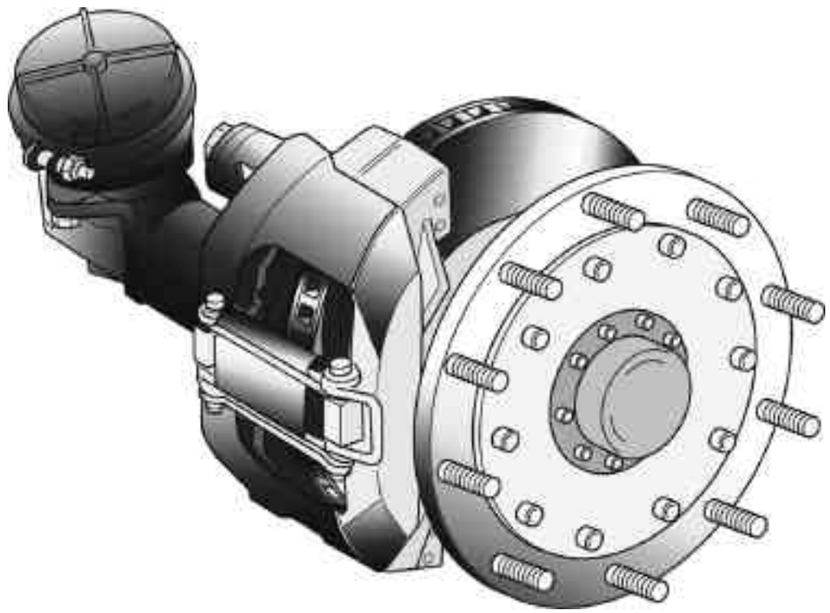
Service Manual

RA-SB0003 EN

Pneumatic Disc Brake
Bendix ADB 3700 / ADB 4300
(for IVECO Commercial Vehicles)



KNORR-BREMSE
Systeme für Nutzfahrzeuge

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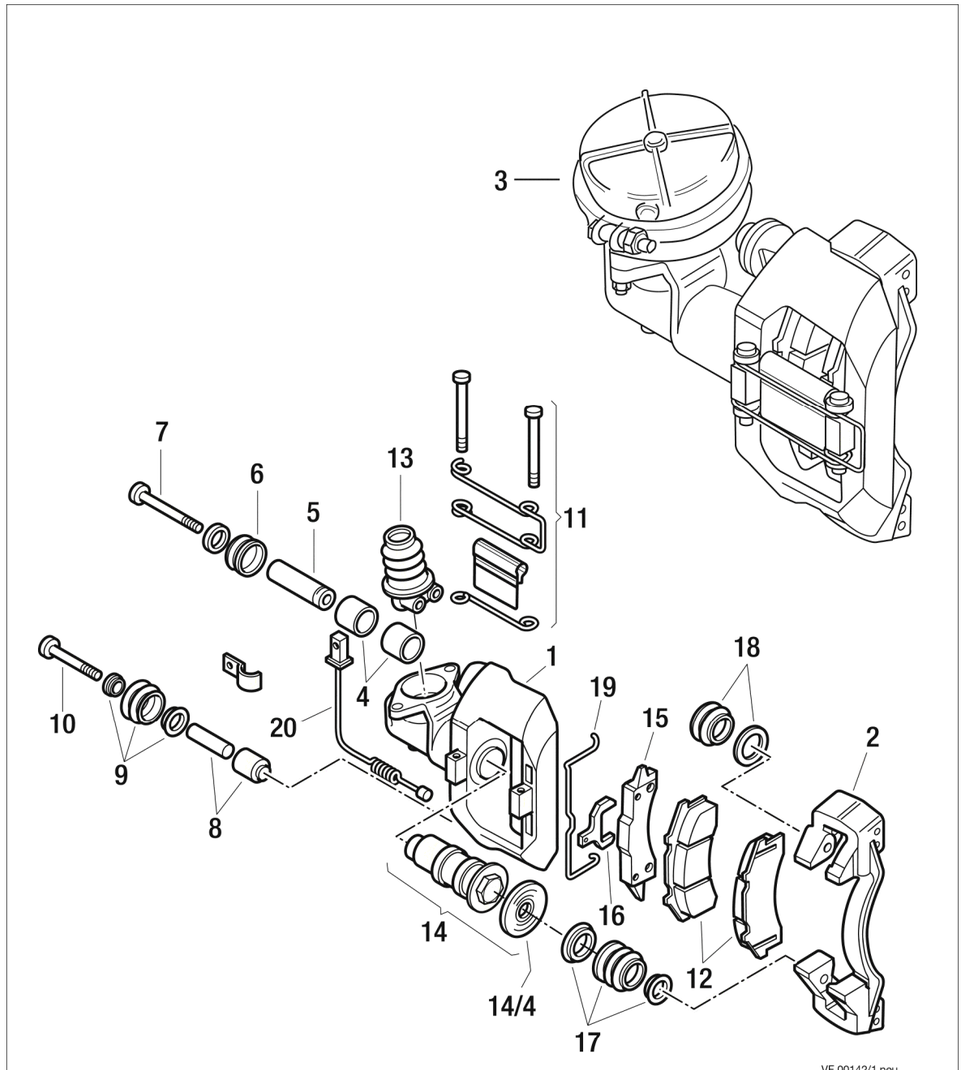
1 Exploded view of brake



1	Caliper	12	Brake pads
2	Carrier	13	Wedge assembly
3	Brake actuator	14	Brake adjustment mechanism with boot
4	Bush	14/4	Boot
5	Guide pin	15	Thrust plate
6	Boot	16	Fork
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8	Resilient mount	18	Boot assembly
9	Boot assembly	19	Wire spring
10	Guide bolt	20	Wear indicator
11	Pad retainer, assy.		

