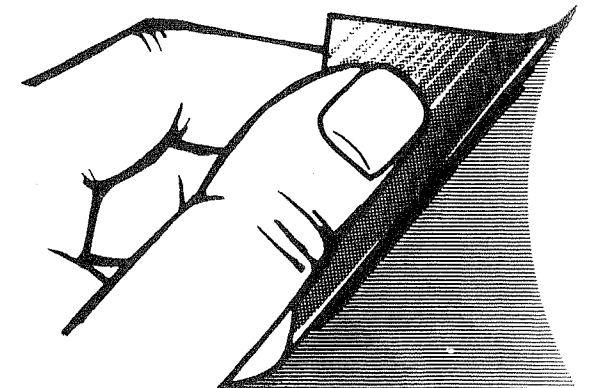
**Operating clearance of brake pads and discs**

Operating clearance > 0.4 mm and < 1.0 mm

Brake lever travel < 65 mm

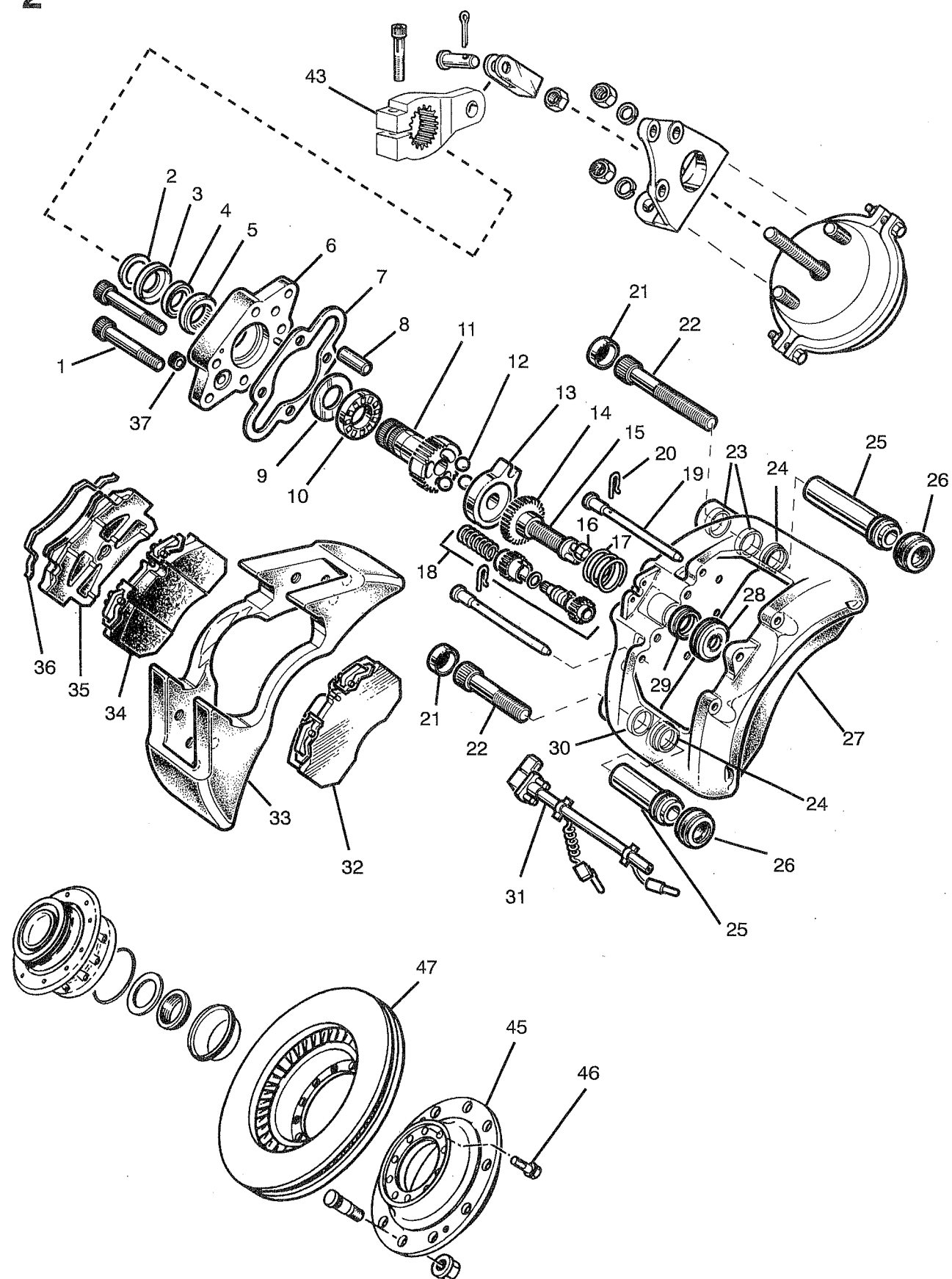
Note: Refer to section C, paragraph "Fitting brake pads" for these values.

DESCRIPTION - OPERATION



## Description - operation

2



## Introduction

The air actuated disc brake (fig. 1) has been designed for vehicles in the 19 tonnes range, PTAC (Total Authorised Weight under Load).

The caliper operating mode is simple, but it is important that the technical specifications of the automatic adjustment system, which are not sensitive to braking effort, are clearly understood. It is essential that maintenance procedures are correctly observed to ensure that the caliper provides satisfactory operation for the whole of its life.

## Operation

See fig. 2.

The air chamber is mounted to the caliper housing (27) and connected by a brake lever (43) to the caliper operating shaft (11).

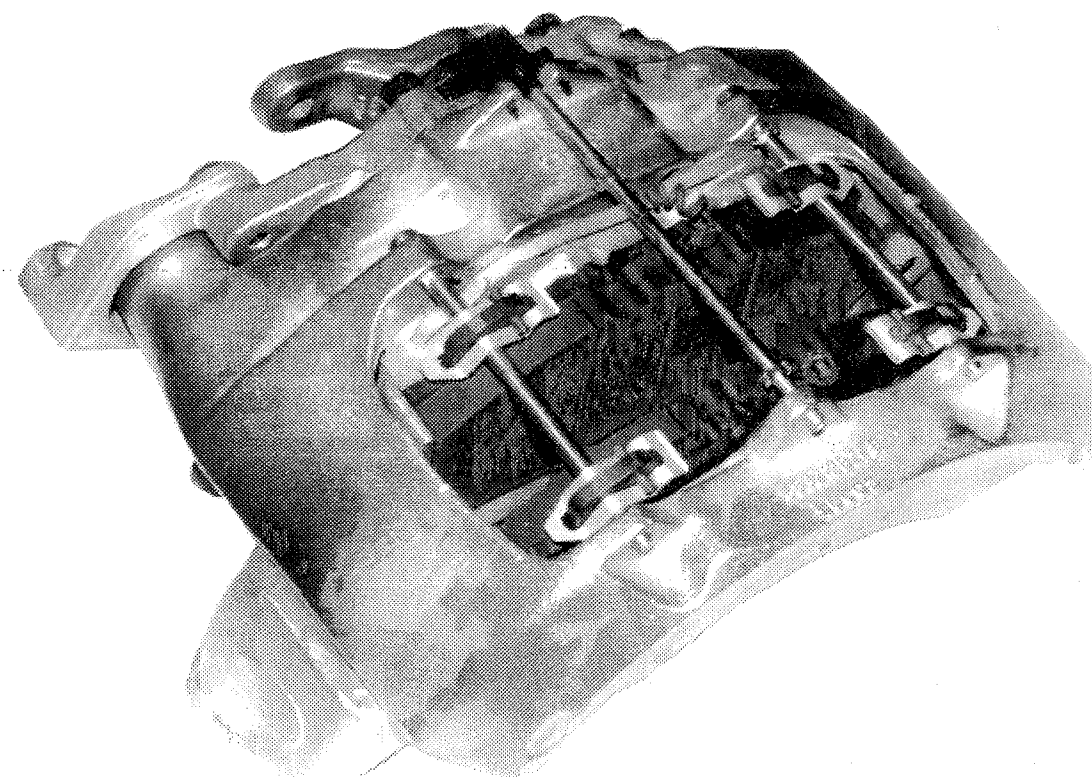
A carrier bracket (33), which absorbs the braking force, is mounted to the vehicle's stub axle and covers the brake disc. The caliper housing (27) moves along two sealed guide sleeves (25), fixed to the carrier bracket (fig. 3) and the brake pads (32/34) are held by the retaining pins (19).

**IMPORTANT**

The slide guide system is made up of two cylindrical bearings (23) on the air chamber side, and an OVAL bearing on the opposite side (30). The OVAL bearing provides the necessary clearance for the caliper housing to slide correctly on the slide guides.

Brake pad wear adjustment is carried out automatically and continuously by an integrated automatic adjustment mechanism (18) which is not sensitive to braking force.

1



## Applying the brakes

### Brake application, no adjustment required

The caliper housing (27) is mechanically operated and consists of a control shaft (11), three very high resistance ball bearings (12), ramp (13) / adjuster (14) / tappet screw (15) assembly, which are associated with a completely integrated automatic adjustment mechanism (18).

The adjustment mechanism (fig. 4) is located near the ramp (13) / adjuster (14) / tappet screw (15) assembly and has a multidisc clutch arrangement (40), a notched wheel (41) and a wrap spring (39), these being concentric in relation to one another.

The multidisc clutch is designed to slip at a specific torque in each direction of rotation. The wrap spring (39) drives it in one direction, whilst it is free in the opposite direction.

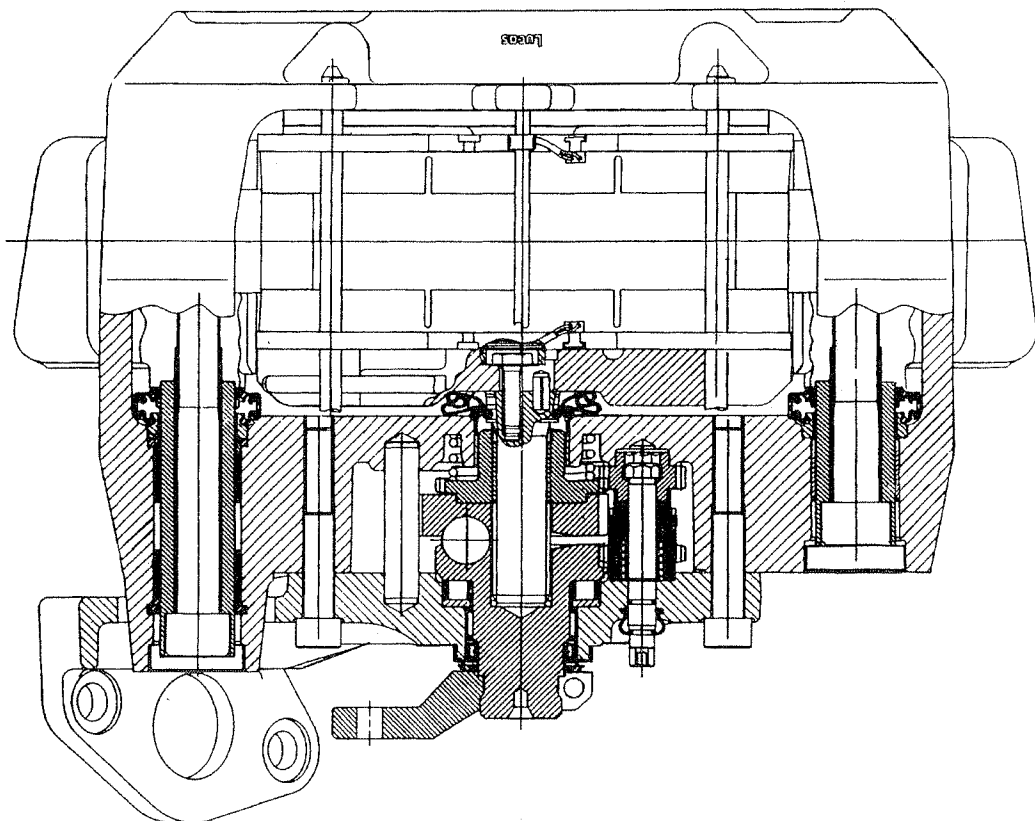
When the service brake is applied, the air chamber operates the brake lever, which causes the operating shaft to rotate.

