Bremsen, Räder, Reifen
Brakes, Wheels, Tires
Freins, Roues, Pneus
Freni, Ruote, Gomme

PORSCHE

Workshop-Manual

914
914/6

DR.-ING. h. c. F. PORSCHE KG STUTTGART-ZUFFENHAUSEN

This publication contains the essential removal, installation and adjustment procedures for the Porsche 914-914/6 vehicles sold in the USA and Canada.

Components and procedures described in this manual are identical for both types unless differences are pointed out in the text.

It is assumed that the reader is familiar with basic automotive repair procedures. Special tools required in performing certain service operations are identified in the manual and recommended for usw. Use of tools or procedures other than those recommended in this repair manual may be detrimental to the vehicle's safe operation as well as the safety of the person servicing the vehicle.

The Porsche 914 - 914/6 Workshop Manual is divided into 8 volumes. The volumes are subdivided into 10 Main Groups as follows:

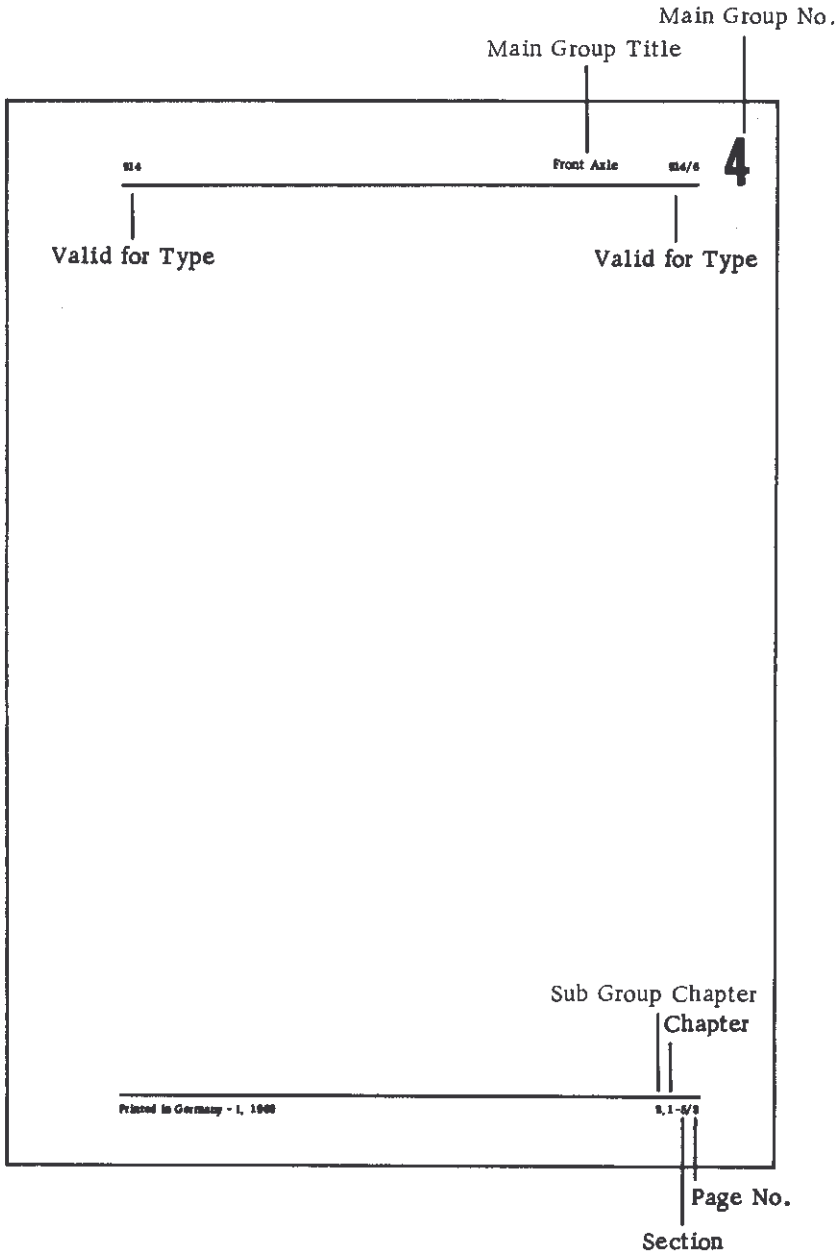
1st Volume	Engine and Clutch - 914	Main Group No. 1
2nd Volume	Fuel System - 914	Main Group No. 2
3rd Volume	Engine and Clutch - 914/6	Main Group No. 1
	Fuel System - 914/6	Main Group No. 2
4th Volume	Transmission	Main Group No. 3
5th Volume	Front Axle	Main Group No. 4
	Rear Axle	Main Group No. 5
6th Volume	Brakes, Wheels, Tires	Main Group No. 6
	Pedal System and Levers	Main Group No. 7
	Maintenance, Specifications	Main Group No. 0
7th Volume	Body	Main Group No. 8
8th Volume	Electrical System	Main Group No. 9

The binders have a transparent plastic pocket on the spine into which the appropriate volume title can be inserted.

To find the individual repair operations, each main group is subdivided into "Chapters" and "Sections". Every main group is provided with a very detailed table of contents. Refer to example on next page.

The repair operations described in this Workshop Manual are based on the Type 914 vehicle. Repair operations which apply to Type 914/6 vehicles are described separately. The type vehicle to which the repair operation applies is given on the top left or right of the page.

When certain repair operations are similar for both type vehicles, the procedures are described together and the minor differences for the 914/6 emphasized by notes and remarks.



Technical Information

The "Technical Information" pages which are published from time to time should be filed in chronological order at the beginning of the respective Main Groups of the Workshop Manuals.

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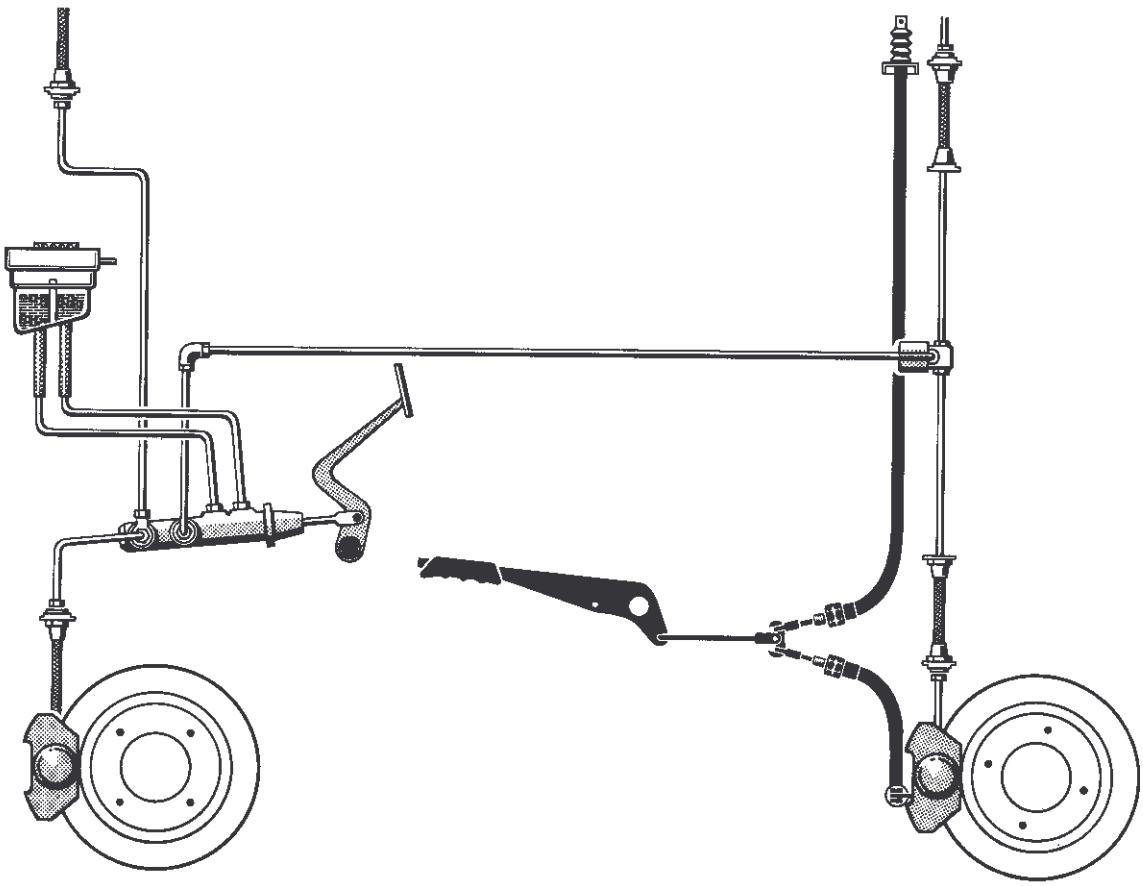
4.1 Wheels and Tires

HYDRAULIC DUAL CIRCUIT DISC BRAKE

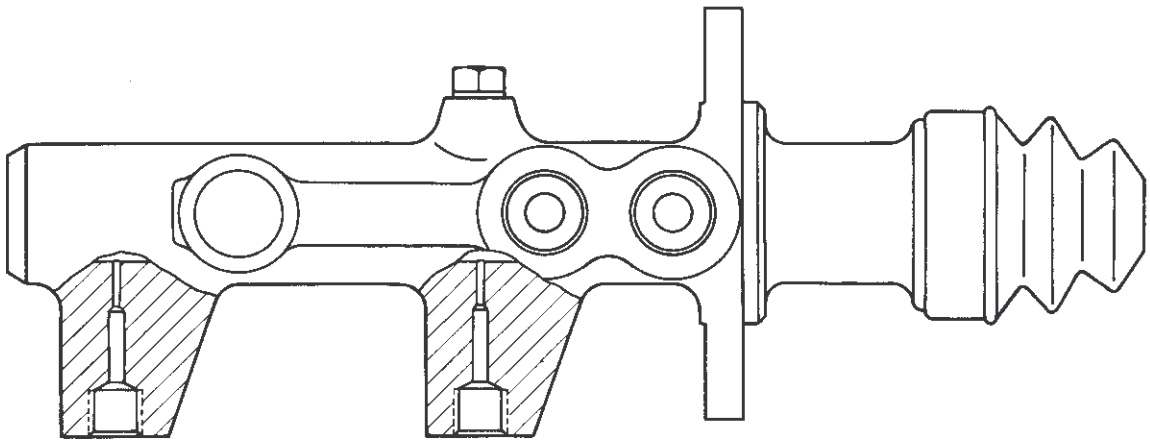
The service brake is a hydraulic dual circuit disc brake. When the brake pedal is depressed, the piston rod moves the pistons inside the tandem brake master cylinder to establish the required pressure. The pressure travels via the brake fluid in the line system to the pressure cylinders of the calipers. The pistons in the calipers then force the brake pads from both sides against the brake discs. The force of the brake pedal pressure determines the extent of the contact pressure of the brake pads against the brake discs and thereby the power of the braking operation.