1.1 Service kits for “Bendix ADB 3700 / 4300”

KNORR-BREMSE Service Kit No.	Description	Contains Item No's	For Brake Type No.
381.391	Guide Pin Kit (no seals) (Caliper set)	4, 5, 7, 8, 10	All Types
381.412	Wear Indicator Kit (Axle set)	20	131.766 131.767 131.720 131.721
381.425	Wear Indicator Kit (Axle set)	20	131.790 131.791 131.774 131.775
381.413	Seal Kit (Caliper set)	6, 9, 17, 18, 14/4	All Types
381.419	Pad Retainer Kit (Caliper set)	11, 16, 19	131.720 131.721 131.774 131.775
381.422	Pad Retainer Kit (Caliper set)	11, 16, 19	131.766 131.767 131.790 131.791
381.426	Wedge Assembly (Caliper set)	13	131.766*) 131.767*) 131.790 131.791
381.427	Wedge Assembly (Caliper set)	13	131.720*) 131.721*) 131.774 131.775
381.428	Adjuster Assembly (Caliper set)	14	131.766 131.767 131.790 131.791
381.429	Adjuster Assembly (Caliper set)	14	131.720 131.721 131.774 131.775
II 32955	Brake Pads with Pad Retainers (Axle set for **ADB 3700**)	11, 12, 16, 19	131.766 131.767 131.790 131.791
II 32957	Brake Pads with Pad Retainers (Axle set for **ADB 4300**)	11, 12, 16, 19	131.720 131.721 131.774 131.775

*) Only suitable if the original Wedge and Brake Chamber Assembly have been replaced with the "Clip" Type Brake Chamber – see Section 12

KNORR-BREMSE Service Kit No.	Description	Contains Item No's	For Brake Type No.
II 33683 II 33684 II 33685 II 33686 II 33687	T 18 Brake Chamber (with Wedge Assy.) T 20 Brake Chamber (with Wedge Assy.) T 22 Brake Chamber (with Wedge Assy.) T 24 Brake Chamber (with Wedge Assy.) T 27 Brake Chamber (with Wedge Assy.)	3, 13 3, 13 3, 13 3, 13 3, 13	131.766*) 131.767*)
II 33688 II 33689 II 33690 II 33691	T 18 Brake Chamber (with Wedge Assy.) T 20 Brake Chamber (with Wedge Assy.) T 22 Brake Chamber (with Wedge Assy.) T 24 Brake Chamber (with Wedge Assy.)	3, 13 3, 13 3, 13 3, 13	131.720*) 131.721*)
II 37371 II 37372 II 37373 II 37374 II 37375	T 18 Brake Chamber (Clip Type) T 20 Brake Chamber (Clip Type) T 22 Brake Chamber (Clip Type) T 24 Brake Chamber (Clip Type) T 27 Brake Chamber (Clip Type)	3 3 3 3 3	131.790 131.791 131.774 131.775
II 33692	Pad Retention Pins and Clips Kit (Axle set)	11 (Pins & Clips only)	All Types
II 33693	Clip for Brake Chamber (2 off)	(not pictured)	All Types
II 34564	Pad Locating Pins and Retainer Spring Kit (Axle set)	(not pictured)	All Types
II 37400	Boot for Adjuster (Axle set)	14/4	All Types

*) If the original Wedge and Brake Chamber Assembly have been replaced with the "Clip" Type Brake Chamber, the "Clip" type must be used again.

1.2 Brake discs and pads

1.2.1 General notes

The replacement of brake discs and pads is subject to the specifications of the respective vehicle manufacturer.

When replacing brake discs, make sure that the correct screw fittings are used and observe the specified bolt tightening torques (refer to Section 2.3 and to IVECO manual).

1.2.2 Measurement of brake discs and pads

WARNING!

For optimum safety, stay within the Disc and Pad wear limits.

Dimensions refer to ADB 4300.
Dimensions in brackets refer to ADB 3700.

A = Disc thickness – new condition – 50 (45) mm

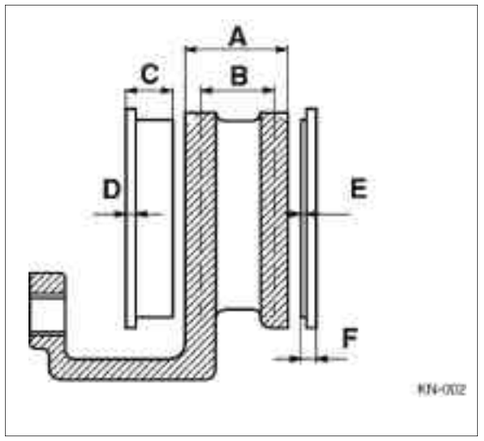
B = Minimum Disc thickness – **47 (42) mm**
The disc must be replaced!

C = Overall thickness of new Pad 25 mm

D = Backplate 7 mm

E = Minimum thickness of friction material 2 mm

F = Minimum thickness brake pad + backplate 9.0 mm; brake pads must be replaced



1.2.3 Wear limits of Brake Discs

Check Disc at each change of Pads for grooves and cracks. The diagramm shows possible conditions of the Brake disc surface.

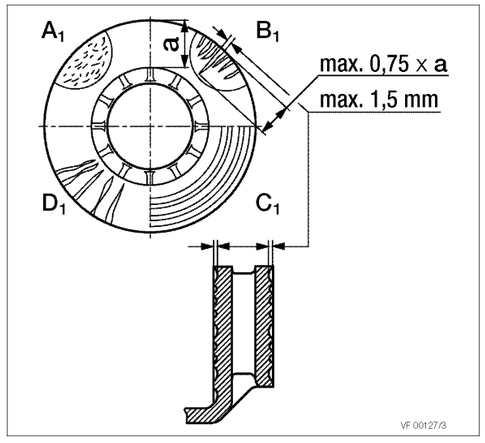
A_1 = Small cracks spread over the surface **are allowed**

B_1 = Cracks less than 1.5 mm deep or wide, running in a Radial direction, **are allowed**

C_1 = Grooves (circumferencial) less than 1.5 mm wide **are allowed**

D_1 = Cracks in the vanes **are not allowed** and the Disc **MUST BE REPLACED**.

a = Pad Contact area



Notes:
In case of surface conditions A1 to C1 the disc can continue to be used until the maximum wear limit B = 47 (42) mm is reached – see Section 1.2.2.

Machine the faces of the brake disc in conformity with the specifications of the respective vehicle manufacturer. The brake disc must be machined evenly on both sides.

1.2.4 Notes on Brake Discs for the ADB 4300

Vehicles up to chassis numbers **4165557** or **C014648** have been equipped with Brake Discs with smooth continuous cooling channels.

IVECO part number 19076341 (old version):

If required, these discs must be replaced by the version with interrupted cooling channels (pillar design). Since they have a reduced susceptibility to cracking.

IVECO part number 7180177 (new version):

As brake discs and pads are only replaced in complete sets, the following IVECO repair kits for Brake Discs are available:

- **IVECO kit no 1908729**
  (for replacement of Brake Discs of the **"old"** version)
  Contents: 2 Brake Discs
  (part no. 7180177)
  24 bolts M16x80
  (part no. 16683434)
  Note: The repair kit replaces the old Brake Disc version.