The operating shaft rolls the ball bearings (12), which are located in the sockets containing the vanes in the operating shaft (11) and the brake ramp (13), which then begin to ascend the slope of the socket, thereby causing a movement between the operating shaft and the brake ramp.

The brake ramp (13) which is held by an anti-rotation pin (8) is pushed from the operating shaft (11) in the axis direction.

Linear displacement of the "tightening force" is transmitted by the adjuster threads (14) to the tappet (15).

## 3



The tappet (15) transmits this force to the spreader plate (35), which distributes it over the brake pad, applying the inner brake pad (34) to the brake disc. A reaction force is transmitted over the thrust roller bearing (10), its bearing race (9), the cover (6) and its six mounting bolts (1) which apply the outer brake pad to the other surface of the disc.

When the operating shaft (11) begins to rotate, it also turns the slotted wheel (41) of the automatic adjustment system (18). The wrap spring (39) re-tightens and makes the assembly interdependent and the clearance between the slotted wheel (41) and the multidisc clutch (40) is taken up. The permitted angular displacement represents the operating clearance between the pads and the brake disc when the brakes are slackened.

The multidisc clutch (40) transmits the torque from the slotted wheel (41) towards the adjustment wheel (38) then to the adjuster (14).

When the brake pads touch the brake disc, all additional rotation of the operating shaft will increase the tightening force and thereby the torque between the tappet and the adjuster up to a level which will be greater than the torque determined from the multidisc clutch.

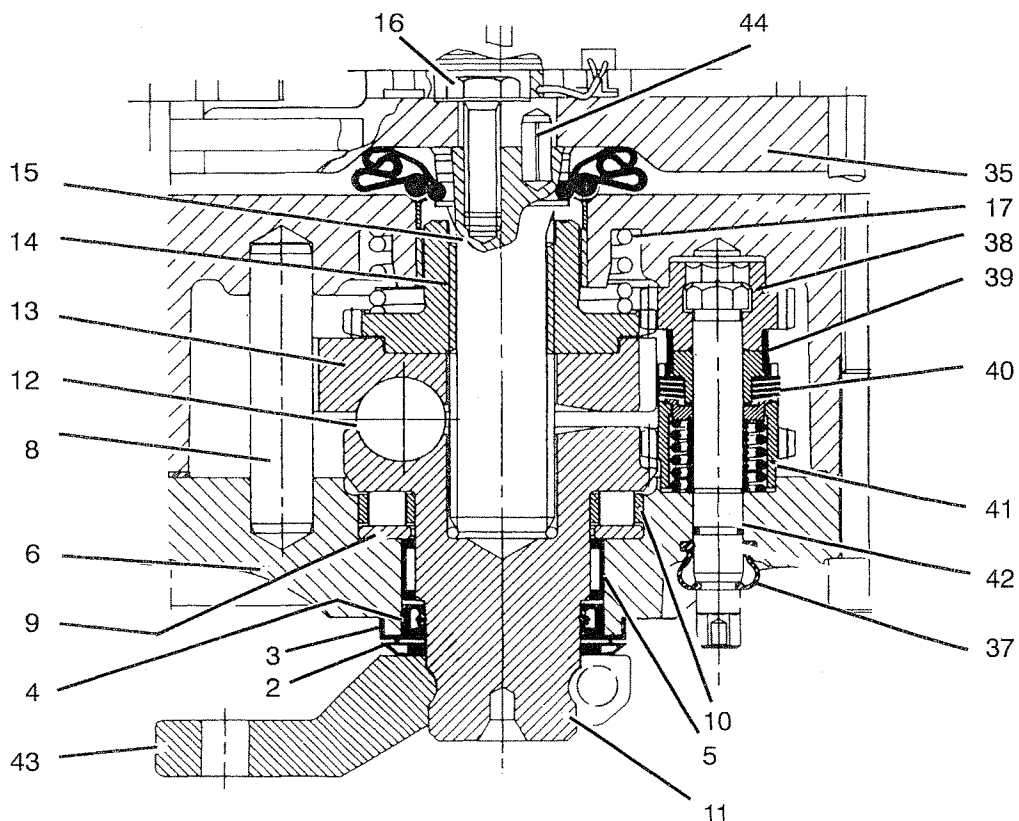
However, the clutch slips to prevent adjustment of the brake.

When the brake is released by the return spring (17), in conjunction with the air chamber, the actuation mechanism is returned to the rest position.

#### Brake application, adjustment required

The air chamber acts in the same way as described above and the slotted wheel (41) takes up the angular clearance between the groove and the tabs of the clutch discs (fig. 4). As the space between the pads and the brake disc is greater than the predetermined operating clearance, no force is generated to cause the multidisc clutch to slip.

4



The result of this is that the clutch (40) becomes a solid shaft driving the adjustment wheel (38), which operates the adjuster (14) as it turns, thereby displacing the tappet (15) which reduces the clearance between the pads and the brake disc. When the brake pads are in contact with the brake disc, all additional rotation of the operating shaft will increase the tightening force and cause the multidisc clutch (40) to slip and prevent the adjustment system (18) from adjusting any further. When the brake is released, the brake pad tightening force is cancelled. The operating shaft turning in the return direction drives the slotted wheel (41), the multidisc clutch tabs move along the groove in the notched wheel until they reach the other side of the groove.

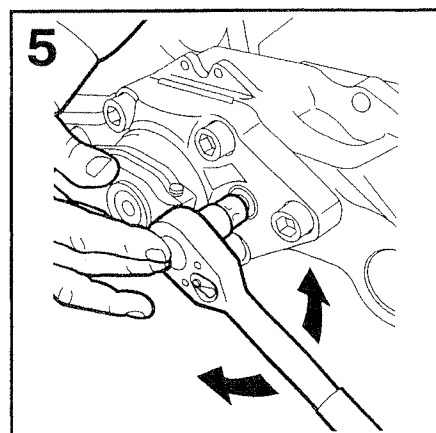
Any rotation of the operating shaft in the return direction drives the slotted wheel (41) and the multidisc clutch. However, no movement is transmitted to the adjuster (14) because of the wrap spring (39) which releases in its direction of rotation.

As a result, the tappet (15) remains in its new position with the operating clearance determined and restored.

### Manual adjustment

The brake automatic adjustment device (18) is equipped with manual adjustment capability (fig. 5). This allows the brake to be de-adjusted or adjusted when the brake pads are removed / fitted.

To de-adjust or adjust the brake, place a 10 mm socket on the adjuster stem (42) (fig. 4) and push it until it engages in the adjustment wheel (38) (fig. 4). With the adjuster stem held in place, turn it in the appropriate direction.



#### **IMPORTANT**

*Note: The direction of rotation depends on the desired action: adjust or de-adjust the brake. By turning the adjuster stem (42) in the opposite direction to the application of the brake lever, the brake will adjust itself and by turning in the direction of the application of the brake lever, the brake will be de-adjusted.*

**REMOVAL / FITTING OF BRAKE PADS**

## Removal / Fitting of brake pads

Carry out a visual inspection of the whole brake to check for any signs or damage or corrosion. If there is any doubt about its operating capability, replace or repair.

**IMPORTANT**

*Always replace all the brake pads on the axle.*

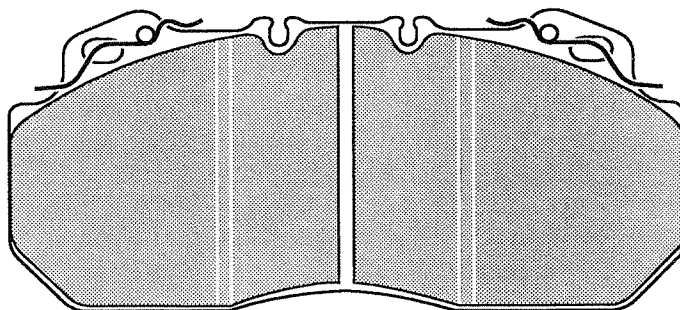
## Fitting brake pads

**IMPORTANT**

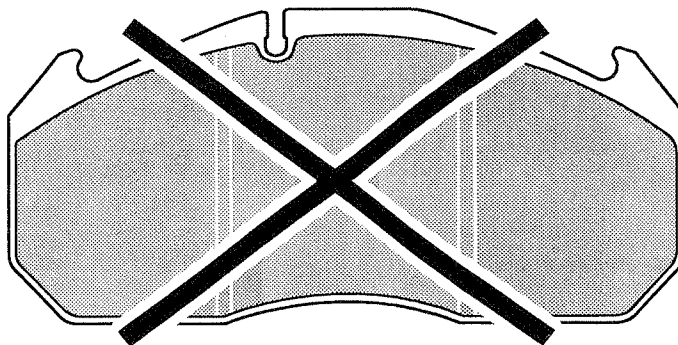
*The pads fitted to D3 and D lisa brakes are different. Do not mix they are not interchangeable, fig.6.*

**6**

D Lisa Brake



D3 Brake



## Removing the brake pads

Immobilise the vehicle on a firm, level surface using the parking brake. Lift the front axle and position the appropriate axle stands. Remove the wheels and drain the air braking system.

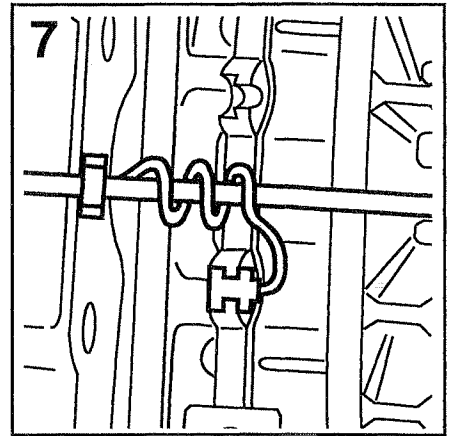
**IMPORTANT**

Never use compressed air to remove dust from the disc / brake caliper area. All dust, if inhaled, is at best an irritant, at worst dangerous. Whenever possible, use a vacuum brush for dry dust. If the surfaces have to be wiped with a moist cloth, never attempt to accelerate drying time using compressed air.