When the brake pedal is released, the pistons in the tandem brake master cylinder are returned by a spring so that the brake fluid flows back in the line system and the pressure in the entire brake system is reduced.



TANDEM BRAKE MASTER CYLINDER

The tandem brake master cylinder corresponds in its basic design to two normal brake master cylinders connected in series, with one piston supplying the pressure for the front brake circuit and the other the pressure for the rear brake circuit. Since no initial pressure is permitted in the line system of disc brakes, the brake system has no floor valves. Throttle holes at the two connecting points for the front and rear wheel brake circuit permit bleeding of the system without the use of a bleeding device by manipulating the brake pedal in quick succession.



OPERATION OF TANDEM BRAKE MASTER CYLINDER

The two pistons divide the tandem brake master cylinder into two pressure stages, one stage serving the front wheel brake circuit and the other the rear wheel brake circuit. If one brake circuit fails as the result of a leak, the vehicle can still be braked with the other brake circuit.

If, for example, the front brake circuit leaks, the two pistons of the tandem master cylinder as well as the brake fluid between the pistons are initially moved forward until the piston for the front wheel brake circuit rests against the bottom of the housing. The pressure built-up for the rear wheel brake circuit can now begin.

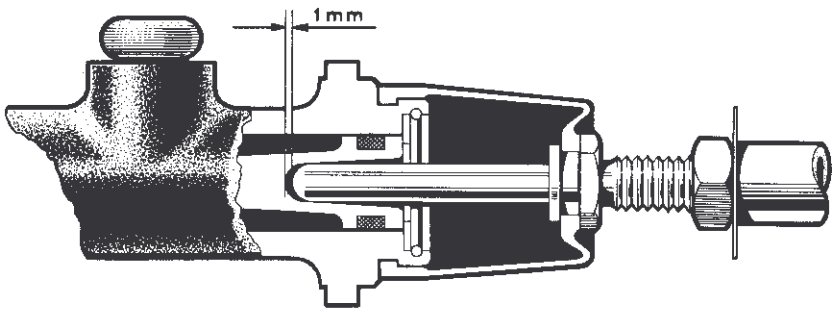
When the rear brake circuit leaks, the piston for the rear wheel brake circuit is first moved up to the stop against the stopping sleeve. The brake is not actuated, since the brake fluid escapes through the leak. Continued stepping down on the brake pedal will then move the piston of the front brake circuit forward under the influence of the pressure exerted by the abutting rear piston. The pressure for the front wheel brake will then be built up and the vehicle will be braked.

The loss of a brake circuit is characterized by an essentially longer free travel of the brake pedal. In addition, the normally obtained deceleration of the vehicle is more or less reduced, depending on which brake circuit is out of action.

When the brake pedal is depressed, the piston for the rear wheel brake circuit is pushed forward by the piston rod. As soon as the primary sleeve covers the compensating hole, pressure will be built up in the thereby closed pressure chamber (rear wheel brake circuit), which will then move the piston for the front wheel brake circuit forward. When the compensating hole of the front pressure chamber is also covered by the primary sleeve and the pressure chamber for the front wheel brake circuit is thereby closed, a uniform pressure will be built up in both pressure chambers. The brake fluid displaced in the respective pressure chamber will then flow to the pistons of the calipers via the pertinent lines.

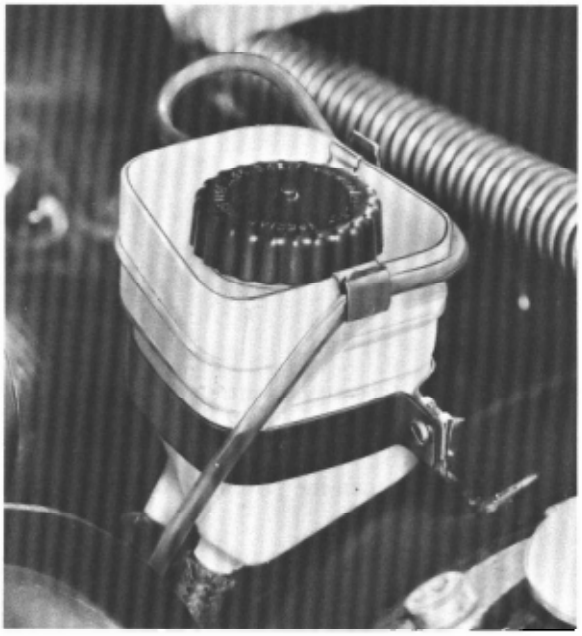
PISTON ROD

To prevent the compensating holes in the inoperative position of the brake from being covered by the primary sleeve, the piston rod for the tandem master brake cylinder must be set in such a manner that a clearance of 1 mm (.04 in.) is provided between the piston rod and piston pressure pan.



BRAKE FLUID RESERVOIR

The brake fluid reservoir is in the front luggage compartment. Approximately 3/4 of its capacity should be filled with brake fluid. An overflow hole at the top of the reservoir is attached to a drain hose which allows excess fluid to flow out of the vehicle. The overflow hole also serves as a vent to prevent a vacuum buildup which might cause difficulties in the entire brake system. The brake fluid reservoir is divided into two compartments by separating wall of half its height. In the event of the failure of one brake circuit, there is still enough brake fluid in the reservoir for the remaining brake circuit. The two chambers of the reservoir are connected by brake lines to the pressure chamber of the front wheel or rear wheel brake circuit of the tandem brake master cylinder.



BRAKE FLUID

Only brake fluid with the specification SAE 1703a should be used in the brake system. This fluid ensures that the brakes work properly and reliably under all climatic conditions your car may normally encounter. The composition is such that it does not affect the structure or surface finish of the seals and other parts of the brake system.

Heat generated while braking is not only transferred to the brake discs but also to the calipers and thus to the brake fluid. If brake fluids other than those recommended by the factory are used, the operational safety of the brakes might become impaired.

Brake fluid is hygroscopic, meaning that it has a tendency to absorb moisture from the atmosphere. Brake fluids used for an extended period of time may have accumulated a high enough water content to reduce the boiling point. This condition influences the viscosity at low outside temperatures, it also may promote corrosion in the brake system.

It is therefore necessary to replace the brake fluid in the hydraulic brake system as prescribed in the current maintenance schedule.

Whenever brake fluid has to be added, only new brake fluid should be used.

BRAKE CYLINDER PASTE

The sealing parts of the hydraulic brakes must not be lubricated with mineral oil or grease. To give good lubrication of the pistons and cylinders, the factory indroduced a brake cylinder paste. This pase is neutral in relationship to the sealing material of the brake system, improves the sliding properties of pistons and cups and should be used each time the cylinders are disassembled and assembled.

FRONT WHEEL BRAKES

The front brakes are of the disc type, the main parts being the cup shaped brake disc and the brake caliper. The caliper contains the hydraulically operated components of the brake system. (On the 914/6 the brake disc is vented and bolted to the wheel hub.) A cover plate protects the inner disc surface from damage due to dirt, stones or similar damage. The outer surface of the brake disc is protected from damage by the wheel. Viewed in driving direction, the brake caliper is located in front of the wheel axis.

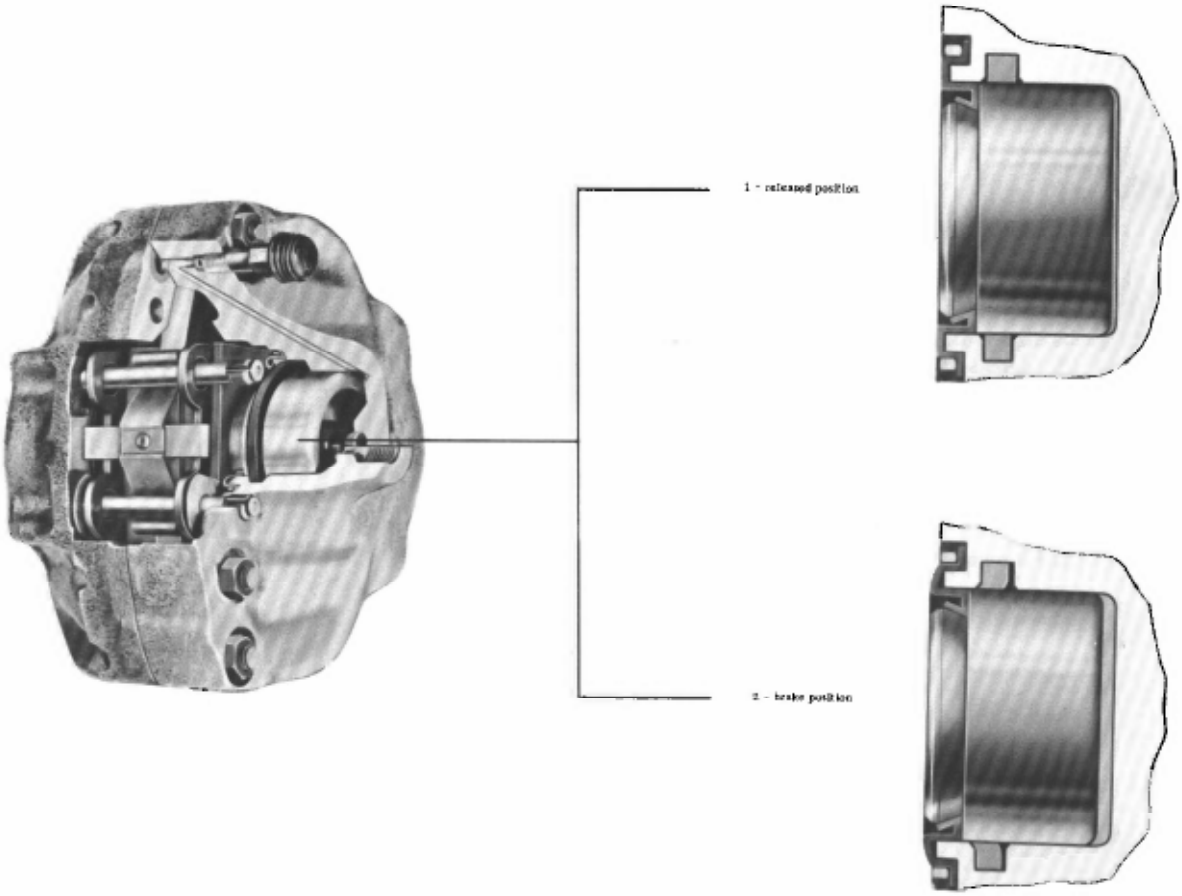
BRAKE CALIPER

The brake caliper consists of the inner housing and the outher housing. These housings are positioned on each side of the brake disc. Four bolts hold the two caliper housing firmly together. The caliper is secured to the steering knuckle by two bolts. A cylinder is machined into each caliper housing and each contains a piston and a rubber seal. The rubber seal, of square cross section, is positioned in an annular groove in each of the cylinders and prevents fluid from leaking past the piston. Cylinder, piston and rubber seal are protected against moisture and dirt by a seal which is held in the recess at the front end of the cylinder by a spring ring. The piston is held in position by the inherent tension of the seal.