- **IVECO kit no. 1908614**
  (for replacement of the Brake Discs of the **"new"** version)
  Contents: 2 Brake Discs
  (part no. 7180177)
  (without bolts)

  Note: This kit had been provided for vehicles where the discs have already been converted to the **"new"** design.

Note:
Brake discs of the new version (part no. 7180177) may only be installed with "long" bolts M16x80 (part no. 16683434). For bolt tightening torques refer to Chapter 2.3.

2 General Information

2.1 Brake data

Brake	Brake discs dia. mm	Brake discs thickness mm	Wheel size	Weight without actuator	Pad to Disc Running clearance
ADB 4300	430	50	22.5"	57 kg	0.9-1.2 mm
ADB 3700	370	45	19.5"	45 kg	0.9-1.2 mm

2.2 Lubricants

Part no.	Designation	Colour
423.243	Shell Darina R2	yellow

2.3 Torque requirements

Item no. (refer **3.1**)	Designation	Bolt tightening torque in Nm	Spanner size
10	Guide Bolt	300 ± 20	24 mm
7	Guide Pin Retaining Bolt	400 ± 40	32 mm
	Brake Chamber Mounting Nuts	100 ± 10	24 mm
	brake carrier/ steering knuckle 4 hexagon bolts	615 ± 60	30 mm
	brake disc/hub	280 ± 13	18 mm

2.4 Tools

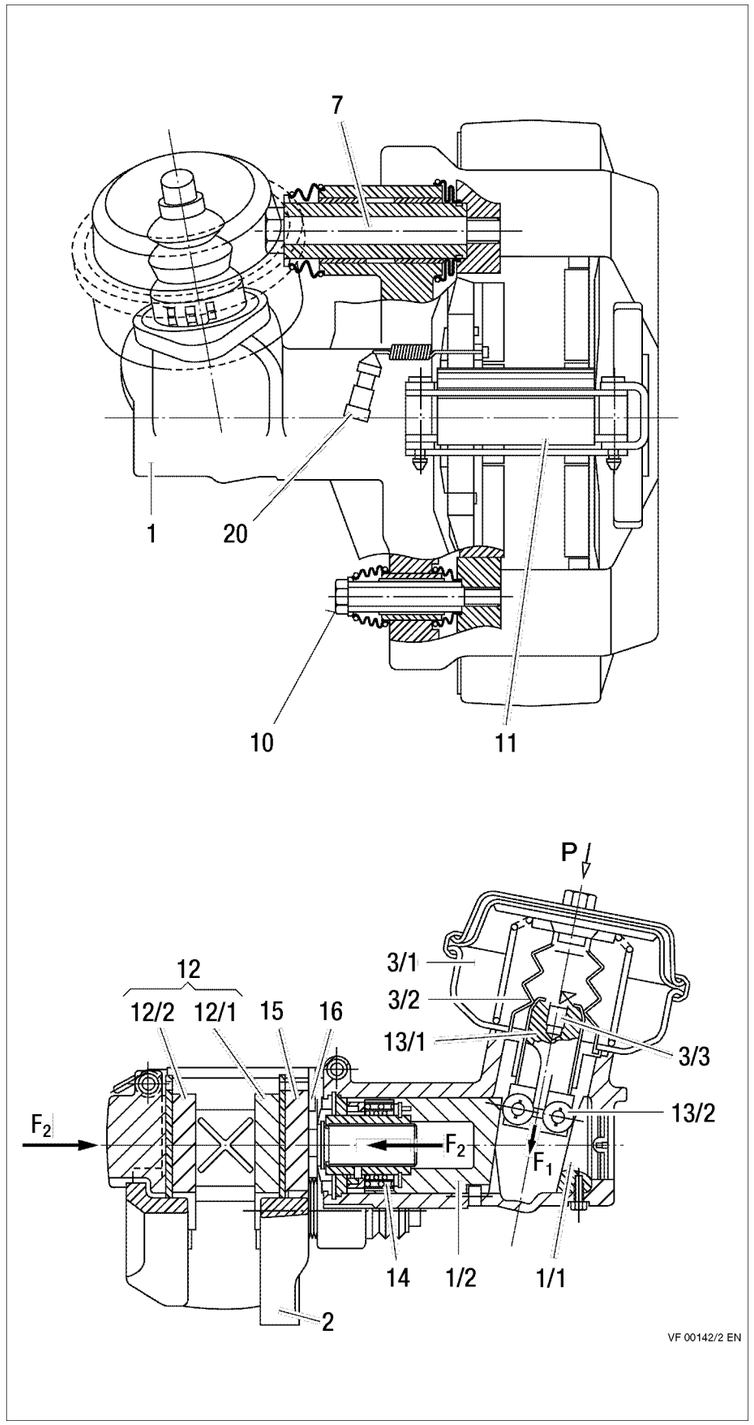
dismantling tool (2 off)	Il 33905 (see pages 19 - 23)

3 Description and Function

3.1 Sectional drawing

Legend:

1	Caliper
1/1	Fixed ramp
1/2	Movable ramp
2	Carrier
3/1	Brake Chamber
3/2	Boot
3/3	Push rod
7	Guide pin retaining bolt (primary guidance)
10	Guide bolt (secondary guidance)
11	Pad retainer, assy.
12	Brake Pads
12/1	Inboard Brake Pad
12/2	Outboard Brake Pad
13/1	Wedge
13/2	Roller set
14	Adjuster assy.
15	Thrust plate
16	Fork
20	Wear indicator



3.2 Description of operation (Floating Caliper principle)

3.2.1 Brake application

Refering to Fig. 3.1

When applying the brake, the brake pressure P causes the piston rod force (F1) of the Brake Chamber (3/1) to be transmitted to a wedge assembly equipped with two rollers (13/2).

One of the rollers is supported by a fixed ramp (1/1), whereas the second roller displaces a movable ramp (1/2) in an axial direction giving an increased application force (F2). This force (F2) is then transmitted, through an integral adjuster assembly (14) and an intermediate Thrust Plate (15), to the inboard brake pad (12/1) and, through the brake caliper, to the outboard brake pad (12/2).

The contact pressure between the brake pads (12) and the brake disc generates the braking torque for the wheel.

3.2.2 Brake release

As the braking pressure P is reduced, springs inside the brake as well as inside the Brake Chamber cause the wedge unit to resume its initial position.

3.2.3 Brake adjustment (automatic)

To maintain a constant running clearance between the brake pads and the brake disc, the brake is equipped with a low-wearing automatic adjusting mechanism (14). This operates when pad wear had taken place.,

4 Safety Instructions for service work

Please also refer to the relevant safety instructions for repair work on commercial vehicles, especially for jacking up and securing the vehicle.