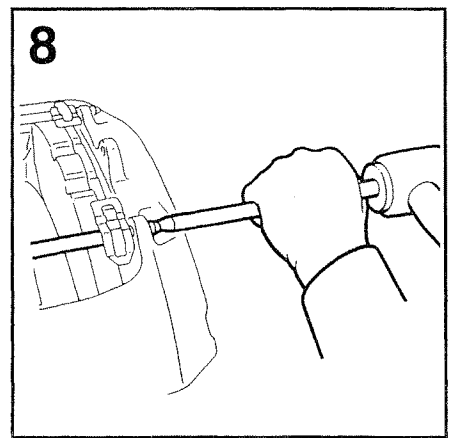
Remove all dust from the caliper using a wire brush, taking care not to damage the rubber dust cover (26).

Remove the brake pad wear indicator inserts (fig. 7), disconnect and remove the brake wear indicator assembly (31).



Remove the pad retaining pin clips (20) and remove the retaining pins (19) using a hammer and a roll pin punch (fig. 8).

The anti-squeal spring (36) on the spreader plate is held under tension by the brake pad retaining pins. Hold the spring in position while the retaining pins are removed and thereby prevent it from "jumping" out of the brake.

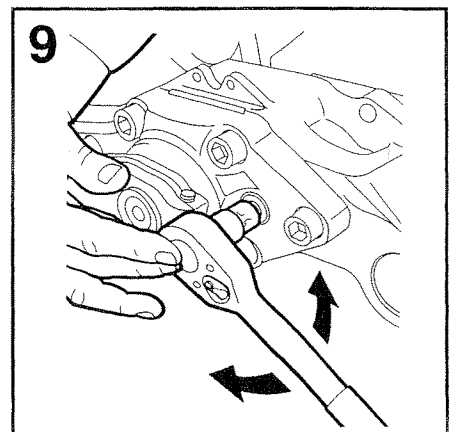


#### **IMPORTANT**

*Always adjust / de-adjust the brake carefully, MANUALLY. Never exceed a maximum torque of 10 Nm in each direction on the adjusting rod and NEVER use pneumatic or electrical tools to adjust or de-adjust the brake.*

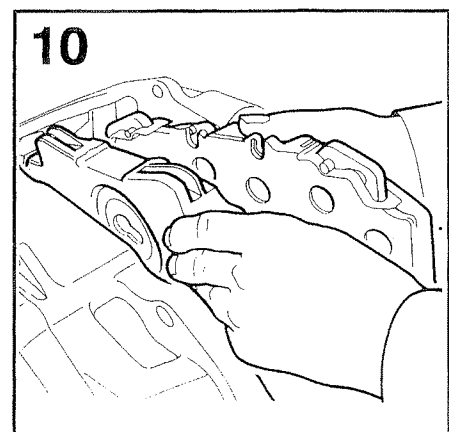
#### **De-adjusting the brake to remove worn brake pads.**

Place a 10 mm socket on the adjuster stem (42). Press down on the adjuster stem to engage the adjusting wheel (38), then, with the adjuster stem held down, turn the socket in the direction of the brake lever (in the direction of brake application) (fig. 9) until it is possible to remove the worn pads. Continue to de-adjust the brake until there is enough space to fit the new pads.



#### **NOTE**

Remove the spreader plate (fig. 10).



## Checking and cleaning the brake caliper

**IMPORTANT**

*Axial slide clearance is determined by the OVAL bearing (30). If the clearance seems abnormal, section D MUST be consulted.*

When the brake pads have been removed, check the integrity of the guide sleeve dust covers (26) and of the tappet dust cover (28) and ensure that they are not damaged and that they are positioned correctly in their grooves.

If any of the dust covers are damaged or out of place, the brake caliper must be removed and disassembled and the contents examined to detect any damage or corrosion. Replace or repair.

Check that the caliper housing moves easily along the guide sleeves fixed to the mounting.

**IMPORTANT**

*Be careful with fingers when checking brake slide. The forward and back movement must be carried out slowly. There is a risk that the dust covers (26) will come away from their retainer(24).*

If the caliper housing (27) does not move easily along the guide sleeves (25), remove them from the carrier bracket (33) as described in section F, in the section entitled "Replacing the caliper housing". Examine the guide sleeves and their bores in the caliper housing to detect wear and / or corrosion.

If there is any doubt about their capability of fulfilling the operation, replace with new components.

Visual inspection of the brake discs.

- refer to MR 50 900.

Measure the thickness, observing the wear limit value.

Check the surface condition. The wear should be regular and correctly distributed. Regrind if necessary. Observe the regrinding limits. Regrinding must be equally distributed over each surface.

Replace if necessary. Refer to section H.

Wear eye protection when removing rust and burrs on the outer diameter of the brake disc and particularly on the braking surface.

A scraper or an old screwdriver held against the mounting (33) while the disc is turned will remove the majority of the rust. Use an emery cloth to finish off if necessary.

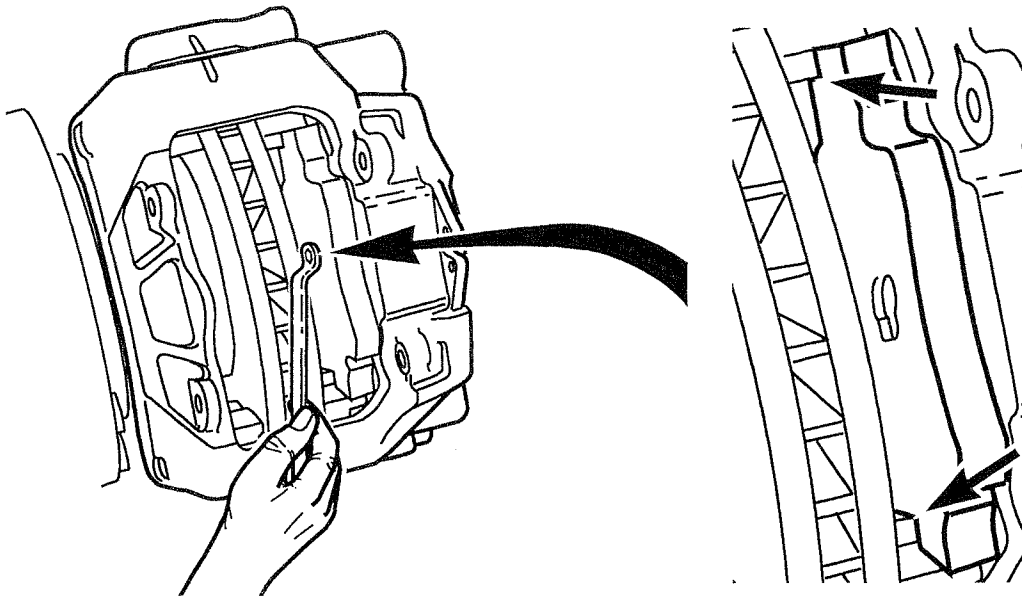
### Fitting brake pads

Remove all trace of burrs, rust, dust etc... from the abutment surfaces of the spreader plate and the brake pads which may restrict their movement in the carrier bracket (33) and, as a result, prevent correct de-adjustment of the brake.

After cleaning, do not put lubricant or oil on the brake pad supports or the spreader plate.

Fit the spreader plate (35) whilst ensuring that pin (44) of the tappet head is correctly fitted in the spreader plate (fig. 10) and secure it to the tappet head. To tighten bolt (16) to the recommended torque of 47 Nm, place the spreader plate against the mounting (fig. 11). Pull the brake towards the outside of the vehicle and first position the outer pad. Push the brake towards the inside of the vehicle until the outer pad is in contact with the brake disc, then fit the inner pad.

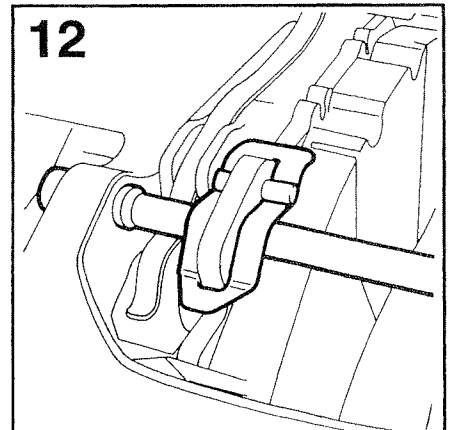
11



Correctly position a new anti-squeal spring (36) for the spreader plate and hold it in position while one of the pad retaining pins is inserted from the brake operating shaft side. Ensure that the pad retaining pin is correctly positioned below the springs which are integrated into the brake pads (fig. 12) when this is put in place.

Carry out this procedure again for the second pin and secure each pin using a new clip.

12

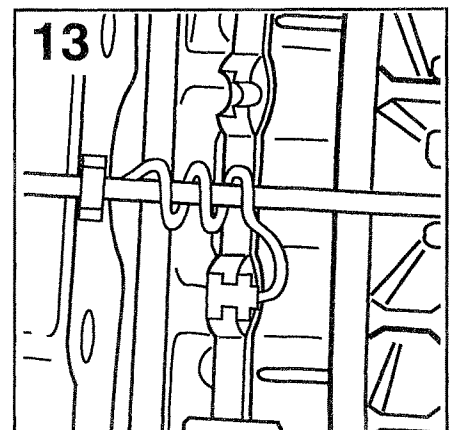


Fit the pad wear indicator assembly (31) with the wiring on the same side (fig. 13). Carefully fit the inserts into the pad backplates.

#### NOTE

Do not stretch or damage the wiring.

13

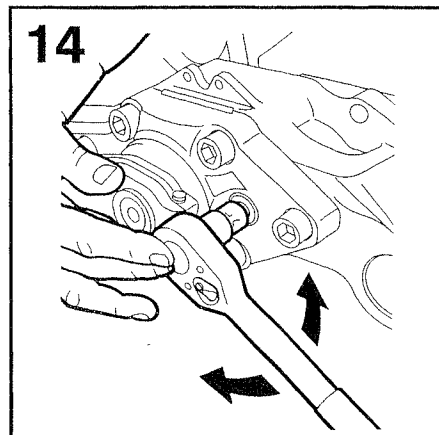


## Adjusting the operating clearance

Using a screwdriver, push the caliper bridge towards the outside of the vehicle (fig. 15 & 16), using moderate force.

Create an initial operating clearance of 1 mm.

Place a 1 mm shim (marked 100 in the FACOM 804 LS set of shims) between the caliper bridge and the outer pad using the adjustment system (fig. 14).



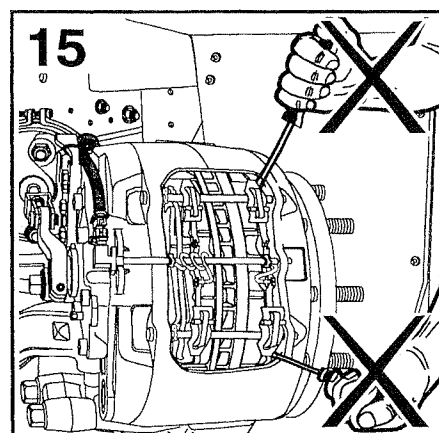
### NOTE

Never exceed a torque of 10 Nm on the adjuster stem.