To prevent the piston from rotating when braking retaining plates are provided which are pushed into the piston crowns and held against recesses in the caliper.

OPERATION

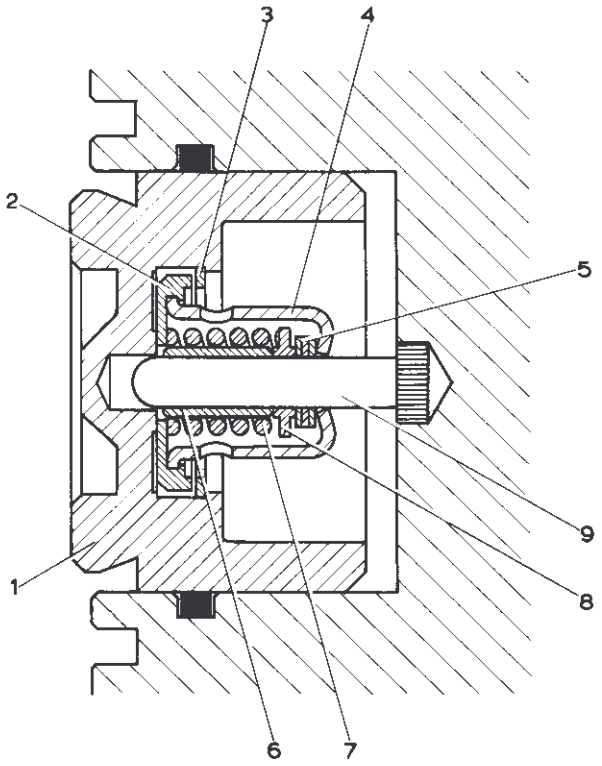
When the brake pedal is depressed, hydraulic pressure from the tandem master cylinder piston is transfered to the brake caliper pistons. As the pistons move toward each other they overcome the clearance between pads and disc and press the friction pads against the disc. The rubber seals on the pistons deflect against the cylinder walls into the direction of the piston movement.



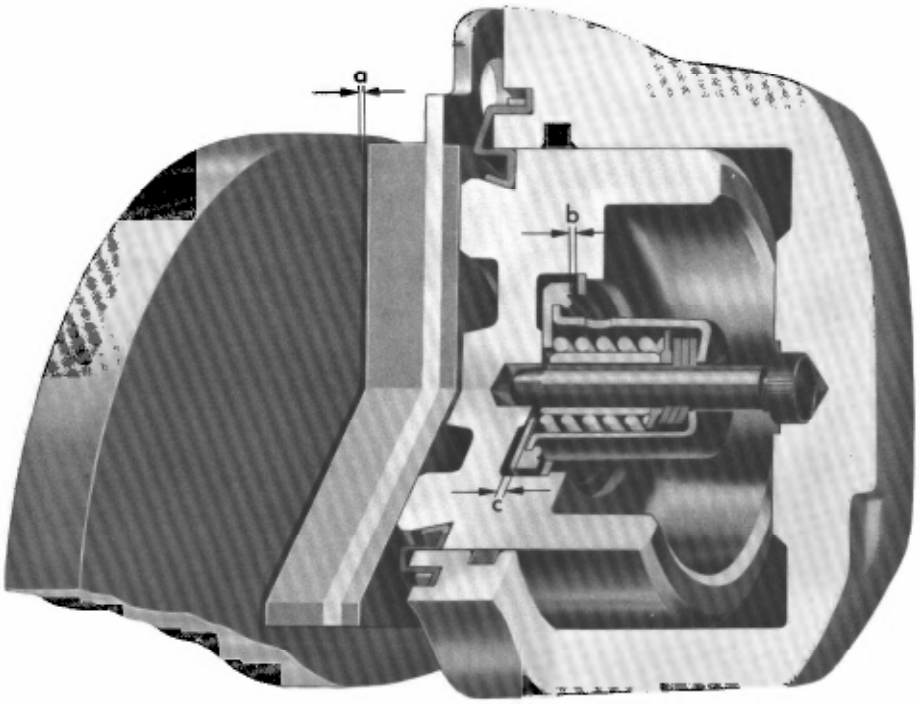
When releasing the brake pedal, the springs force the tandem master cylinder pistons back to their original positions and the complete system is relieved of pressure due to the pressure relief port in the tandem master cylinder. Simultaneously, the pistons in the brake caliper are retracted by the rubber seals resuming their normal condition. The friction pads, which are pressed against the pistons by the speader springs, move away from the brake disc, thus allowing the disc to rotate freely again. The amount of clearance between the friction pads and the brake disc when the brakes are off depends upon the elasticity of the rubber seal. The clearance is approximately. .002-.008 in. (0.05-0.2 mm). This clearance does not increase as the friction pads wear, as the pistons, when they have to cover a distance toward the brake disc larger than the lateral deflection of the rubber seals, slip through the rubber seals. The friction pads adjust themselves automatically according to the amount of wear, and the adjuster and brake disc deflection compensator comes into operation with every movement of the piston.

ADJUSTER AND BRAKE DISC DEFLECTION COMPENSATOR

1 Piston
2 Stop washer
3 Lock washer
4 Spring housing
5 Friction disc
6 Spacing sleeve
7 Compression spring
8 Spacing washer
9 Friction pin



The adjuster and brake disc deflection compensator has the task of maintaining a constant clearance between friction pads and brake disc even when the pistons have to cover a longer distance toward the brake disc. For example, when the friction pads, wear or the brake disc is warped. The compensator consists of the spring housing, the stop ring, the spring, the spacer sleeve, the spacer washer and the friction washers. The spring housing is peened to the stop ring. The compensator is so arranged that it can slide along the cylindrical pin which is firmly pressed into the base of the cylinder and it is held in the piston with a predetermined clearance between the underside of the piston crown and the retaining disc.

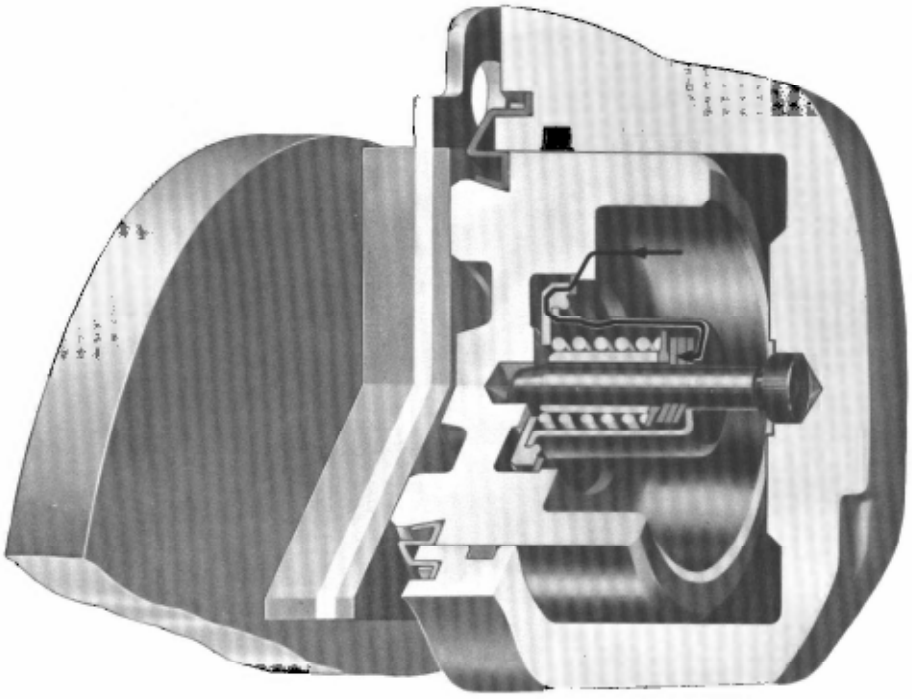


Clearance a is the clearance between friction pads and brake disc.

Clearance b between retaining disc and stop ring is required for the automatic adjustment of the pistons.

Clearance c between underside of piston crown and end of spacer sleeve is required for the brake disc deflection compensator.