Use only original KNORR-BREMSE parts.

Please follow repair manual instructions and adhere to the wear limits of the Pads and the Disc – see Section 1.2.2 and 6.

Tighten bolts and nuts to the recommended torque values – see Section 2.3.

WARNING!

Pads must be changed as an axle set and NOT individually.
Use only Pads which are permitted by the vehicle manufacturer.
Failure to comply with this may invalidate the Vehicle Manufacturer's Warranty

After re-fitting the wheel according to the Vehicle Manufacturer's recommendations, please ensure that there is sufficient clearance between the Tyre Inflation Valve, the Caliper and the wheel rim, to avoid damage to the Valve.

After service work:
Check the brake performance and the system behaviour on a rolling road or by actual road test.

5 Brake Inspection

WARNING!

If these recommendations are ignored, there is a danger of brake failure.
If the Pads are worn down to the backplate or if Disc wear is excessive, brake performance will be severely affected and may be lost completely.

Make a visual check of the brake pads in order to

a) ascertain the wear condition or thickness of the pads (refer Section 1.2);

b) compare the thicknesses of the inboard and outboard pads of a brake (refer Section 6.2).

Check the electrical wear indicator (20) for its correct fit and make sure that it does not show any signs of damage.

Check the visible rubber parts to make sure that they are not damaged.

Check the condition of the Brake Discs (refer Section 1.2.2).

Check the wheel hub for tightness and make sure that its bearing clearance is correct to vehicle manufacturers recommendation.

If there are any signs indicating malfunction, such as uneven pad wear, pad distortion or if a high residual brake torque is evident, the brakes must be checked to verify:

a) the sliding capability of the brake caliper (refer Section 7.8)

b) the automatic adjustment function (refer Section 11).

The inside of the brake caliper should be checked for corrosion after removal of the wedge unit (refer Section 12).

6 Brake pad check

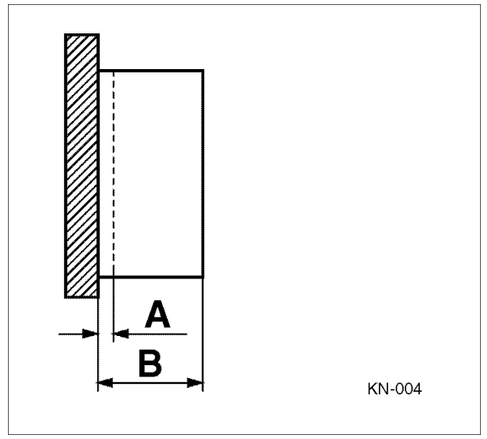
WARNING!

Observe the wear limits of the pads.

6.1 Brake Pad thickness

The thickness of the pads must be checked regularly, dependent on the usage of the vehicle. The pads must be checked in conformity with any legal regulations, but at least every three months.

A = Minimum thickness of friction material 2 mm
B = Thickness of friction material 18 mm (when new)



6.2 Uneven Pad wear

If the difference in thickness of the two pads is greater than 4 mm, brake checks should be made – see Section 5.

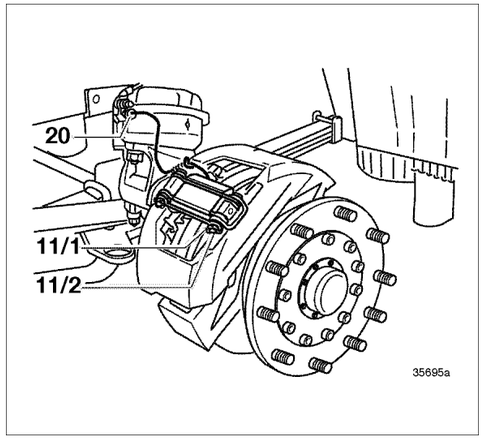
WARNING!

To avoid damage to the Disc surfaces, the Pads must to be replaced when 2mm of friction material thickness is reached at any point.

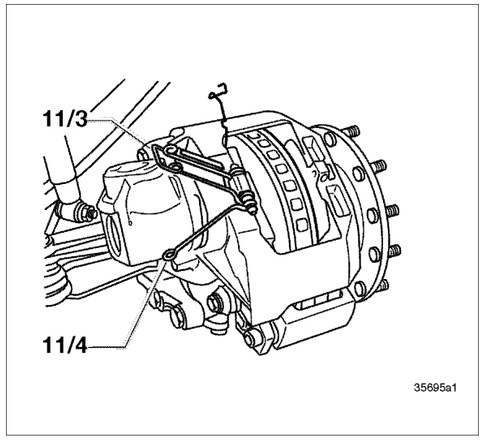
7 Pad removal
The road wheel must be removed.

7.1 Remove the connection cable of the Pad Wear Indicator (20).

7.2 Remove the Split Pin 11/1 from the retention bar 11/2. Depress the Pad Retainer 11/3 and carefully push out the retention bar noting positions of washers.

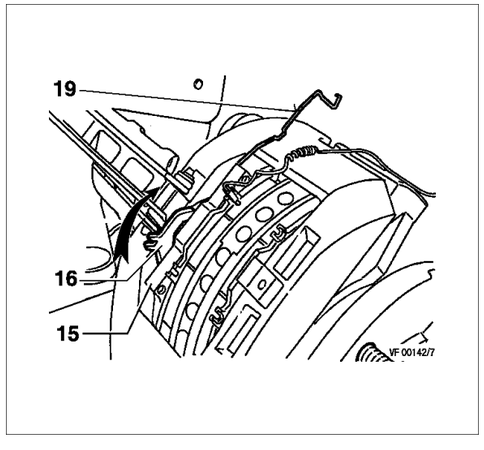


7.3 Lift the Pad Retainer (11/3) and the locking mechanism retainer (11/4).



7.4 Unhook the wire spring (19).

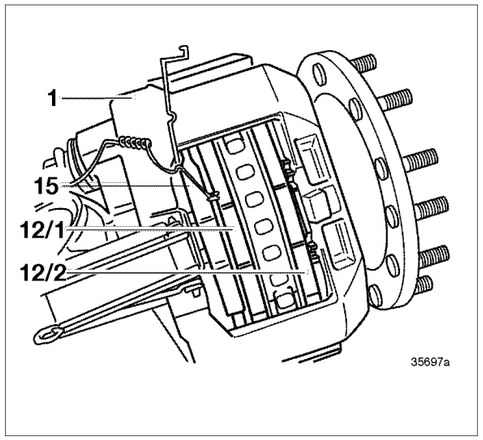
7.5 Rotate the hexagon of the Adjuster (14) to its stop by means of the Fork (16) (see arrow).