Remove the 1 mm shim.

Connect a pressure gauge to the reservoir.

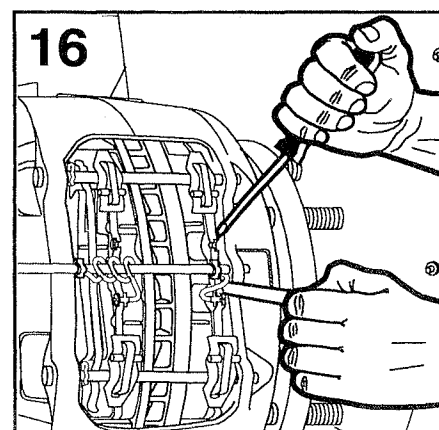
Press down on the brake pedal 30 times and check the dropping pressure to 0 bar each time the brake pedal is pressed down.



Check the operating clearance established by pushing the bridge towards the outside of the vehicle as described at the beginning of the procedure (fig. 16).

Evaluate the clearance obtained between the bridge and the outer pad.

0.4 mm < clearance < 1.0 mm



## Measuring brake lever travel

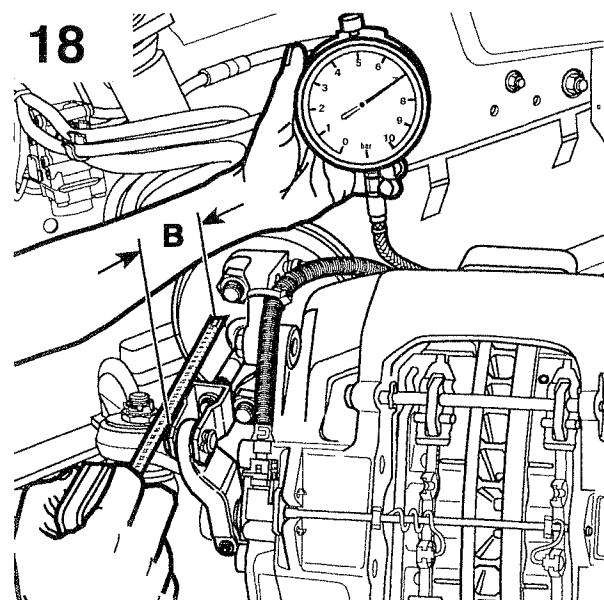
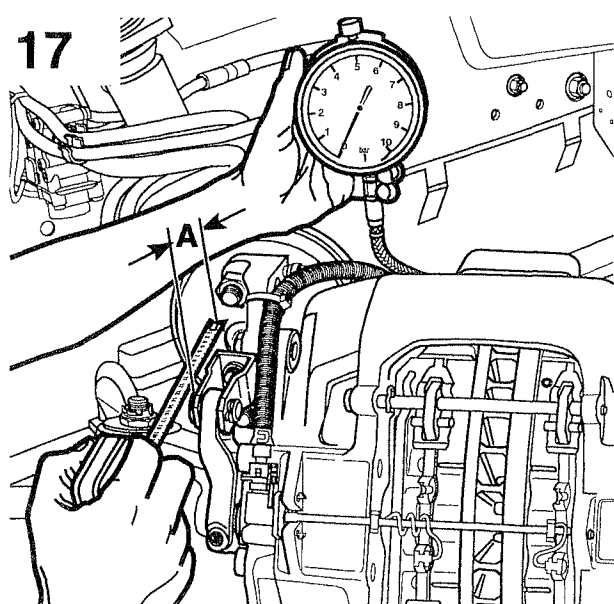
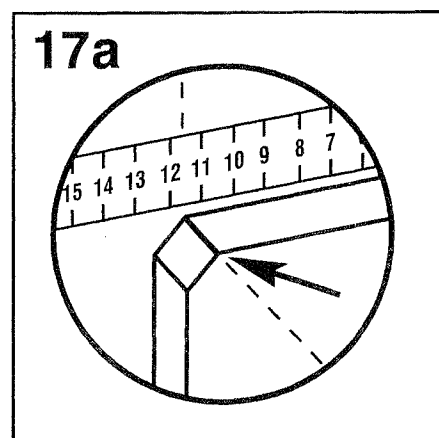
Make a note of dimension A when the brakes are released (fig. 17 & 17a). Apply the service brakes to 7 bars.

Make a note of dimension B (fig. 18).

Release the brakes.

Lever travel will be:  $B - A$

TRAVEL < 65 mm with a difference in travel of < 10.0 mm between the right and left hand brake.



### IMPORTANT

Check that the brake lever clevis pin rotates freely.

The caliper is correct if:  $0.4 \text{ mm} < \text{clearance} < 1.0 \text{ mm}$

TRAVEL < 65 mm and a difference between the right and left hand side < 10 mm

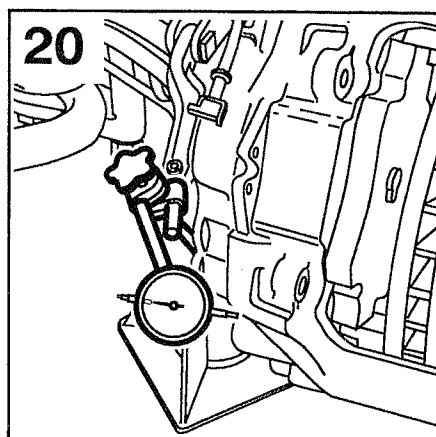
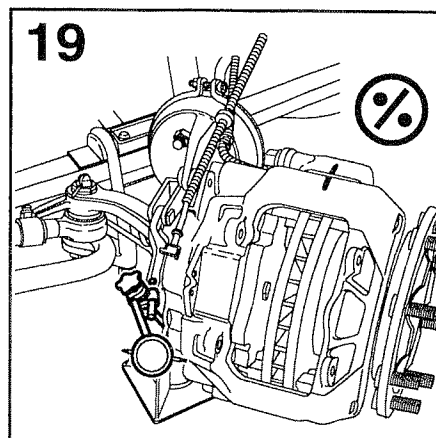
**CHECKING THE CALIPER**

## Checking the caliper

Checking the axial clearance of the caliper

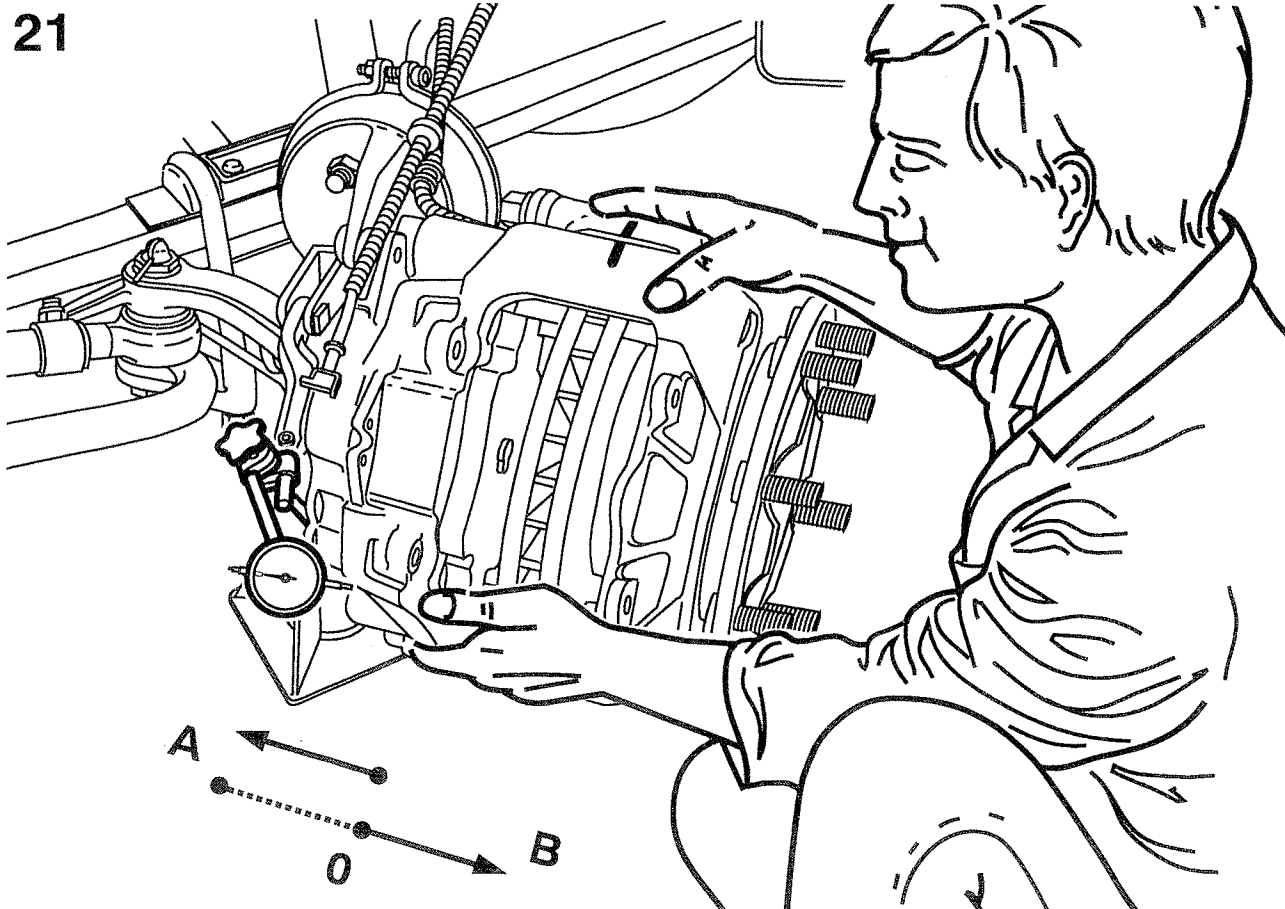
If, following removal of the brake pads and checking of the caliper housing slide, a seemingly abnormal axial clearance has been noted, the following procedure should be applied:

- Turn the wheel towards the outside of the vehicle.
- Install a dial gauge with a magnetic support whose needle is placed in the centre of the blanking cover (21) of the lower guide sleeve (fig. 19).
- Mark the relative positions of the brake mounting and the caliper housing (fig. 19).
- Use manual pressure to tilt the housing in the two directions as indicated in fig. 21.
- Zero the dial gauge (fig. 20).



### IMPORTANT

When tilting to measure axial clearance, the housing **MUST** remain laterally immobile in relation to the bridge. Refer to the markings made.