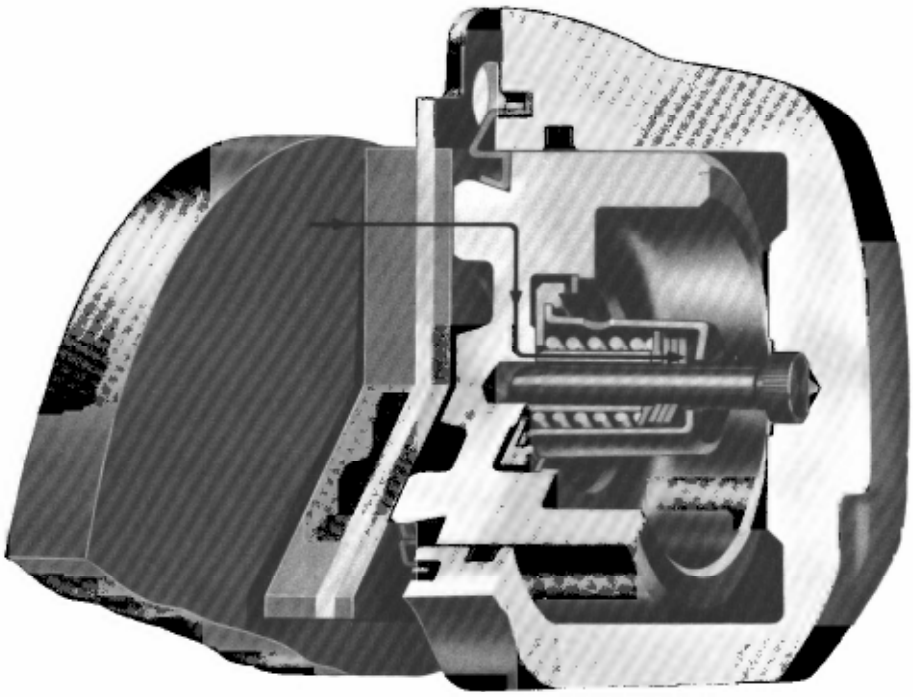
AUTOMATIC ADJUSTMENT OF THE BRAKE FRICTION PADS



When the brake pedal is depressed, the piston is forced toward the brake disc by the hydraulic pressure, thus eliminating clearance a and b. When braking hard, the friction pad wear is so great that the piston has to move farther toward the brake disc that clearance b permits. The piston then slides through the laterally deflected rubber seal and via the retaining disc pulls the stop ring and the spring housing with it. The friction washers are forced along the cylindrical pin accordingly (arrow = direction of force).

When the brake pedal is released, the piston is retracted into the cylinder by the rubber seal, the amount of retraction being equal to the amount of rubber seal deflection (clearance a). Clearance b then exists again between retaining disc and stop ring. The friction pad is moved back against the piston by a small lateral movement of the brake disc and also by the pressure of the speader spring.

BRAKE DISC DEFLECTION COMPENSATION



The forces acting on the front axle when operating the vehicle can lead to a lateral deflection of the brake disc. If this deflection is greater than clearance a, the piston is pushed back into the cylinder. As the underside of the piston crown rests against the stop ring when the brakes are at rest, the spring which also rests against the stop ring is compressed. Clearance c is reduced. If, however, the brake disc deflection is so great that clearance c is completely eliminated and the piston crown bears against the spacer sleeve, the friction washers are forced along the cylindrical pin by the spacer sleeve pushing against the distance piece (arrow = direction of force).

BRAKE FRICTION PADS

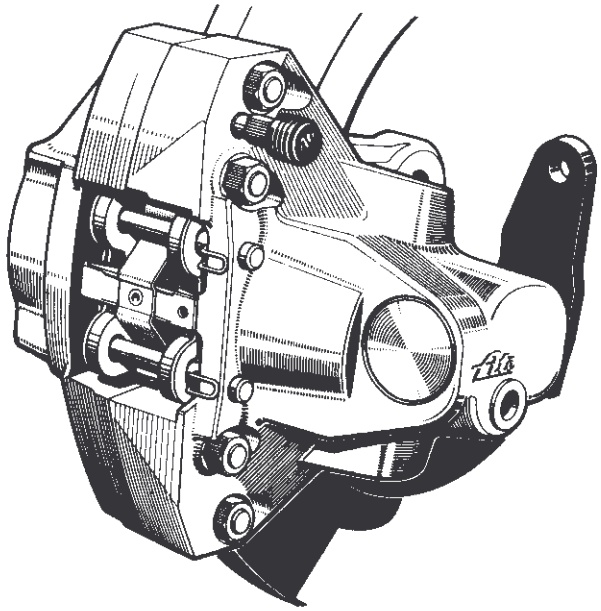
The friction pads consist of friction material and a metal plate. A layer of sound deadening plastic is cemented to the back of the metal plate to keep noises down to a minimum.

The friction material is provided with a groove, .08 in. (2 mm) wide and .3 in. (8 mm) deep running in a radial direction which immediately breaks up any water or oil film that has formed on the brake disc. By this good braking in bad weather is maintained.

REAR WHEEL BRAKES

The rear wheel brakes are the disc type. The main components are the brake disc and the brake caliper which contains the hydraulically operated brake components. The caliper is designed so that the brake friction pads can be operated both hydraulically (the service brake) and mechanically (the hand brake).
A cover plate protects the inner disc surface from damage due to dirt, stones, etc.. The outer surface of the brake disc is protected from damage by the wheel. Viewed in driving direction, the brake caliper is located to the front of the wheel center.

BRAKE CALIPER



The brake caliper combined with the mechanical actuating components, consists of the flange housing and cover housing.
Each housing has one cylinder and piston, each with adjusting device and a reversing lock.
The mechanical brake actuating components which act against the piston are inside the flange housing.
The automatic adjustment is variable and is actuated hydraulically. It is not influenced by caliper expansion and is protectively located in the brake fluid.
Protective caps and piston seals are arranged similiar to the front calipers.

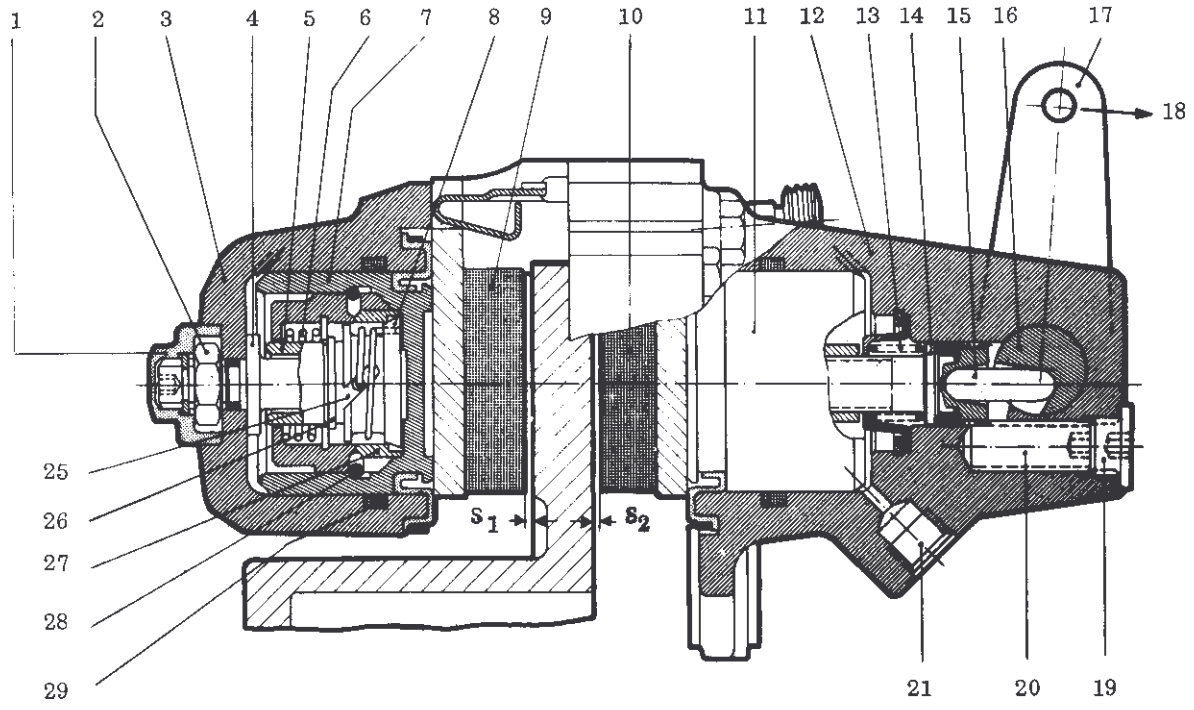
Operation

The caliper is connected to the hydraulic brake system. During the pressure build-up i.e. when braking, the pistons overcome clearance S_1 and S_2 and push the friction pads against the brake disc at a pressure matching the applied braking force. The automatic adjustment clearance corresponds to clearance S_1 and S_2 (when adjusted).

Automatic adjustment begins when the friction pad wear reaches a certain point, that is when clearance S_1 or S_2 is greater than the basic clearance.

As a result of the locking action on the cone of the housing, which is coupled to the piston by means of the spring ring (safety connection), the carrier is moved axially toward the brake disc. The threaded sleeve screwed on the spindle is rotated by the angular slot in the carrier to provide an axial adjustment increment.

This increment is very small and does not always have the size of the entire piston travel of one stroke. Large friction pad wear will be adjusted after several such actuations, in order to prevent any binding of the friction pads which have a tendency of becoming flexible under extreme high temperatures. The clearance S_1 and S_2 is, therefore, insignificantly influenced by the caliper expansion and the compressibility of the friction pads and will never be below the minimum clearance of 0.05 mm (.002 in.).



When the pressure in the brake system is relieved, the caliper pistons are retracted by the compression spring along with the tension of the rubber seals.

If the specified maximum piston stroke is exceeded; for example, if the brake is applied before the friction pads are installed, then the safety connection of the lock ring will release and prevent any damage to the adjusting device. The service brake remains operable whereas the hand brake does not.

If such an event should ever occur, the piston must be pushed back with the piston resetting fixture P 83 until the lock ring can be felt or heard to engage.