7.6 By displacing the Brake Caliper (1) toward the vehicle centre, the Thrust Plaste (15) can be pulled out of its location. After pulling out the inboard brake pad (12/1), the Caliper can be slid toward the road wheel, whereupon the outboard Brake Pad (12/2) can also be removed.

Note:
The inboard Brake Pad (12/1) is held in place by two pins to the Thrust Plate (15). These insert in the bores provided in the backplate of the brake pad.

The Thrust Plate (15) must be checked for wear at its contact points. Wear of more than 0.4 mm is not permissible.



7.7 After removing the Brake Pads, dirt must be removed from the pad abutments which, together with the rubber parts, must be inspected for any visible damage.

7.8 The sliding capability of the brake caliper must be checked. Care should be taken to not trap fingers and the caliper should slide freely along the guide pins. If sliding forces are high, the brake caliper must be removed and the guiding system checked.

8 Pad installation

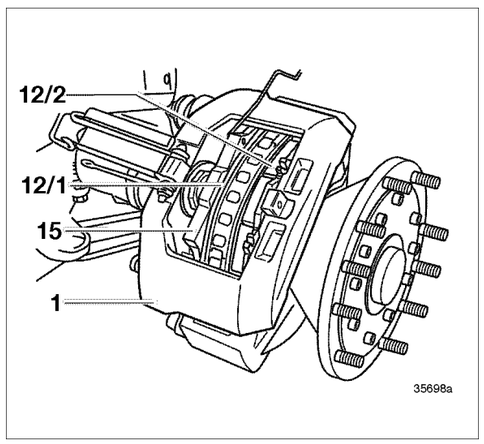
IMPORTANT!

Use only new Genuine pads, approved by the vehicle manufacturer.
Replace brake pads only as an axle set.

8.1 Move the brake caliper (1) toward the vehicle centre, then install the Thrust Plate (15) and the inboard Brake Pad (12/1).

8.2 Move the brake caliper toward the road wheel and install the outboard Brake Pad (12/2).

Note:
The two pins of the Thrust Plate must insert into the bores of the Brake Pad backplate. The Thrust Plate and Brake Pads must be freely movable.

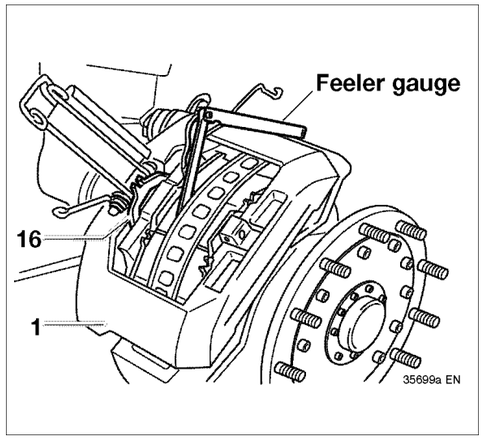


9 Setting of running clearance between Brake Pad and Disc

9.1 Firmly move brake caliper (1) toward the vehicle centre.

9.2 Insert a feeler gauge between the inboard pad (12/1) and the brake disc (specified dimension: 1.2 + 0.2 mm).

9.3 Turn the Adjuster (14) screw by using the Fork (16) such that the feeler gauge is tight. Pull out the feeler gauge and check that the wheel hub rotates freely.



10 Final Checks

10.1 Connect the wire spring (19) to retain the Fork (16).

Note:
The spring presses the Fork (16) on to the Thrust Plate (15).

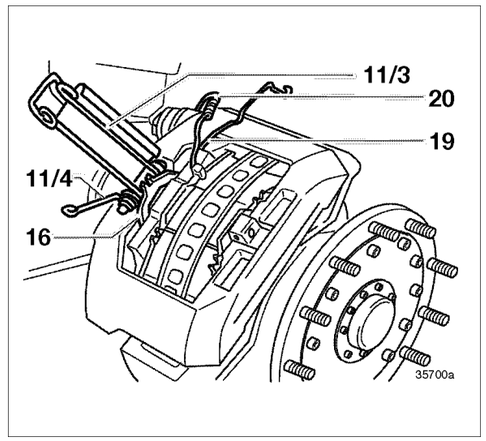
10.2 Insert the locking mechanism retainer (11/4) into the small groove in the Fork (16). Lower the Pad Retainer with the spring (11/3) and secure by means of a retention bar and split pin.

10.3 Attach the connecting cable to the wear indicator (20).

10.4 Operate the vehicles brakes several times and manually check the freewheeling of the hub.

10.5 Re-Fit road wheel.

10.6 Perform a test run.



IMPORTANT!

Bed in new brake pads.
Initially avoid long duration or heavy brake applications.

11 Check of the automatic adjusting function

11.1 Remove the pad retainer as per Section 7.1 to 7.3.

11.2 For checking the automatic adjusting function, a running clearance between the brake pad and disc of > 2 mm is required. See Section 9.2 for checking. This should be set by rotating the Fork (16) – see Section 9.3.

11.3 Actuate the brake about ten times with low pressure (about 2 bar).

11.4 Again measure the running clearance .

If the running clearance has reduced notably, the automatic adjusting function is working correctly. Running clearance values between 0.6 and 1.2 mm are permissible.

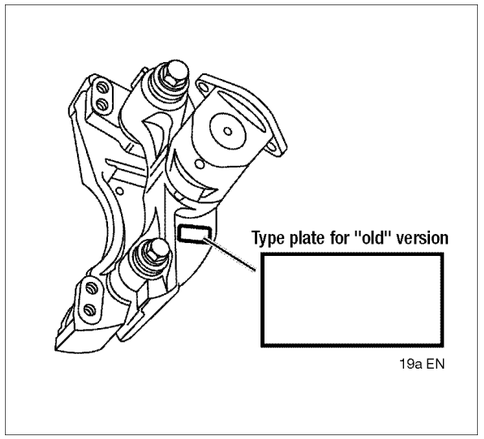
IMPORTANT!

Running clearance values that are smaller than 0.6 mm may cause rubbing or hot running of the brake.
If the automatic adjusting function of the brake caliper is not working, the Adjuster Mechanism or Caliper must be replaced.

12 Replacement of Brake Chamber

12.1 General

Since the brake was introduced the design of the Push Rod connecting the Brake Chamber to the Wedge Assembly has been modified.
At the time of change, the Part Number Label was changed as below and this will allow identification of the Caliper as an "Old" version or a "New" version.