- Exert manual pressure as shown in fig. 21, make a note of the measurement (A).
- Exert manual pressure in the opposite direction as shown in fig. 21, make a note of the measurement (B).
- Ensure that there is no lateral movement of the caliper housing. The markings must coincide. If they do not, repeat the procedure.
- Add the two measurements taken, A + B, which must be less than:

**IMPORTANT**

*AXIAL CLEARANCE : 3 mm*

*If the axial clearance measured is greater than the value mentioned above, refer to section F, in the section entitled "Replacing the guide sleeves and their bushes, the dust covers and their retainers."*



**REPLACING THE CALIPER**

## Replacing the caliper

### Removing the caliper

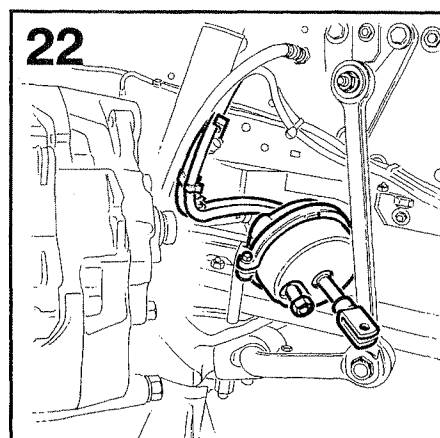
Immobilise the vehicle on a firm, level surface using the parking brake. Raise the front axle and place it on the correct axle stands. Remove the wheels and drain the air braking system.

### **IMPORTANT**

Never use compressed air to remove dust from the brake disc / brake caliper area. Any form of dust, if inhaled, is at best an irritant and at worst, dangerous. Whenever possible, use a vacuum brush to remove dry dust. If the surfaces are wiped with a damp cloth, do not attempt to accelerate drying time by using compressed air.

Remove all dust from the caliper using a wire brush being careful not to damage the rubber dust cover (26).

Disconnect and remove the brake pad wear indicator assembly (31). Remove the wheel speed sensor. Remove the shaft connecting the air chamber clevis to the brake lever (43). Remove the air chamber and its mounting and fit the air chamber in front of the suspension caliper which will not interfere with removal of the brake caliper and will not cause stretching of the brake cables (fig. 22).



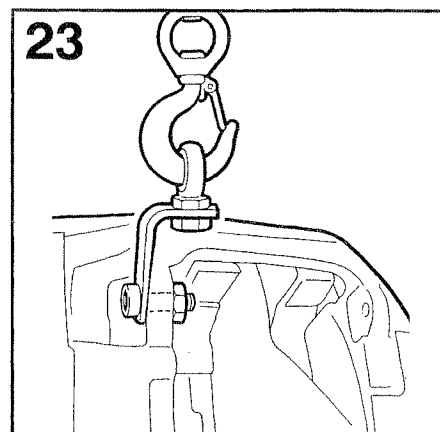
Remove the brake pads and the spreader plate as described in section C, in the paragraph on "Removing the brake pads".

### **IMPORTANT**

*The complete caliper is heavy, weighing approximately 53 kg. You must ensure that you are assisted by a second operator, or preferably, the appropriate lifting equipment, before attempting to remove the caliper from the vehicle.*

Figure 23 shows a simple angle bracket with mountings which allow the whole caliper to be safely lifted from the hub carrier using simple lifting equipment. The hooking point on the caliper housing is the hole for the upper pad retaining pin.

To remove the caliper mounting bolts, lighten the weight of the caliper by carefully lifting it. Lift the caliper vertically from the hub carrier. **Scrap the mounting bolts.**



**IMPORTANT**

When lifting the caliper, be careful when placing hands between the caliper housing and the mounting. These two components slide freely in relation to one another. Also prevent sudden movements which could cause the components to slide rapidly and may cause damage to the dust cover area.

**Fitting the caliper**

Preferably using appropriate lifting equipment or the help of a second operator, carefully lower the complete caliper into position on the hub carrier. Avoid all sharp movements of the caliper while it is being positioned and do not allow the caliper to fall on the hub carrier; either of these could damage the dust cover.

Fit the new mounting bolts and tighten them to the recommended torque of 600 Nm.

**Brake lever position**

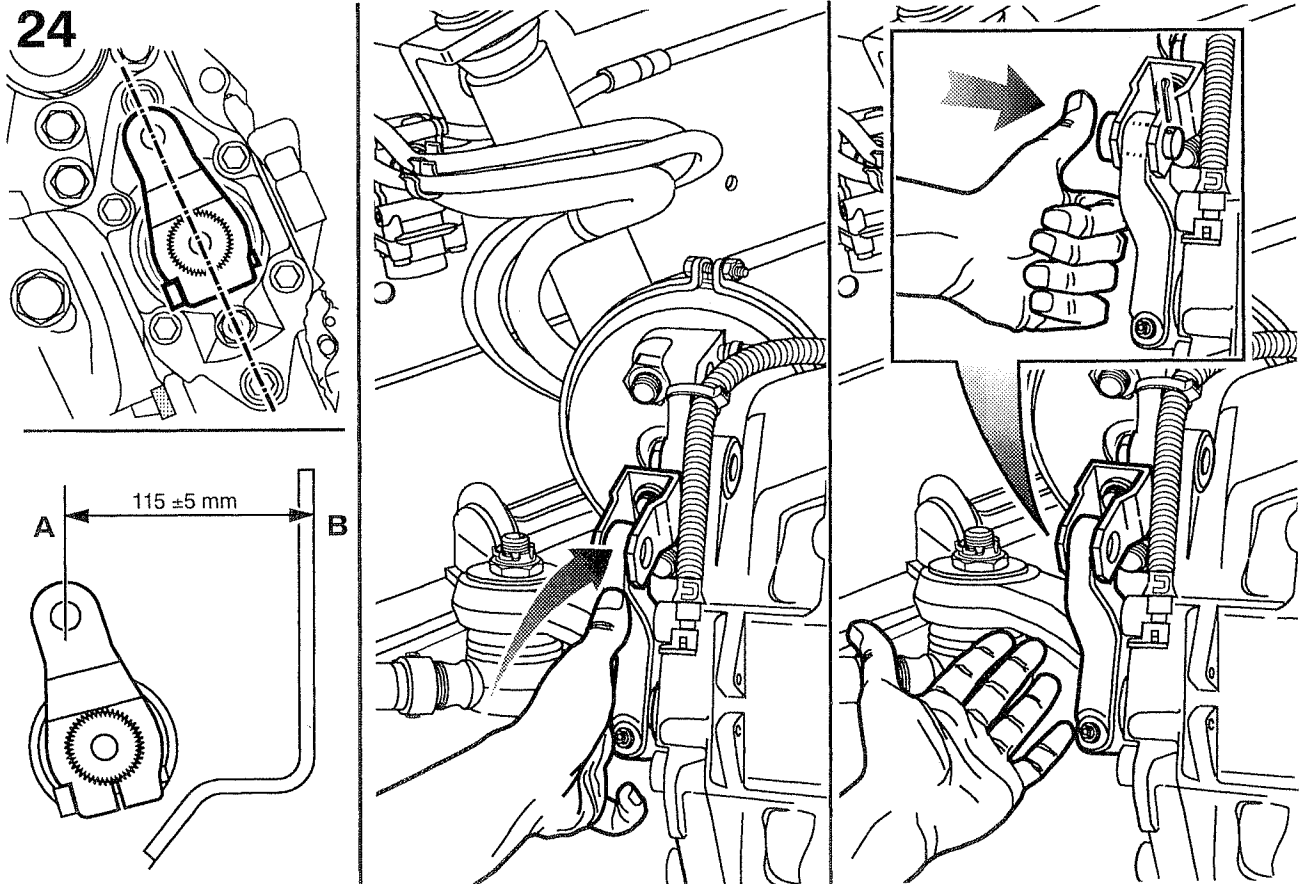
Place the air chamber bracket on the caliper housing and tighten the bolts to the recommended torque of 100 Nm. Check the alignment of the lever with the cover mounting bolts (fig. 24).

Ensure that the distance AB conforms with specification  $115 \pm 5$  mm (fig. 24).

Fit the air chamber, pretightening the mounting nuts.

Push the caliper housing lever towards the air chamber bracket (fig. 24) then release it.

Check that the holes in the clevis and the lever coincide. If not, adjust the clevis to adjust the holes. Fit the clevis pin and ensure that the pin moves freely.



**The pin should fit freely and without constraint****IMPORTANT**

*If the holes of the clevis and the lever are slightly out of line, ensure that they coincide by adjusting the clevis only.*

Tighten the air chamber mounting nuts to the recommended torque, 180 Nm, and fit a roll pin to the connecting pin.

Refit the wheels, remove the axle stands and lower the vehicle to the ground. Bring the air braking system up to pressure.

**NOTE**

Before moving the vehicle, operate the service brake 5 times, at low pressure, to ensure correct adjustment of the brake pads.

**REPLACING THE CONTROL UNIT**

## Replacing the caliper housing

### Removing the caliper housing

#### **IMPORTANT**

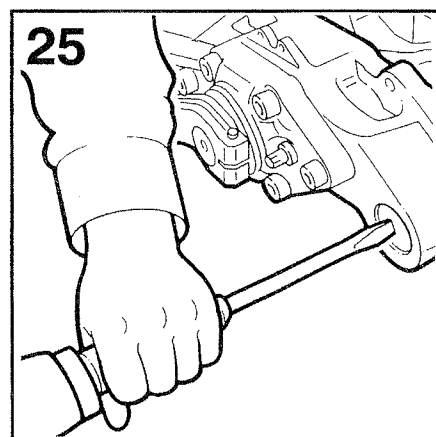
*The guide sleeve dust covers must be replaced when the caliper housing is removed.*

Remove the brake caliper, the wear indicator assembly, the brake pads and the spreader plate as described in section E, paragraph "Removing the caliper", and place the brake caliper in a sturdy vice, holding it very firmly by the ier bracket.

Remove the guide sleeve blanking covers (21) (fig. 25) pierce the covers and use a lever action to remove them, then slacken the guide sleeve bolts (22) without using pneumatic equipment. Whilst supporting the weight of the caliper housing, remove the guide sleeve mounting bolts (22) and carefully lift the caliper housing from the carrier bracket. Scrap the mounting bolts which have been removed.

Remove the guide sleeves (25) from the caliper housing. Clean the guides using methylated spirit and examine them for any sign of wear or corrosion. Clean and inspect the mounting (33) for possible damage or wear, paying particular attention to the brake pad supports and to the guide sleeve position countersinking.

If there is any doubt about the operating capability, replace with a new component.



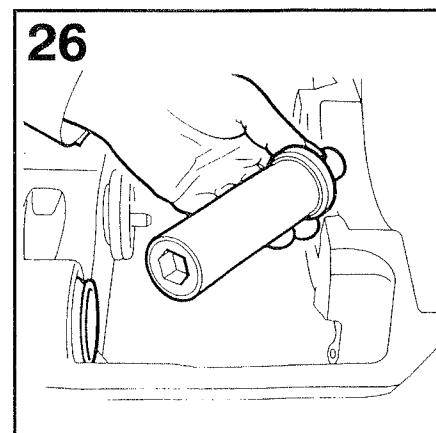
### Fitting a new caliper housing

Fitting a new caliper housing means using a guide sleeve kit. Lightly lubricate the inner surface of the dust covers (26) and place the dust covers on the guide sleeve (25), ensuring that they are correctly positioned in the groove of the retainer. Apply lubricant to the guide sleeve and in the caliper housing bores for the guide sleeves.

#### **NOTE**

Only use the lubricant which comes with the components or repair kits supplied as spare parts. No other type of lubricant should ever be used.