HAND BRAKE

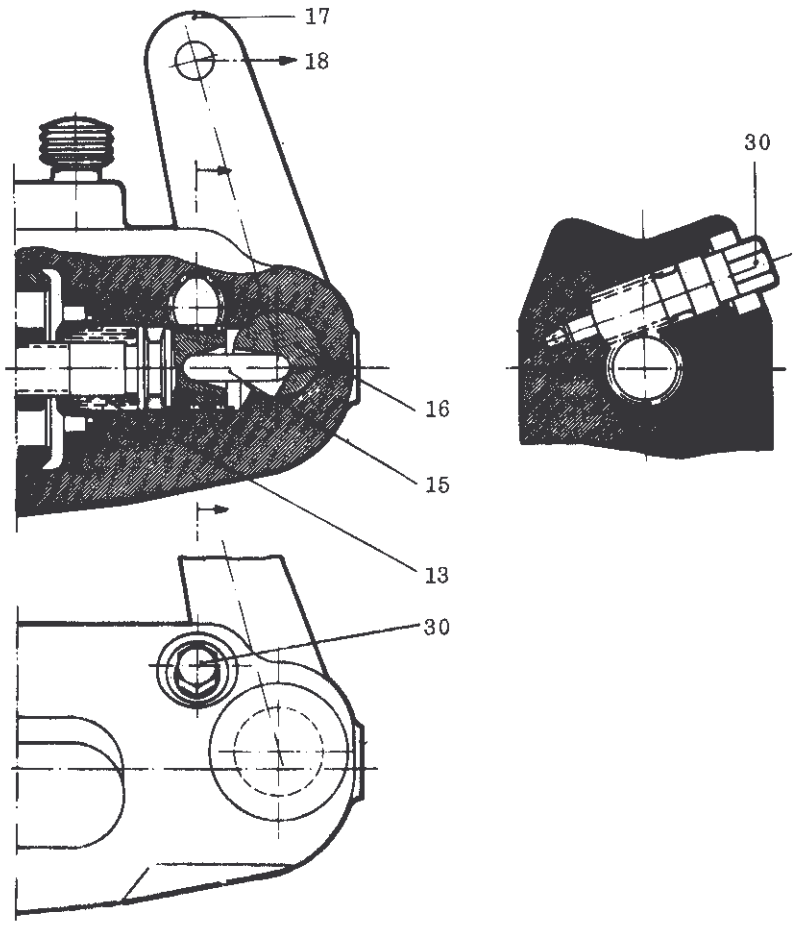
The hand brake lever is located at the left next to the driver's seat. Pulling the handle of the brake lever will actuate the hand brake. The lever will lock automatically and can be lowered with the brake applied. The control cable attached to the hand brake lever connects the two hand brake cables to the hand brake lever by means of the cable rocker. The cables are connected to the actuating levers of the rear calipers.

The hand brake and the service brakes are provided with an automatic adjusting device. Basic adjustment of the hand brake is only required when the rear calipers or the hand brake cables are replaced.

Function of Mechanical Hand Brake

The brake cable is connected to the actuating lever (17). Actuation of the cable will rotate the shaft (16). The eccentricity of the spherical segment in the shaft will move the thrust piece (15), the drive spindle (14) and the piston (11) coupled with the latter toward the brake disc. The resulting force will cause the piston to press the friction pad against the disc. The clearance S_1 is overcome by the elastic deformation and the bearing play. Since the adjusting device prevents the piston from retracting, the force is directed to the friction pad.

When the hand brake is released, the actuating lever will return against the stop supported by an external leg spring and the drive shaft will return to its starting position under the spring tension.



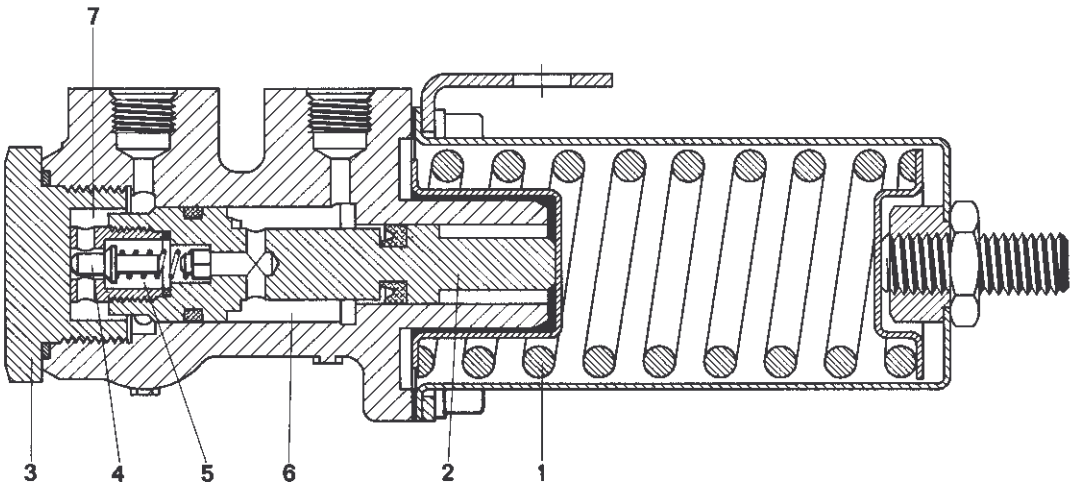
1 Closing screw - cover end
2 Counter nut
3 Housing - cover end
4 Spindle
5 Threaded sleeve
6 Compression spring
7 Piston
8 Cone
9 Friction pads
10 Friction pads
11 Piston
12 Housing - flange end
13 Spring
14 Spindle
15 Thrust piece
16 Shaft
17 Actuating lever
18 Brake cable
19 Closing screw - flange end
20 Resetting shaft
21 Connection
25 Inclined slot
26 Carrier
27 Housing
28 Spring ring (safety connection)
29 Sealing ring
30 Hexagon

Note!

Do not disassemble rear caliper, since disassembly of the piston may destroy the automatic adjusting device.

BRAKE PRESSURE REGULATOR

While braking the brake pressure in the brake line is transmitted uniformly to the front and rear brake calipers. As the brake line pressure increases, a point is reached where the brake pressure regulator prevents this uniform pressure distribution. It limits the pressure to the rear brakes. This increases the road holding ability of the car during hard brake application.

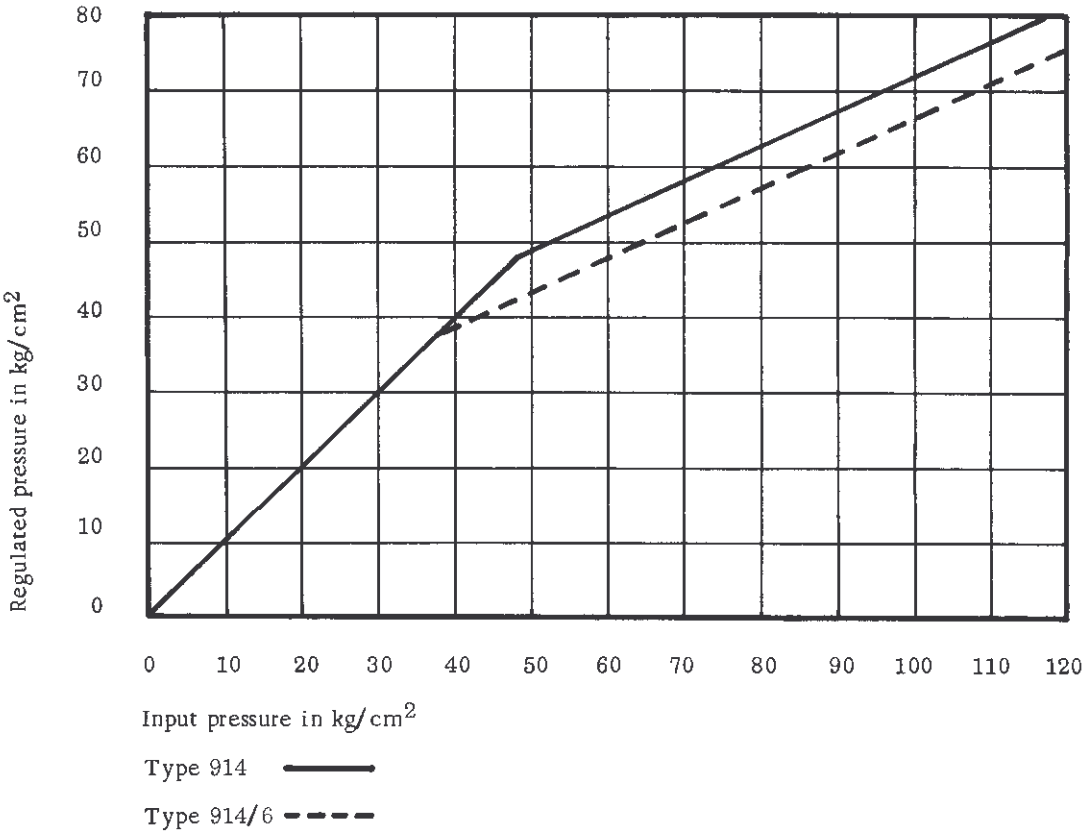


Operation

The brake pressure regulator consists of a stepped piston under spring pressure in which a spring loaded check valve is installed. The pressure from the master cylinder is exerted on an annular surface on the part of the piston facing the large spring. The regulated pressure acts on the check valve end of the piston. When the regulator is inoperative, at a line pressure of less than 37 kg/cm^2 (525 psi) the pressure in the brake line together with the spring (1) forces the stepped piston (2) against the plug (3). With the piston in this position, the end of the check valve (4) bears against the plug, the check valve opens against the spring pressure and the pressure from the master cylinder can continue via the pressure chamber (6) and the chamber (7) to the wheel cylinders. If the line pressure increases to above the regulating point, the pressure acting on the piston surface in chamber (7) becomes greater than the pressure exerted on the smaller annular surface of the piston in chamber (6). The piston then moves away from the plug and the check valve (4) closes, thus preventing the pressure to the rear wheel brake cylinder from increasing. If the pressure in the brake line to the regulator and, therefore, also the pressure in the chamber (6) increases still further, the force of the large spring, together with the increases pressure, is sufficient to push the piston toward the left again against the plug and the check valve opens once more. This movement repeats itself continually over the whole regulating range.

Pressure regulation is governed by the ratio of the surface differential between the annular surface in chamber (6) and the total piston surface in chamber (7).

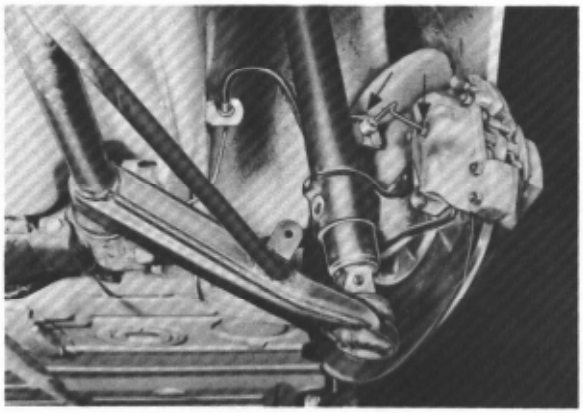
The changeover point at which control begins is at 48.0 kg/cm^2 (683 psi), and can be adjusted by changing the preload of the regulator spring (in vehicle Type 914/6 the changeover pressure is at 37.0 kg/cm^2 = 526 psi).



When the pressure to the regulator drops, the stepped piston is pushed against the large spring (1) by the higher pressure behind the regulator. At the same time, the pressure in chamber (7) opens the check valve (4) and the pressure in the rear brake circuit drops completely. The stepped piston then moves to the left again into its original position.