12.1.1 "Old" Version

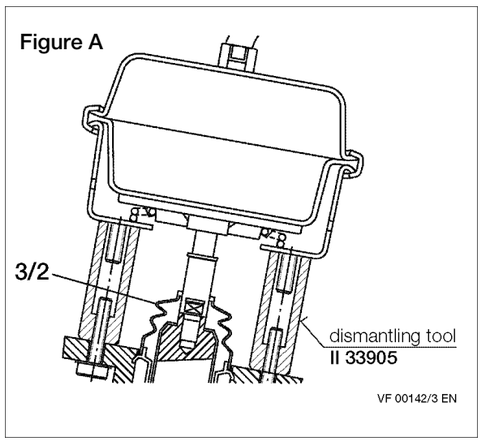
The "Old" version used a "No Clip" version Push Rod (Figure A).

Wedge Assembly supplied as part of Brake Chamber.

Note:

The "No Clip" version may have been replaced at an earlier service by a "Clip" version (see below).

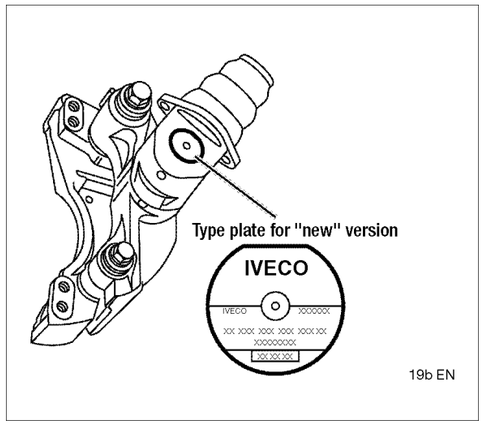
Figure A



12.1.2 "New" Version

The "New" version uses a "Clip" version (Figure B).

Wedge Assembly supplied as part of the Caliper. Brake Chamber available separately.



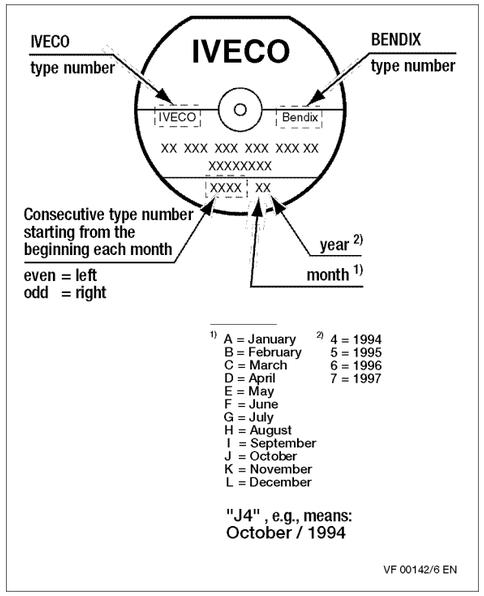
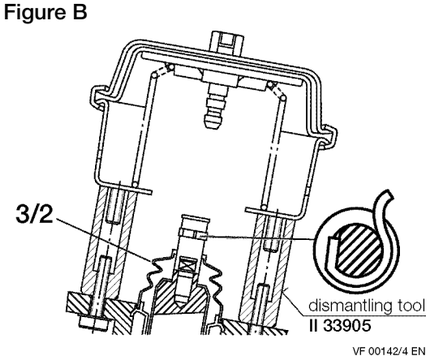


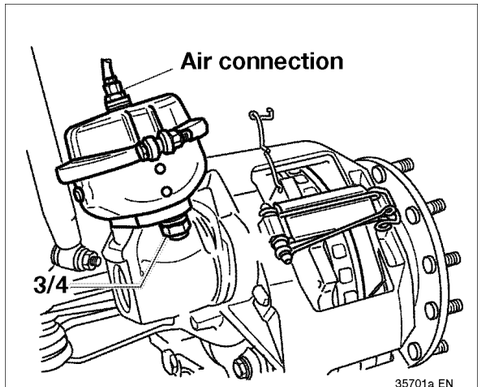
Figure B



12.1.3 Notes regarding changing of Brake Chambers

On account of the increased Service Return Spring force introduced into Brake Chambers after Feb. 1995 (Week Date Code 0895), checks should be made of the date codes on both Disc Brake Chambers of the vehicle. In the event that **either** shows a date code before this, it is recommended that **both** Brake Chambers are replaced.

It is important that both Brake Chambers have the same Return Spring force.

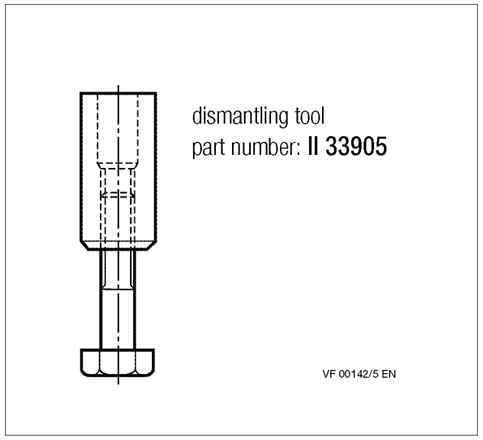


12.2 Removal of Brake Chamber

a) disconnect both nuts (3/4) from the threaded bolts of the brake actuator and remove them together with the washers;

b) charge brake actuator with compressed air (2 bar max.) to obtain the greatest possible piston stroke for the following tasks;

c) introduce a safety tool II33905 (spacer tube) between the brake actuator flange and the brake caliper flange to ensure that the return spring remains compressed and the working space is kept free;



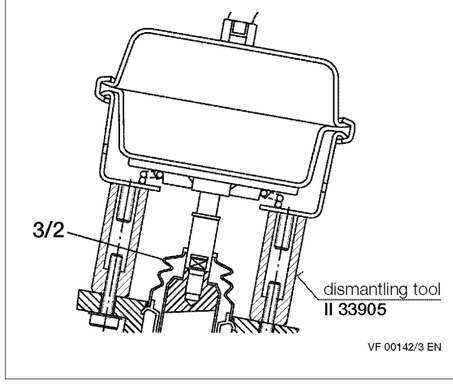
CAUTION!

The dismantling tool must be correctly positioned, since otherwise the hands might get squeezed.

d) pull the Boot (3/2) away from the Push Plate to expose the Push Rod (see Figure A and Figure B on Page 19 and 20).