Insert the new mounting bolts (22) in the guide sleeves and place these in the new caliper housing (27) (fig. 26). Inserting the mounting bolts in the guides sleeves before they are put in the caliper housing prevents lubricant rising up under the mounting bolt head (22) and onto the section of the guide sleeve (25) which could affect the torque value when the final tightening is carried out.



Remove the mounting bolts and wipe away any lubricant ▲ below the mounting bolt heads (fig. 27) and locate the dust covers onto the guide sleeves.

Locate the guide sleeve dust covers on the retainers (24) of the caliper housing and pull gently on the guide sleeve to check the correct fitting of the dust covers (fig. 28).

Carefully place the caliper housing (27) in position on the carrier bracket (33) and ensure that the guide sleeves (25) position themselves correctly in the countersinking on the carrier bracket (fig. 29).

**IMPORTANT**

*When refitting the caliper housing onto the carrier bracket, do not damage the tappet dust cover (28) and the guide sleeve dust covers (26).*

Fit the new guide sleeve mounting bolts and temporarily tighten them to an initial torque of 50 Nm.

Check the free movement of the caliper housing by sliding it slowly back and forth several times on its guide sleeves.

Using an angular tightening tool, (fig. 30), equipment 50 00 269 777, appropriately located, and a torque multiplier, 50 00 269 744 and a 17 mm allen key with a 3/4" square drive, start with the longest mounting bolt. Zero and tighten to 127 to 137°. Then continue with the second mounting bolt, the shortest and apply a torque of 97 to 107°. This method for tightening the bolts ensures precise and constant tightening.

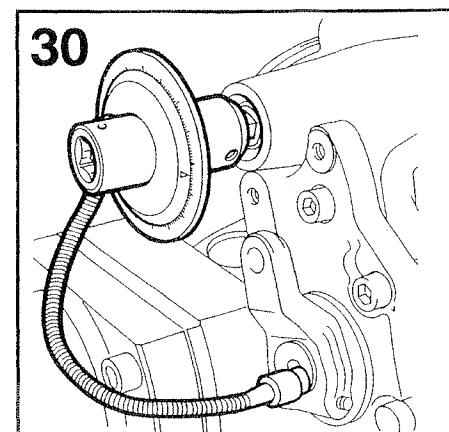
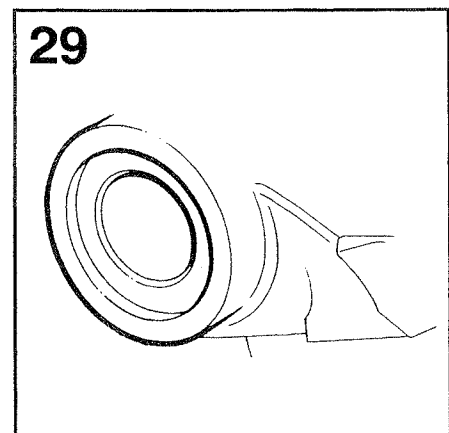
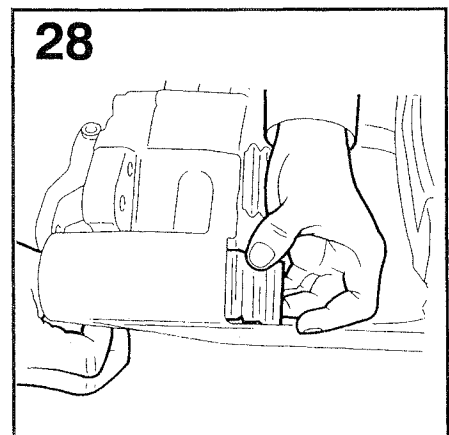
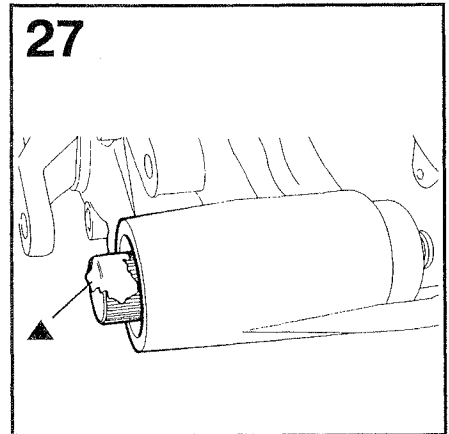
**IMPORTANT**

*The measurement of the tightening angle must never be less than the data given above.*

Check the free movement of the caliper housing on the guide sleeves again.

**IMPORTANT**

*Be careful of fingers when checking brake slide. The forward and backward movement must be carried out slowly. There is a risk that the dust covers (26) may come away from their retainers (24).*

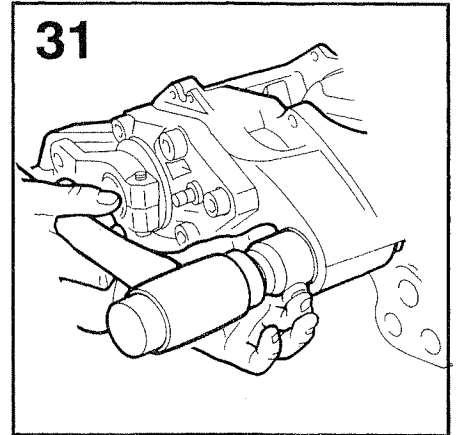


Using a copper hammer, tap the blanking covers (21) into the caliper housing, fig. 31, then, using an appropriate tool or a socket, tap down the blanking covers until they stop against the shoulders of the caliper housing.

**IMPORTANT**

*Before refitting the caliper assembly, the wheel speed sensor MUST be pushed against the toothed wheel. Check the run-out of the toothed wheel: - Maximum run-out: 0.2 mm*

Clean and check the brake discs as described in section C, paragraph "Checking brake discs".



Refit the brake caliper on the hub carrier and check the adjustment of the brake lever as described in section C, paragraph "Fitting the caliper".

## Replacing the tappet and dust cover

### Replacing the tappet dust cover

The operation is carried out on the vehicle. Remove the brake pads and the spreader plate. Refer to section C, paragraph "Removing brake pads".

Gently push the caliper housing towards the inside of the vehicle to obtain the best access to the area around the tappet (15).

Clean the area around the dust cover (28) very well using methylated spirit.

Remove and scrap the old dust cover.

Clean the retainer (29).

If there is any doubt, replace with new components, following the method detailed in section F, paragraph "Replacing the tappet".

**NOTE**

Keep the exposed areas of the tappet and the caliper housing free from dust or particles.

Lightly lubricate the inner surface of the new dust cover with the lubricant provided, as well as the dust cover location points on the tappet and on the caliper housing.

**NOTE**

Never use another type of lubricant.

Carefully fit the dust cover (28) above onto the tappet head(15) and then locate onto the caliper housing retainer. Ensure that the dust cover location on the caliper housing and the tappet are correct.

**IMPORTANT**

*Remove the air in the dust cover. Re-check the way it is located onto the housing retainer and the tappet head.*

Refit the brake pads as described in section C, paragraph "Fitting brake pads".



### Replacing the tappet

Remove the brake caliper as described in section E, paragraph "Replacing the caliper". Remove the dust cover (28) as described in section E, paragraph "Replacing the tappet dust cover". Unscrew the tappet (15) from the caliper housing.

Clean the dust cover retainer (29) and the associated areas of the caliper housing.

### NOTE

Keep the exposed areas of the tappet and the caliper housing free from dust or particles.

Check the condition of the dust cover retainer.

Remove used lubricant from the front face of the adjuster (14) and lubricate again with the product provided with spare parts.

Apply the same lubricant to the threads of the adjuster and tighten the new tappet in the adjuster, leaving a space of approximately 20 mm between the tappet head and the surface of the adjuster to allow easy fitting of the dust cover. Fit a new dust cover as described in section E, paragraph "Replacing the tappet dust cover" and reassemble the brake caliper as described in section E, paragraph "Replacing the caliper".

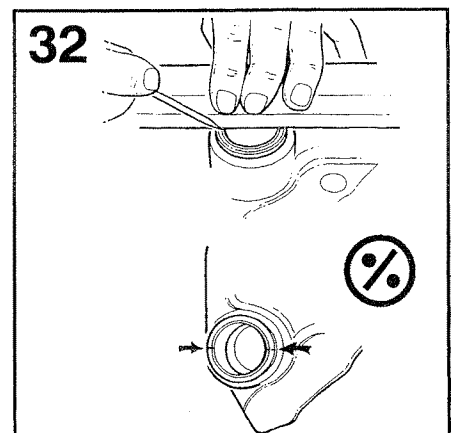
### Replacing the guide sleeves and their bushes, the dust covers and their retainers.

#### Removing the guide sleeves

Remove the brake caliper as described in section E, paragraph "Replacing the caliper", remove the caliper housing from its mounting as indicated in section F, paragraph "Replacing the caliper housing".

Transfer it to a work bench and position it, upper section face down, so that the guide sleeves are showing.

Remove the guide sleeves (25) with their dust covers (26) from the caliper housing.



#### **IMPORTANT**

*Before removing the OVAL bush (30) which is located in the bore of the short guide sleeve, mark its precise position as follows: Align the caliper housing so that the operating shaft is pointing upwards. In relation to the bore of the guide sleeve, note the position of the two markings on the section of the bush. Align the two markings using a rule and mark the chousing turret (fig. 32).*

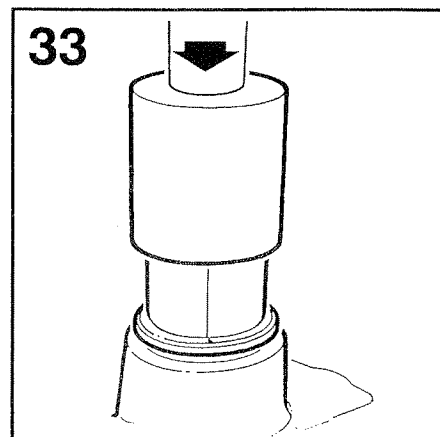
### Removing the bushes and dust cover retainers

There is an alternative fitting method for different types of bbush for these vehicles. Do not mix them up. For the long guide sleeve, one is black and the second is blue on the inner diameter.

#### NOTE

Removal of the guide sleeve bearings (23/30) (fig. 33) and the retainer (24) which are press fitted into the countersinking of the guide sleeve bores is carried out as a single operation.

Use a 35 / 37 tappet from roller bearing kit 50 00 262 363 to remove the bush (30) from the short guide sleeve bore and the two bushes (23) from the long guide sleeve bore and the dust cover retainers at the same time.



### Fitting new bushes

Clean the guide sleeve bores using methylated spirit only. Check the condition of the bores for wear, corrosion or damage. If there is any doubt about operating capability, replace with a new caliper housing.

#### NOTE

Bushes (23) and (30) must be introduced from the operating shaft side of the caliper housing. Do not attempt to fit them from the tappet side of the caliper housing, as access is limited and may cause damage due to improper alignment between caliper housing bore / bushes.

### Short guide sleeve bush

#### **IMPORTANT**

*An aluminium washer 50 00 116 027 MUST be placed between the oval bush and tappet 35/37 from kit 50 00 262 363.*

The new bush(30) has two markings on each end. Place the bearing in the caliper housing bore, ensuring that the bush markings coincide with those on the caliper housing outlet.