BRAKE HOSE ATTACHMENT, TYPE 914 BRAKE SYSTEM (FROM 1972 MODEL)

Beginning with the 1972 model, front and rear brake lines in Type 914 vehicles are attached to the brake calipers by means of taper-thread fittings.
In addition, the brake hoses and retaining brackets at the shock absorber struts and transverse control arms have been changed.



Only shock absorber strut outer components and transverse control arms of the 1972 model version will be furnished as spare parts.

If a shock absorber strut outer component in the front axle, or a transverse control arm of the rear axle is replaced in a pre-1972 vehicle, it will be necessary to install the appropriate brake hoses and brake hose retaining brackets of the 1972 model version as well.

1973 MODEL FRONT BRAKE MODIFICATIONS

Beginning with the 1973 models, larger brake calipers with 14 mm thick brake pads (formerly 10 mm) and two bleeder valves are installed in the Type 914 front axle.

The brake disks, axle spindles, and disk shrouds have been changed to accomodate the larger brake calipers.

The brake caliper bleeding and repair procedure remains unchanged. The second bleeder valve is used only for changing the brake fluid.

GENERAL DATA

Vehicle Type	Dimensions and Adjusting Values 914	914/6	Wear Limit 914	914/6
Tandem main brake cylinder				
Bore	17.46 mm dia. (.6874")	19.05 mm dia. (.7500")		
Stroke	18/13 mm (.7/.5")	18/13 mm (.7/.5")		
Reduction on brake foot lever	5.4 : 1	5.4 : 1		
Play: actuating rod/Piston	1 mm (.04")	1 mm (.04")		
Front wheel brake				
Brake disk (dia.)	281 mm $^{-0.2}_{-.008}$ (11.063")	282.5 mm $^{-0.3}_{-.012}$ (11.122")		
Thickness, new	11 mm $^{-0.2}_{-.008}$ (.433")	20 mm $^{-0.2}_{-.008}$ (.787")		
Min. thickness after refinishing *)	10.0 mm (.394")	18.6 mm (.732")	9.5 mm (.374")	18.0 mm (.709")
Thickness tolerance	max. 0.02 mm (.0008")	max. 0.02 mm (.0008")		
Lateral wobble	0.2 mm (.008")	0.2 mm (.008")		
Caliper piston dia.	42 mm (1.7")	48 mm (1.9")		
Thickness of lining Thickness of lining from 1973 model	10 mm (.4") 14 mm (.55")	10 mm (.4")	2.0 mm (.08")	2.0 mm (.08")
Release clearance	0.05-0.2 mm (.0020-.0079")	0.05-0.2 mm (.0020-.0079")		
Lining surface of four linings	106 cm^2 (16.4 sq.in.)	106 cm^2 (16.4 sq.in.)		
Rear wheel brake				
Brake disk (OD)	282 mm $^{-0.2}_{-.008}$ (11.102")	286 mm $^{-0.2}_{-.008}$ (11.260")		
Thickness, new	9.5 mm $^{-0.2}_{-.008}$ (.374")	10.5 mm $^{-0.2}_{-.008}$ (.591")		
Min. thickness after refinishing *)	8,9 mm (.350")	9,5 mm (.374")	8,5 mm (.335")	9,0 mm (.354")
Thickness tolerance	max. 0.02 mm (.0008")	max. 0.02 mm (.0008")		
Lateral wobble	0.2 mm (.008")	0.2 mm (.008")		
Caliper piston dia.	33 mm (1.3")	38 mm (1.5")		
Thickness of lining	10 mm (.4")	10 mm (.4")		
Release clearance	0.2 mm (.008")	0.2 mm (.008")		
Lining surface of four linings	80 cm^2 (12.4 sq.in.)	106 cm^2 (16.4 sq.in.)		

*) The brake disk may be refinished only symmetrically, that is, uniformly from both sides.

TIGHTENING TORQUES FOR BRAKE MASTER CYLINDER: FRONT AND REAR BRAKES

(In parantheses: for Type 914/6 only)

Location	Description	Thread	Grade	Tightening torque mkp	Tightening torque ft.lb.
Tandem brake master cylinder on bulkhead	Nut	M 8	6.8	2.5	18
Brake lines to hollow bolt, adaptor, brake pressure regulator, caliper, connector, brake hoses *	-	M 10x1	5 S	1.5 ± 0.1	11
Hollow bolt to brake pressure regulator and caliper *	Hollow bolt	M 10x1	-	2.0	14,5
Hollow bolt to brake master cylinder *	Hollow bolt	M 10x1	-	2.5	18
Bolt for clamp nut	Fillister head/hex. (socket screw)	M 7x1	10.9	1.5	11
Caliper on steering knuckle	Bolt	M 12x1,5 x30	10.9	8.5	61.5
Guard plate on steering knuckle	Bolt	M 8x12	5.6	1.0	7.2
Beed valve in caliper	-	-	-	0,2-0,35	1.5 - 2.5
Wheel hub on brake disc	Nut	(M 8)	(6.8)	(2.3)	(16.6)
Housing bolt for front caliper	-	-	-	2,2(3.4)	16(24.6)
Housing bolt for rear caliper				2,2	16
Caliper on rear axle steering arm	Bolt	M 12x1,5 x 30	8.8	7.0	50
Brake disc on wheel hub	Countersunk bolt	M 6x12	8.8	0.5	3.6
Guard plate on rear axle steering arm	Bolt	M 8x10	8.8	2.5	18
Bleed valve in caliper	-	-	-	0.2-0.35	1.5-2.5
Wheel on wheel hub	Bolt (25 mm) Nut	M 14x1.5	6.6	15 (13)	108.5 (94)
	Bolt (39 mm)		8.8	13	94

* Check for leaks

LIST OF REQUIRED SPECIAL TOOLS

Hub cap puller	VW 637/2
Pedal arrester	commercial
Measuring tool	P 87
Dial gauge	commercial
Pulling hook	P 86
Piston resetting fixture	P 83
Piston gauge	P 84
Piston rotating pliers	
3/8" Extension	commercial
4 mm Hexagon socket spanner	commercial
Feeler gauge	commercial

TANDEM MASTER BRAKE CYLINDER REMOVAL AND INSTALLATION

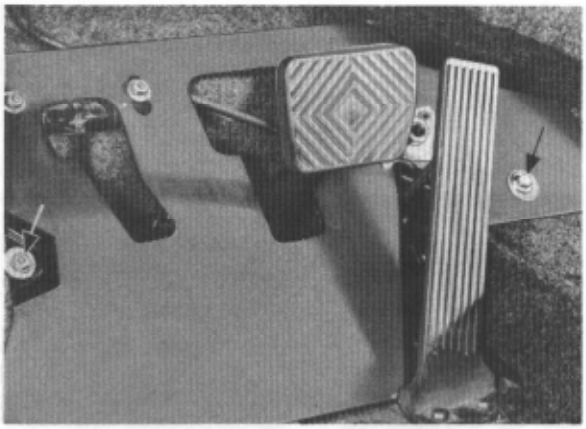
Removal

1. Suck brake fluid out of both chambers of brake fluid container.

   Caution!
   Brake fluid is toxic. Brake fluid should not come into contact with paintwork, because it contains acid.

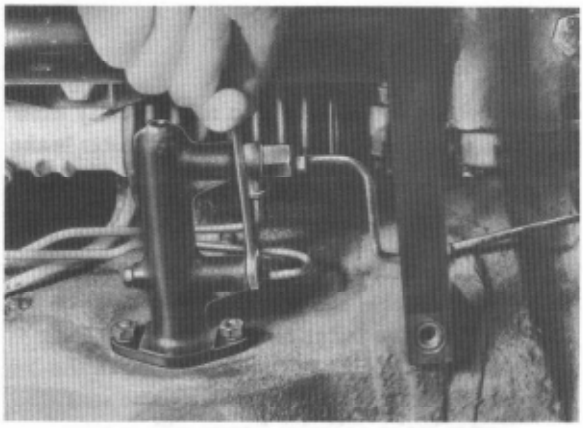
2. Remove floor lining (front left) and pull accelerator pedal toward the rear out of push rod.

3. Loosen hex. bolts for floor board attachment and remove floor board.

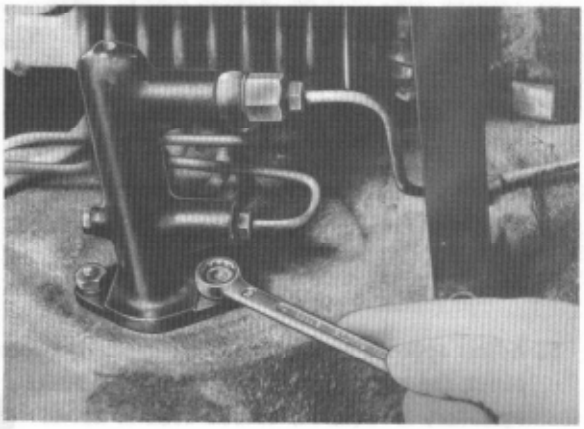


4. Remove underfloor protection of front axle.

5. Unscrew brake lines on tandem master brake cylinder.



6. Loosen hex. nuts on flange of tandem master brake cylinder.



7. Pull connecting lines from brake fluid reservoir and remove tandem master brake cylinder.

Installation

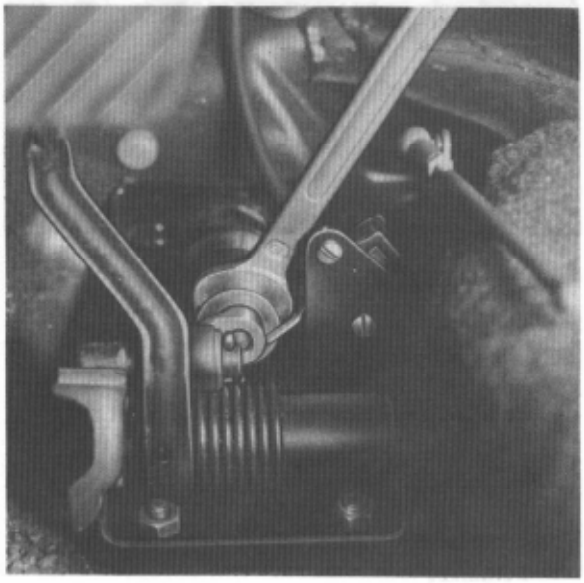
1. Be sure to introduce piston rod correctly from the start when installing tandem master brake cylinder.