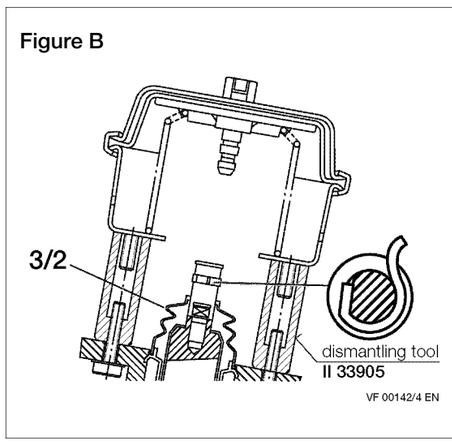
e) If the unit is a "No Clip" version.
Remove the Dismantling Tool. Exhaust the Brake Chamber. Disconnect the air hose. Remove complete Brake Chamber and Wedge Assembly.

Figure A



f) If the unit is a "Clip" version.
Remove the Clip with a small screwdriver. Pull the Brake Chamber out of the Wedge Assembly. Remove the Dismantling Tool. Exhaust the Brake Chamber. Disconnect the air hose. Remove Brake Chamber.

Figure B



12.3 Installation of a new Brake Chamber

12.3.1 "No Clip" Version

Remove plastic protection cap from the assembly. Insert the assembly into the Caliper. Screw both nuts (3/4) with washer onto the threaded bolts of the Brake Chamber (see Section 2.3 for Torque settings). Connect air hose.

12.3.2 "Clip" Version

a) Remove plastic protection cap from the brake actuator;

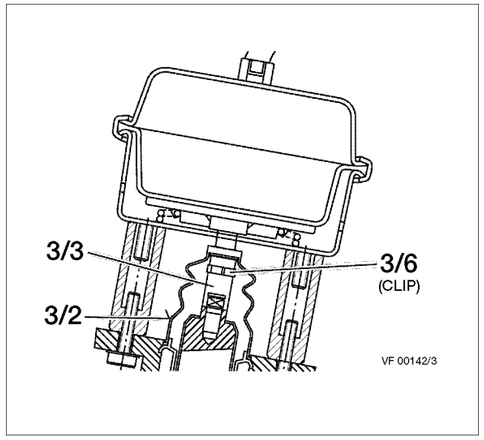
b) remove boot (3/2) to get access to the groove for the clip (3/6); introduce a **new** clip into the groove of the thrust rod (3/3) by means of a small screwdriver;

c) rub grease ("Shell Darina R2") into the grooves of the boot and return the latter into the right installation position;

d) connect air hose to the brake actuator;

e) charge brake actuator with compressed air (2 bar max.) to obtain the greatest possible piston stroke for the following operations;

f) press brake actuator into the thrust rod until the clip engages; check correct fit by lightly exerting a light pull on the actuator.



Note:
If you pull too strongly, the wedge support is placed out of its correct position;

CAUTION!

Do not slide your fingers between the flanges.
They might get squeezed.

g) place the brake actuator into right position in relation to the air connection and the bores of the two bolts; then exhaust the actuator. Ensure that the bolts slide into the bores;

h) press the brake actuator against the flange of the caliper and screw both nuts with washers onto the threaded bolts of the brake actuator (for specified bolt tightening torque refer to Section 2.3).

13 Replacement of Brake Caliper

Note:
When replacing the Brake Caliper, please observe the following points:

On account of design changes made in October 1994, only Calipers with a Date Code J4 or later should be used (refere page 20).

See Sections 12.1.3. regarding Brake Chambers.

13.1 Removal of Brake Caliper

a) disconnect air line from Brake Chamber;

b) remove Brake Pads (refer Sections 7.1 to 7.6);

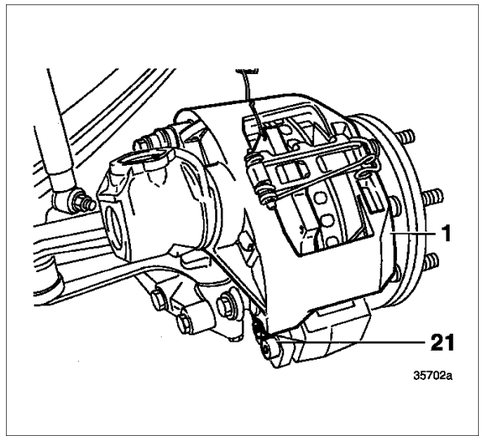
c) remove hexagon head bolts (21) from the brake carrier;

d) take Brake Caliper (1) and Carrier (2) assembly off the steering knuckle;

e) remove Brake Chamber (refer Section 12).

Note:
Check type plates of the Brake Caliper and Brake Chamber to ensure correct replacement.

Replacement Brake Calipers are supplied without Brake Chamber.



CAUTION!
The Caliper is very heavy – take care!

13.2 Installation of Brake Caliper

a) Fasten the Brake Caliper (1) and Carrier (2) assembly to the steering knuckle by means of hexagon head bolts (21). For bolt tightening torques refer Chapter 2.3;

b) install Brake Chamber (refer Section 12.3);

c) install Brake Pads (refer Section 8);

d) set running clearance (refer Section 9);

e) perform final checks (refer Section 10).

14 Repair of removed Brake Caliper

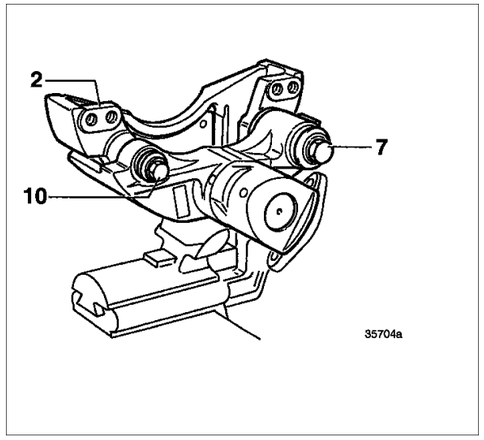
14.1 Replacement of Brake Caliper Guide Pin Seals

a) clamp Brake Caliper into a vice;

b) loosen and remove Guide Pin Retaining Bolt (7) and Guide Bolt (10);

c) remove Carrier (2);

d) remove Boots (6, 9, 17, and 18) (also refer to figure on page 4);



CAUTION!