Place the bush (30) (fig. 33) in the bore using the tooling specified for removal. The front end of the bush will have to fit flush with the bottom of the machined countersinking in the caliper housing (fig. 34).

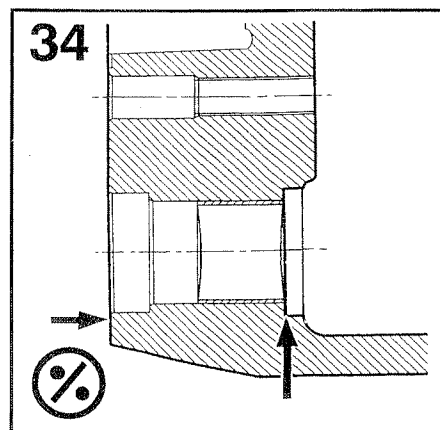
#### NOTE

Do not allow the bush to overhang the countersinking.

### Long guide sleeve bushes

#### **IMPORTANT**

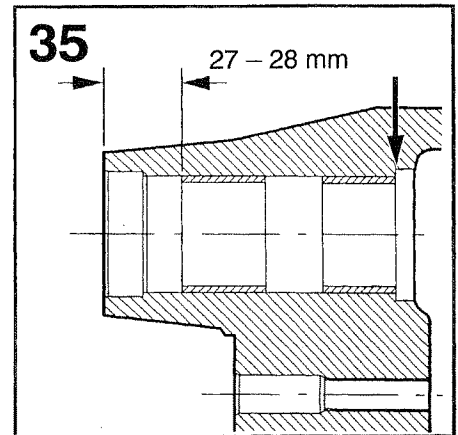
*An aluminium washer 50 00 502 959 must be fitted for the black bush and aluminium washer 50 00 116 027 for the blue bush, between the bush and the 35/37 tappets from kit 50 00 262 363.*



Place the first bush (23) (fig. 33) in the bore using tappet 50 00 262 363. The front end of the bush must fit flush with the bottom of the machined countersinking in the caliper housing. The rear end of the second bearing should be to a depth of between 27 and 28 mm (fig. 35).

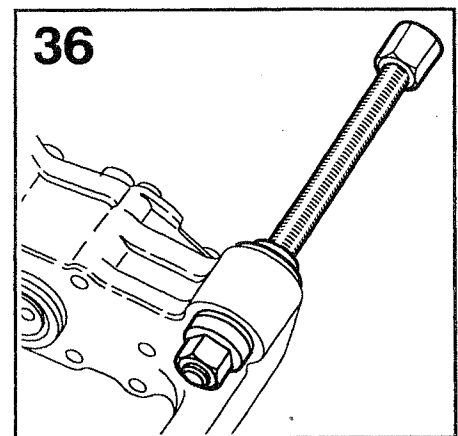
#### NOTE

Do not allow the bearing to overhang the countersinking.



#### Fitting the dust cover retainers

Place the new retainer (24) at the entrance to the countersinking of the guide sleeve bore, tappet side. Using a stud bolt, including aluminium washers and nuts, from tool 50 00 260 811, such as shown (fig. 36), position the retainer until it is at the bottom of the caliper housing countersinking (fig. 37).



#### IMPORTANT

*Do not damage the shape of the retainer which serves as retaining groove for the dust cover.*

Fit the second retainer in the same manner.

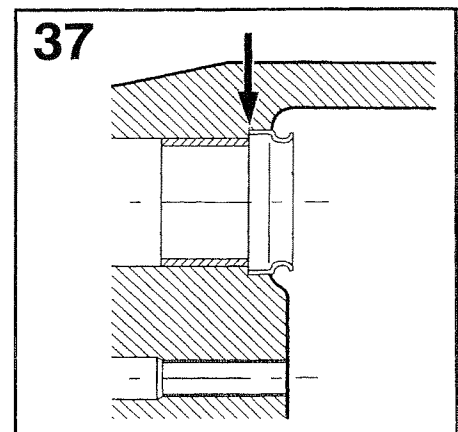
#### Fitting guide sleeves and dust covers

Lightly lubricate the new guide sleeves (25), including: the ring groove, retainers (24) on the caliper housing and the guide sleeve dust covers (26) only on the inner surfaces, using the lubricant provided in the repair kit.

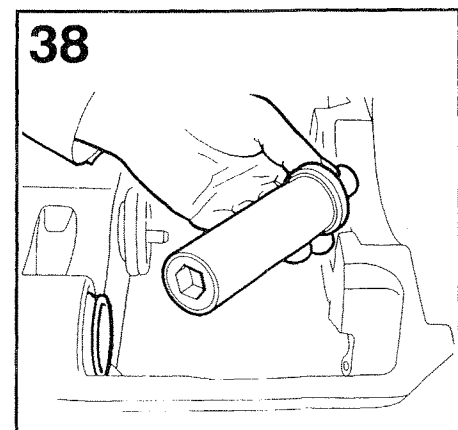
#### NOTE

Only use the lubricant provided with spare components or in repair kits. Under no circumstances may any other type of lubricant be used.

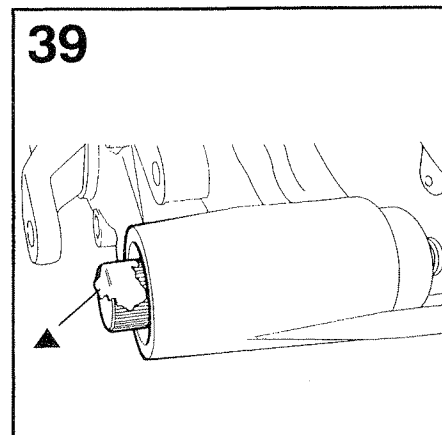
Fit the new dust covers on the guide sleeve, ensuring that they are correctly located onto the retainer.



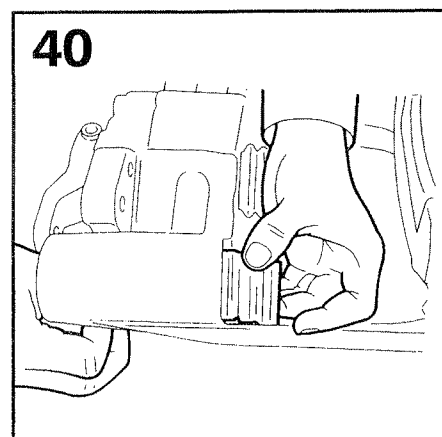
Place new mounting bolts (22) in the guide sleeves and position these in the new caliper housing (27) (fig. 38). Fitting the mounting bolts into the guide sleeves before they are placed in the caliper housing prevents lubricant rising up under the mounting bolt head (22) and onto the guide sleeve section (25) which could affect the mounting bolt torque value when final torque tightening is carried out.



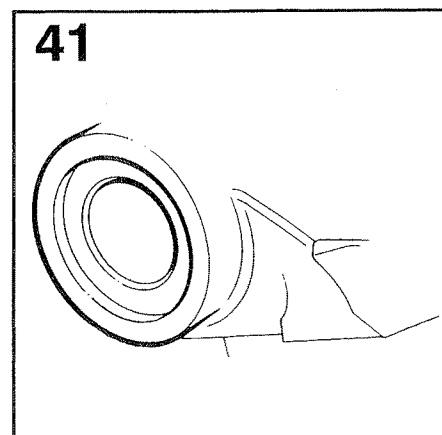
Remove the mounting bolts and wipe away all trace of lubricant ▲ beneath the mounting bolt heads (fig. 39) and locate the dust covers (26) onto the guide sleeves (25).



Place the guide sleeve dust covers (26) on the caliper housing retainers (24) and pull the guide sleeve gently to check the dust covers are correctly fitted (fig. 40).



Carefully place the caliper housing (27) in position on the carrier bracket (33) and ensure that the guide sleeves (25) are correctly placed in the countersinking on the mounting (fig. 41).

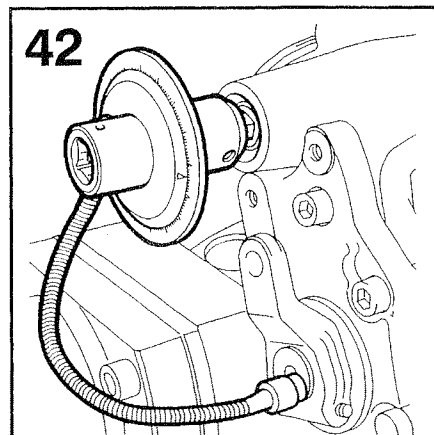
**IMPORTANT**

*Do not damage the tappet dust cover (28) and the guide sleeve dust covers (26) when assembling the caliper housing onto its mounting.*

Fit the new guide sleeve mounting bolts and temporarily tighten them to an initial torque of 50 Nm.

Slide the caliper housing slowly back and forth several times to check that it moves freely on the guide sleeves.

Using an angular tightening tool, (fig. 42), equipment 50 00 296 777, appropriately located, and a torque multiplier 50 00 269 744 and a 17 mm allen key with a 3/4" square drive begin with the longest mounting bolt. Zero and tighten to 127 to 137 degrees. Then move to the second mounting bolt, the shortest, zero again and tighten to 97 to 107 degrees. This bolt tightening method ensures a precise and constant tightening force.

**IMPORTANT**

*The measurement of the tightening angle must never be less than that given above.*

Check the free movement of the caliper housing on its guide sleeves again.

**IMPORTANT**

*Be careful with fingers when checking brake slide.*

*The back and forth movement must be carried out slowly. There is a risk that the dust covers (26) will come away from their retainers (24).*

Using a copper hammer, tap the guide sleeve blanking covers, then use an appropriate tool or a socket, tap the blanking covers down until they stop against the shoulders of the caliper housing.

**IMPORTANT**

*Before refitting the caliper assembly, the speed sensor MUST BE PUSHED BACK to rest against the toothed wheel. Check the run-out of the toothed wheel: - Maximum run-out: 0.2 mm*

Refit the brake caliper on the hub carrier and check the adjustment of the brake lever as described in section E, paragraph "Fitting the caliper".

## Brake lever position

Place the reservoir mounting on the caliper housing and tighten the bolts to the recommended torque, 100 Nm.