2. Moisten rubber sleeves with brake fluid to facilitate the installation of the connecting lines from the brake fluid container to the tandem master brake cylinder. Also seal master brake cylinder flange with sealing putty to prevent water from entering the interior of the vehicle.

3. Tighten hex. nuts for tandem master brake cylinder to specified tightening torque.

4. Watch out for correct seat of protective cap for piston rod.

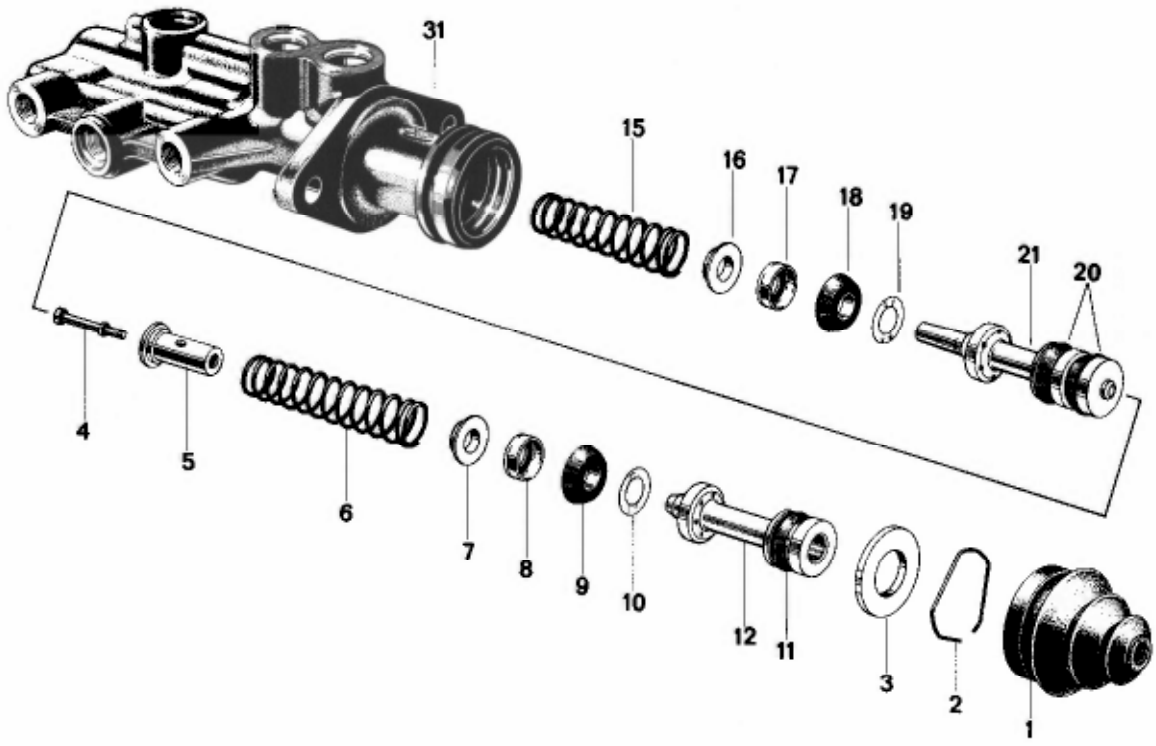
5. Adjust approx. 1 mm (.04") clearance between piston rod and piston in tandem master brake cylinder. If required, loosen counter nut of piston rod and turn piston rod as required.



6. Bleed brake system.

7. Check brake lights.

8. Check warning device for dual circuit brake (only in USA version).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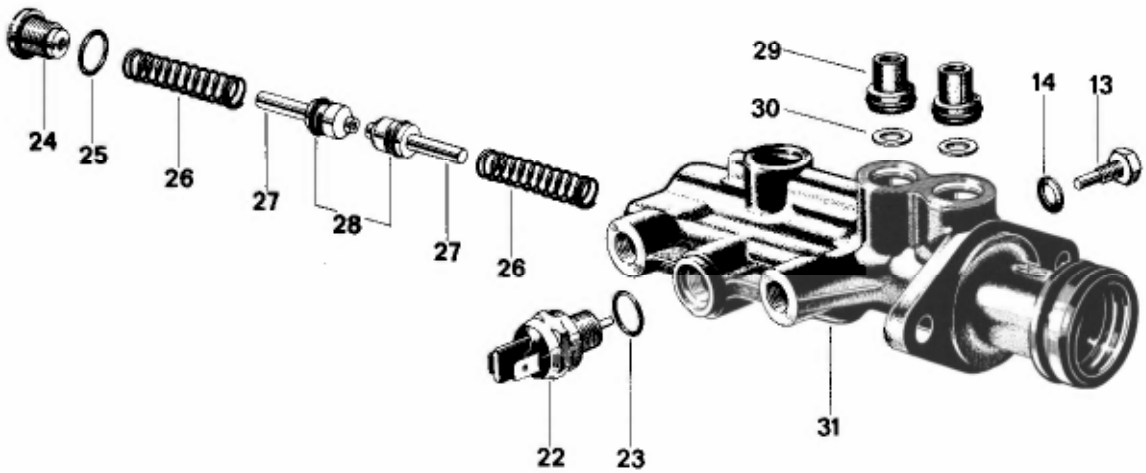
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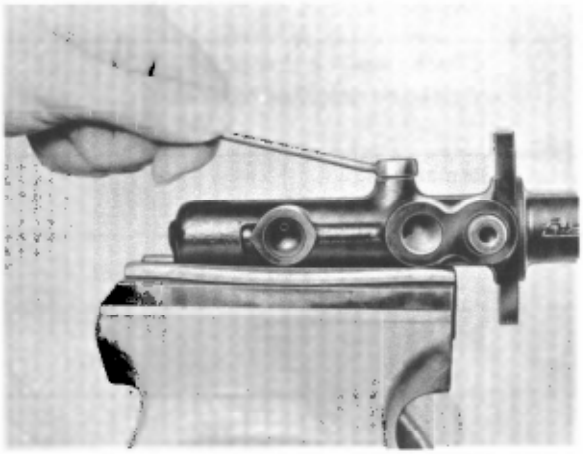
No.	Description	Qty.	Note when Removing	Note when Installing	Spec. Instr.
1	Protective cap	1		Replace if required	
2	Locking ring	1		Observe correct seat	
3	Stop washer	1			
4	Stop screw for stroke restriction	1		Tighten well	
5	Stop sleeve	1			
6	Compression spring for pressure piston	1			
7	Spring retainer	1			
8	Supporting ring	1			
9	Primary sleeve	1		Replace, coat with brake cylinder paste	
10	Filling disc	1			
11	Grooved sleeve	1		Replace, coat with brake cylinder paste	
12	Pressure piston	1		Clean, check for wear, replace if required	
13	Stop screw	1		Tighten to specified torque	
14	Sealing ring	1		Replace	
15	Compression spring for intermediate piston	1			
16	Spring retainer	1			
17	Supporting ring	1			
18	Primary sleeve	1		Replace, coat with brake cylinder paste	

No.	Description	Qty.	Note when Removing	Note when Installing	Spec. Instr.
19	Filling disc	1			
20	Separating sleeve	2		Replace, coat with brake cylinder paste	
21	Intermediate piston	1	Loosen stop screw first	Clean, check for wear, replace if required	
22	Brake warning switch	1		Check, replace if required, tighten to specified torque	
23	Round cord ring	1		Replace	
24	Screw	1			
25	Round cord ring	1		Replace	
26	Compression spring	2			
27	Piston	2		Check for wear, replace if required	
28	Sleeve	2		Replace, coat with brake cylinder paste	
29	Tank plug	2		Moisten with brake fluid	
30	Washer	2			
31	Tandem brake master cylinder housing	1		Check cylinder for wear, replace if required	

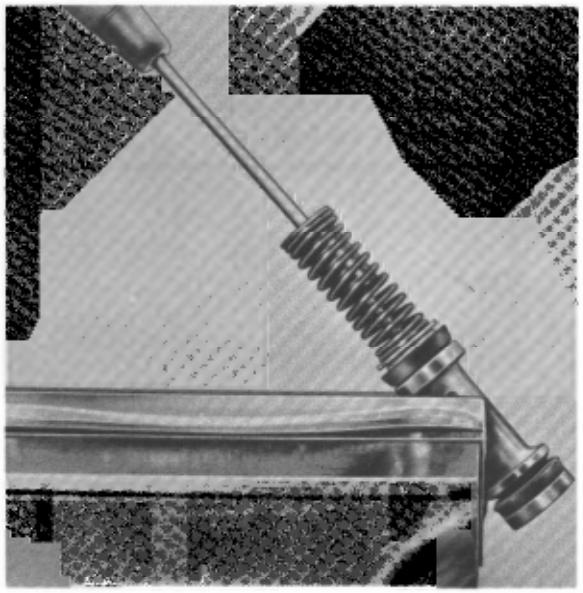
DISASSEMBLING AND ASSEMBLING TANDEM BRAKE MASTER CYLINDER

Disassembling

1. Remove primary piston stop bolt, pushing the piston back to prevent damage, then blow the primary piston out with compressed air (approx 1 atm or 15 psi) while plugging the respective hole in the housing.



2. Clamp pressure piston lightly in vise and loosen pressure piston stop screw. Compress pressure spring slightly so that the threads for the stop screw in the pressure piston are not damaged.



3. Loosen brake warning light switch, loosen closing screw and remove piston together with compression spring by blowing them out of housing with compressed air approximately 1 kg/cm^2 (14.2 psi).

Assembling

Observe the following:

1. Clean all parts with alcohol, blow out with compressed air, also blow out compensating holes.

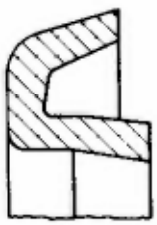
2. For assembly sequence refer to exploded view.

3. Push intermediate piston with a non-metallic object into housing until the hole for the hex. stop screw is freed and screw in stop screw together with new sealing ring.

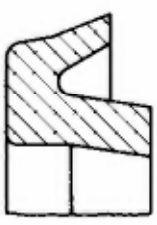
Note!
Check stop screw again for correct seat. The stop screw should be in front of the intermediate piston and the intermediate piston should move up to housing bottom.