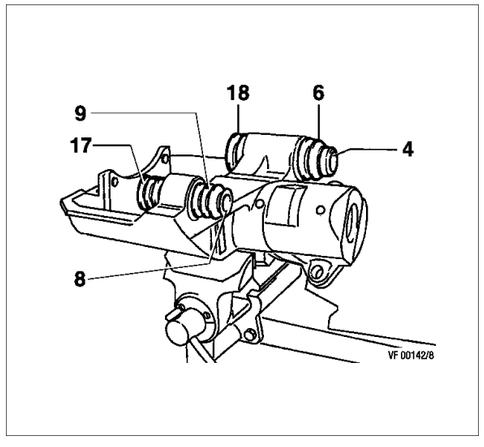
The Caliper is very heavy – take care!

e) press Bushes (4) and Resilient Mount (8) out of the Caliper;

f) clean bush bores in Caliper;

g) install new parts from Seal Kit; performing operations (b) to (e) in reverse sequence;

h) tighten Guide Pin Retaining Bolt (7) and Guide Bolt (10) with specified torques (refer Section 2.3).



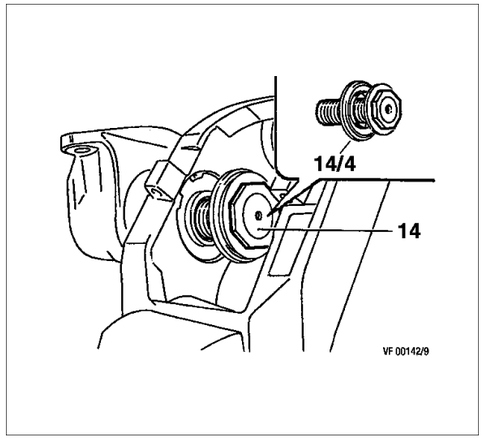
14.2 Replacement of Adjuster Boot

Clean road dirt from area surrounding Adjuster Hexagon and Boot.

Rotate Adjuster Screw several turns anti-clockwise and lever Boot edge out of Caliper housing. Rotate further and remove Adjuster Screw.

Remove the boot (14/4) from the Adjuster screw.

Check the threads of the Adjuster and inside the Brake Caliper as well as all movable parts, for corrosion.



Note:
Make sure that all parts of the Brake Caliper are completely clean. Remove any dirt particles with a rag moistened with isopropyl alcohol (or similar solvent). When assembling the parts, **ONLY** use original "Shell Darina R2" grease (see Section 2.2).

Grease the Adjuster Screw.

Slide new Boot (14/4) from Seal Kit onto the Adjuster; and ensure correctly seated in groove behind hexagon.

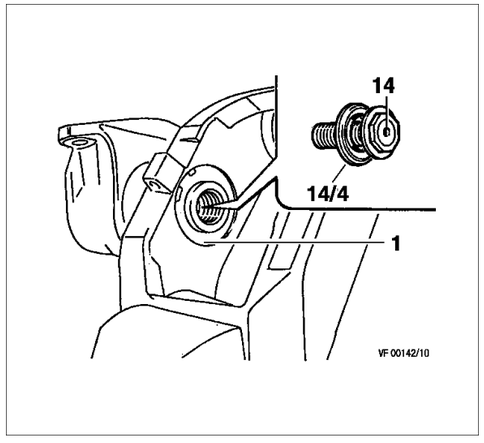
Screw Adjuster into the Caliper (1) by a few threads.

Lightly grease the Boot seat.

Carefully drive the boot seat into the housing bore by means of an aluminium mandrel.

Check proper fit of the Boot.

Rotate Adjuster Screw clockwise until fully retracted.



14.3 Replacement of Adjuster Assembly

Clean road dirt from area surrounding Adjuster Hexagon and Boot.

Rotate Adjuster Screw several turns anticlockwise and lever Boot edge out of Caliper housing.

Rotate further and remove Adjuster Screw.

Remove Circlip and withdraw Adjuster Assembly from Caliper.

The Adjuster Assembly is not repairable.

Thoroughly clean all internal surfaces of Adjuster Assembly hole. If there are signs of serious corrosion, wear or damage, the Caliper should be replaced.

Liberally grease new Adjuster Assembly and Adjuster hole with grease supplied.

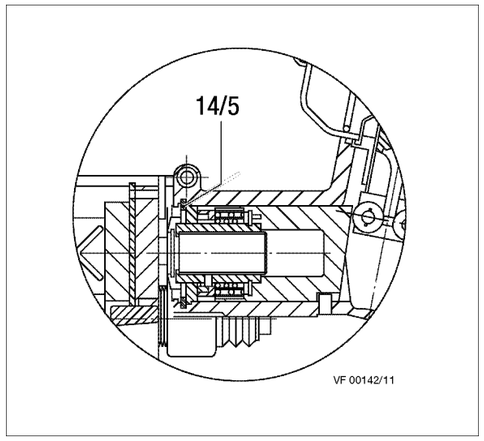
Refit new Adjuster Assembly, ensuring correct orientation by aligning slot and peg.

Replace Circlip.

Lightly grease the Boot seat.

Carefully drive the Boot seat into the housing bore by means of an aluminium mandrel.

Rotate Adjuster Screw clockwise until fully retracted.



15 Replacement of Wedge Assembly

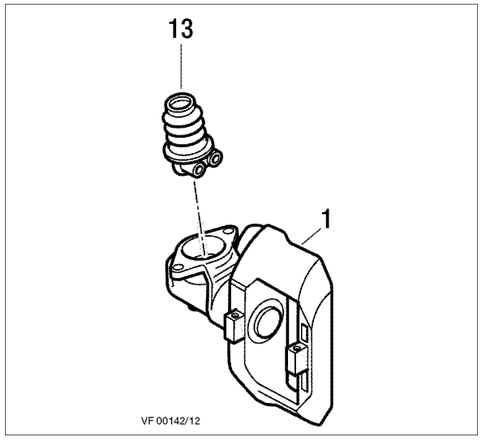
See Section 12.1 to identify version of Caliper.

15.1 "Old" Version

A complete Brake Chamber and Wedge Assembly must be fitted – see Section 12.2.

Or

If the original Wedge and Brake Chamber Assembly have been replaced with the "Clip" type Brake Chamber – see Section 12, the Wedge Assembly may be changed separately as 15.2 below.



15.2 "New" Version

Remove Brake Chamber, see Section 12.3.

Clean local area around Wedge Assembly and ensure no loose road dirt etc. remains.

Pull out Wedge Assembly complete with Boot and clean around rim of hole.

Liberally grease new Wedge Assembly and internal ramp surfaces of Caliper with grease supplied.

Insert new Wedge Assembly.

Refit Brake Chamber, see Section 12.3.2.

Notes:

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