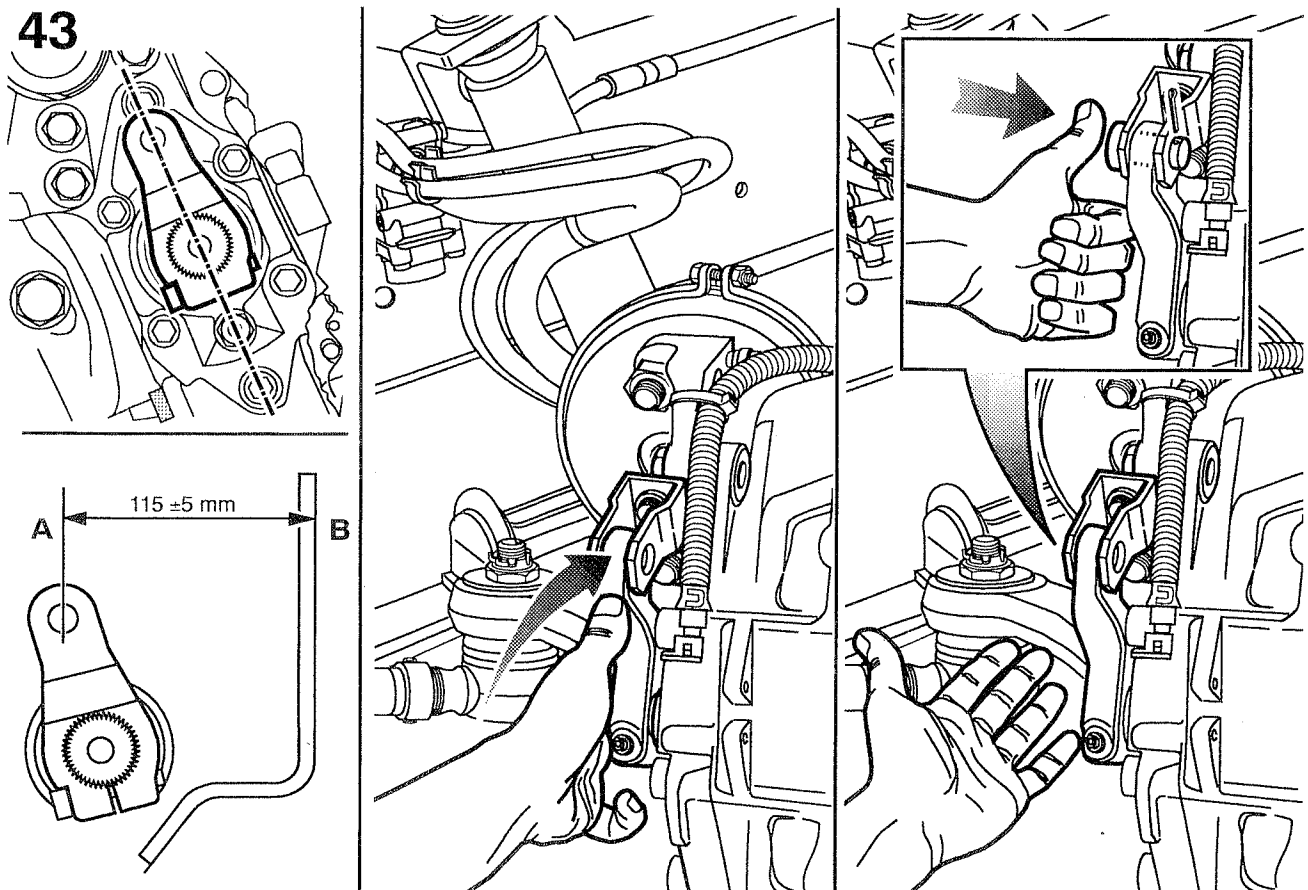
Check the alignment of the lever with the cover mounting bolts (fig. 43).

Ensure that distance AB conforms to specification  $115 \pm 5$  mm (fig. 43).

Fit the air chamber, ensuring pre-tightening of the mounting nuts.

Push the caliper housing lever towards the air chamber bracket (fig. 43) then release it.

Check that the holes of the clevis and the lever coincide. If not, adjust the clevis to adjust the holes. Fit the clevis pin and ensure that the pin moves freely.



**The pin should fit freely and without constraint****IMPORTANT**

*If the holes of the clevis and the lever are slightly out of line, ensure that they coincide by adjusting the clevis only.*

Tighten the air chamber mounting nuts to the recommended torque, 180 Nm, and fit a roll pin to the connecting pin.

Refit the wheels, remove the axle stands and lower the vehicle to the ground. Bring the air braking system up to pressure.

**NOTE**

Before moving the vehicle, operate the service brake 5 times, at low pressure, to ensure correct adjustment of the brake pads.

**BRAKE DISC**

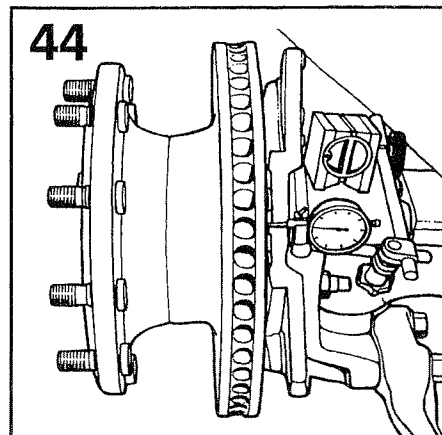


## Brake disc

### Checking run-out

Remove the brake caliper as described in section E, paragraph "Removing the caliper". Position a dial gauge on the magnetic mounting, 42 mm from the outer edge of the disc. Slowly turn the rim carrier.

Disc run-out should never be greater than 0.25 mm (fig. 44).

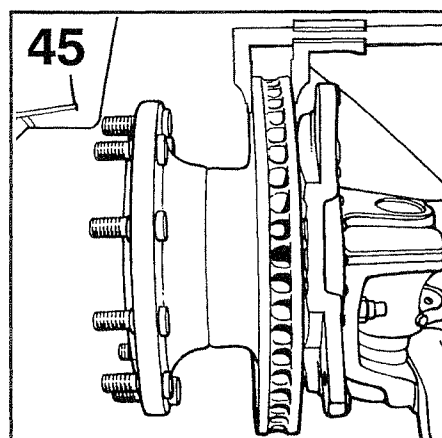


### Checking wear

Measure thickness

Observe the wear limit value (fig. 45).

Refer to section A, technical specifications.



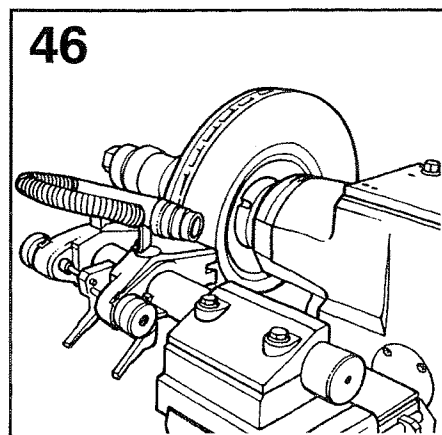
### Checking surface condition

Wear must be regular and correctly distributed over each surface.

Regrind if necessary (fig. 46).

Observe regrinding tolerances.

Regrinding must be distributed over each surface.

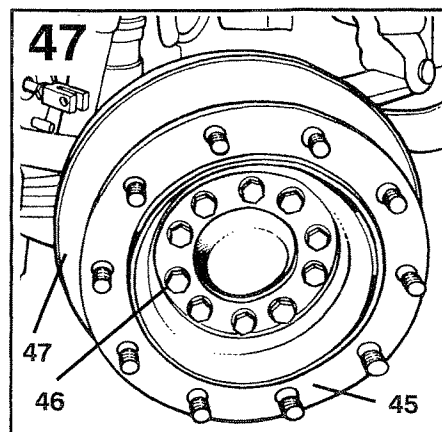


### Removal

Remove, referring to figure 47,

- the bolts (46)
- the rim carrier (45)/ disc (47) assembly.

Using a plastic hammer, detach the disc from the rim carrier. Refer to the appropriate repair manual for checking and repair of the hub.



### Regrinding

If the brake discs require regrinding, position the disc on a dummy hub and fit the assembly onto the regrinder.

Always grind the disc which seems the most worn first and remove a minimum of material. The second disc should be reground to the same thickness.

**Observe the parallelism limits (< 0.05 mm).**

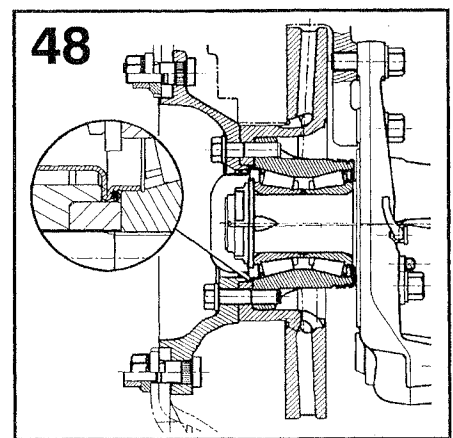
If the faults mean that regrinding to a dimension which is less than that recommended, 42 mm, both discs on the axle **MUST** be replaced.

### Fitting

Carefully clean the pressure surfaces of the brake disc and the rim carrier. Using a fine abrasive cloth, remove the layer of phosphatisation from the braking track on the disc.

#### **IMPORTANT**

*Systematically replace the O-ring seal on the hub.  
Check that it is correctly positioned (fig. 48).*

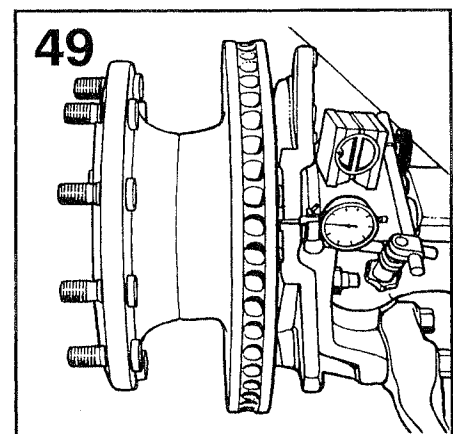


Fit the rim carrier (45) on the disc (47) and fit the assembly onto the hub.

Fit the bolts (46) and tighten them to a torque of 300 Nm (fig. 47).

Position a dial gauge on a magnetic mounting on one of the brake disc surfaces, 42 mm from the outer edge of the disc. Slowly turn the rim carrier. Disc run-out should never be more than 0.25 mm (fig. 49).

If the run-out measured with the new brake disc is greater than the maximum value, look for the cause of this non-conformity at the rim carrier or the hub assembly. Repair or replace if necessary.



#### **IMPORTANT**

*Before refitting the caliper assembly, the speed sensor **MUST BE PUSHED BACK** until it rests against the toothed wheel. Also check the run-out of the toothed wheel: - Maximum run-out 0.20 mm.*

Fit the brake caliper as described in section E, paragraph "Fitting the caliper".

Fit the brake pads as described in section C, paragraph "Fitting brake pads".

## TOOLING

RENAULT V.I. divides tooling into three categories:

- **General purpose tooling:** trades of the trade
- **Special tooling:** specially created tools, distributed by the **RENAULT V.I. Spare Parts Department**
- **Locally made tools:** these tools are labelled differently according to their degree of production:
  - **4 figure part number** (represented by a diagram): simple tool which can be made without any particular qualification.
  - **Part number beginning with 50 00 26...** (may be purchased through **RENAULT V.I. Spare Parts**): production of this tool requires a certain level of skill.

**Three levels** determine their allocation:

- **Level 1:** tool for servicing and light repair work
- **Level 2:** tool for heavy repair work
- **Level 3:** tool for reconditioning work

Special Tooling				
RENAULT V.I. Part No.	Description	Stage	Quantity	Page
50 00 26 0811	Tie rod extractor	1	1	F7
50 00 26 2351	Pushrod kit	1	1	F6
50 00 26 2363	Pushrod kit	1	1	F6
50 00 26 9774	Torque multiplier	1	1	F3 - F9
50 00 26 9777	Cadran anglaise	1	1	F3 - F9