4. When changing the sleeves, ensure correct positioning (refer to exploded view).

Section of primary sleeve



Section of separating sleeve



CHECKING DUAL CIRCUIT BRAKE SYSTEM WARNING DEVICE

General

Check the warning device whenever the hydraulic brake system is being repaired.

Checking

1. Turn on ignition. The hand brake warning light should go on (bulb function test).

2. Start engine.

3. Depress brake pedal down to pressure point.

4. A second mechanic can simulate the loss of one brake circuit by opening a bleeder on one of the wheel cylinders. The warning light should go on.

5. Close bleeder and release brake pedal. The light should go out.

6. Repeat operation on second brake circuit.

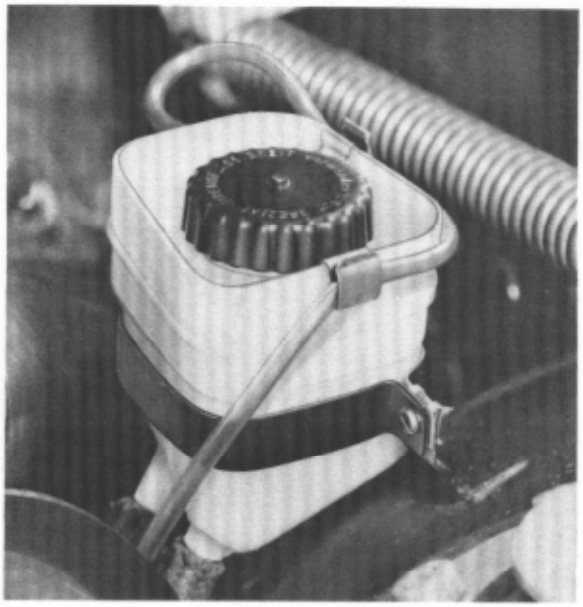
If no lamps are lighting up during one of the tests, check warning system in tandem brake master cylinder and repair, if required.

REMOVAL AND INSTALLATION OF BRAKE FLUID CONTAINER

Removal

1. Fold back front end cover and pull overflow hose from brake fluid container.

2. Suck brake fluid out of brake fluid container.



Caution!
Brake fluid is toxic. Due to its acid nature, brake fluid should not come into contact with paintwork.

3. Remove oval head sheet screws for holding strap and remove holding strap from brake fluid container.

4. Pull hose intermediate pieces from brake fluid container, making sure that the connecting lines to the tandem master brake cylinder are not pulled in upward direction.

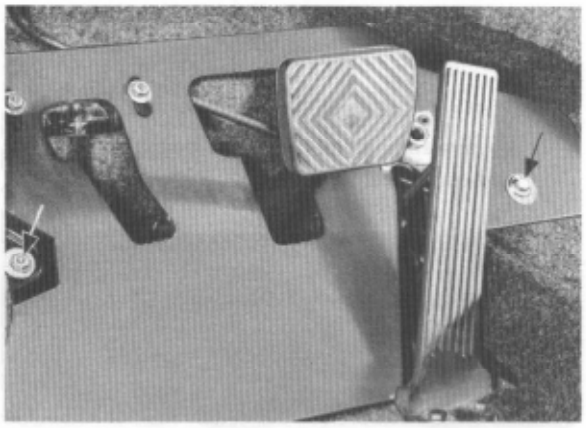
Installation

During installation, moisten connecting sockets of brake fluid reservoir with brake fluid to facilitate attachment of hose intermediate pieces.

REMOVAL AND INSTALLATION OF BRAKE LIGHT SWITCH

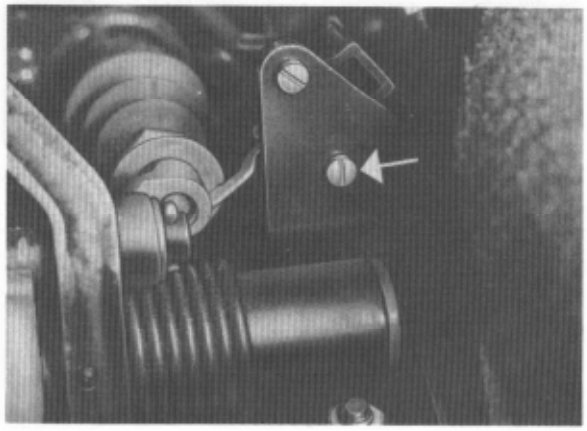
Removal

1. Take out floor covering (front left) and remove accelerator pedal out of push rod toward the rear.



2. Loosen hex. bolts for floor board attachment and remove floor board.

3. Loosen fastening screws for brake light switch, pull cable connections and remove switch.



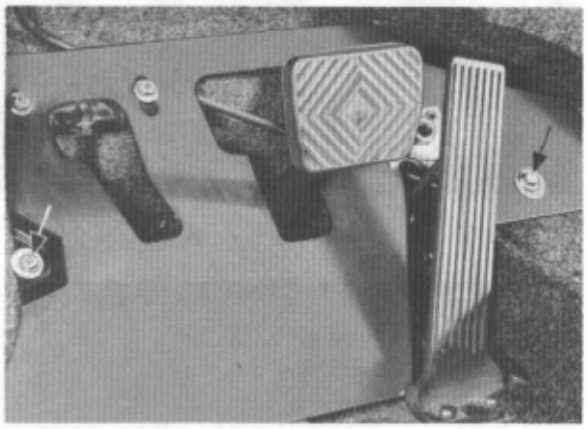
Installation

For installation proceed vice versa. Adjust brake light switch again, if required.

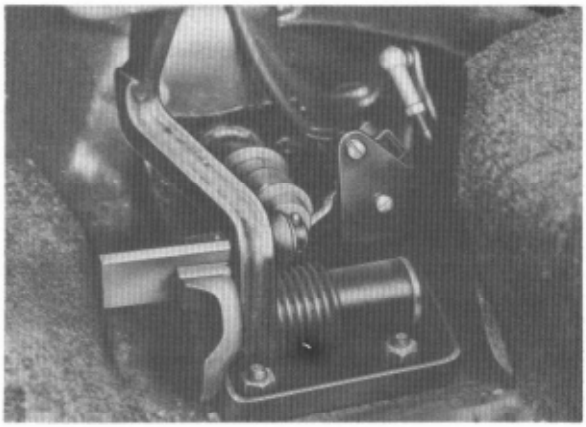
ADJUSTMENT OF BRAKE LIGHT SWITCH

1. Take out floor cover (front left) and remove accelerator pedal put of push rod toward the rear.

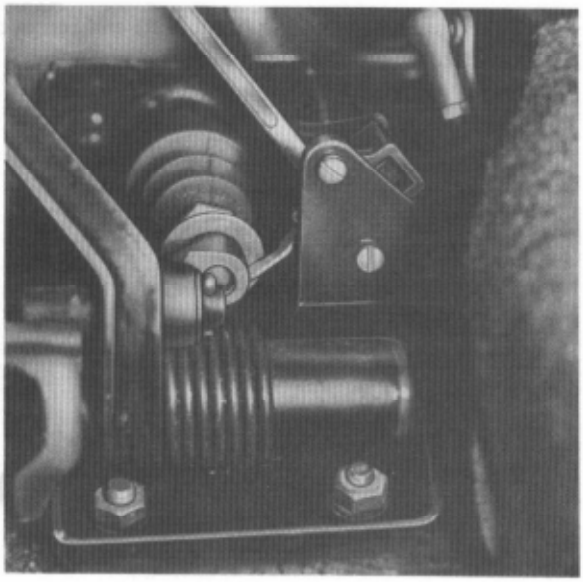
2. Loosen hex. screws for floor board attachment and remove floor board.



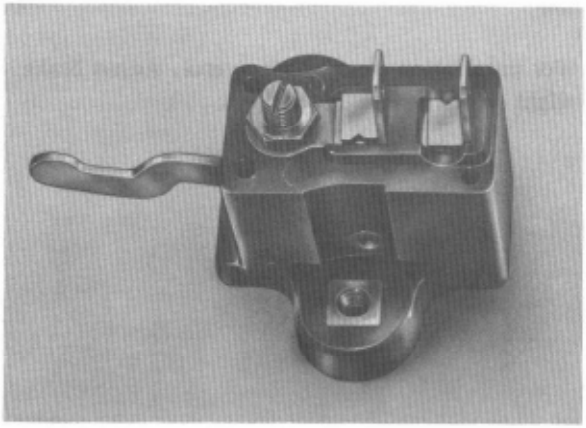
3. Clamp a piece of sheet metal 4 mm (0.16") thick between brake pedal and stop for brake pedal. (This corresponds with a travel of approx. 21 mm on brake pedal plate center).



4. Loosen counter nut of adjusting screw on brake light switch and turn adjusting screw so that the brake light will light up.



5. Tighten counter nut on adjusting screw and check brake light switch once again for function.



BRAKE HOSE INSTALLATION IN FRONT AXLE WITH STABILIZER

The brake hoses must hang low in vehicles equipped with the stabilizer to prevent their rubbing against the stabilizer lever.

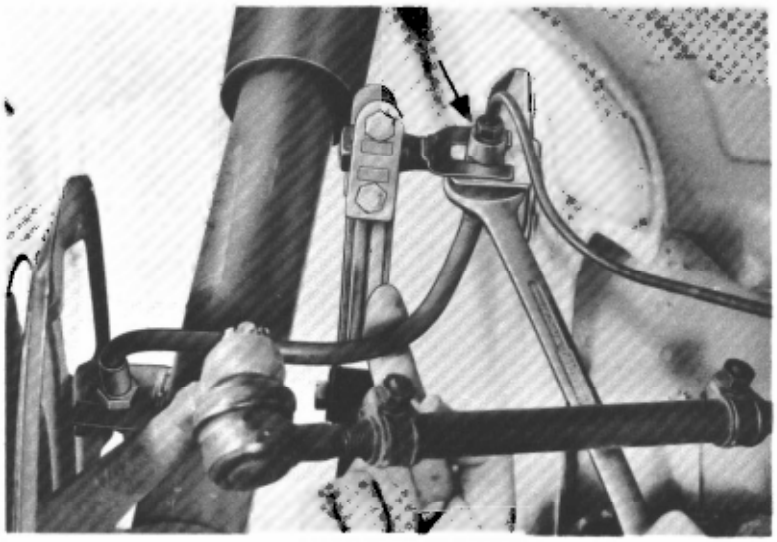
Assembly Instructions

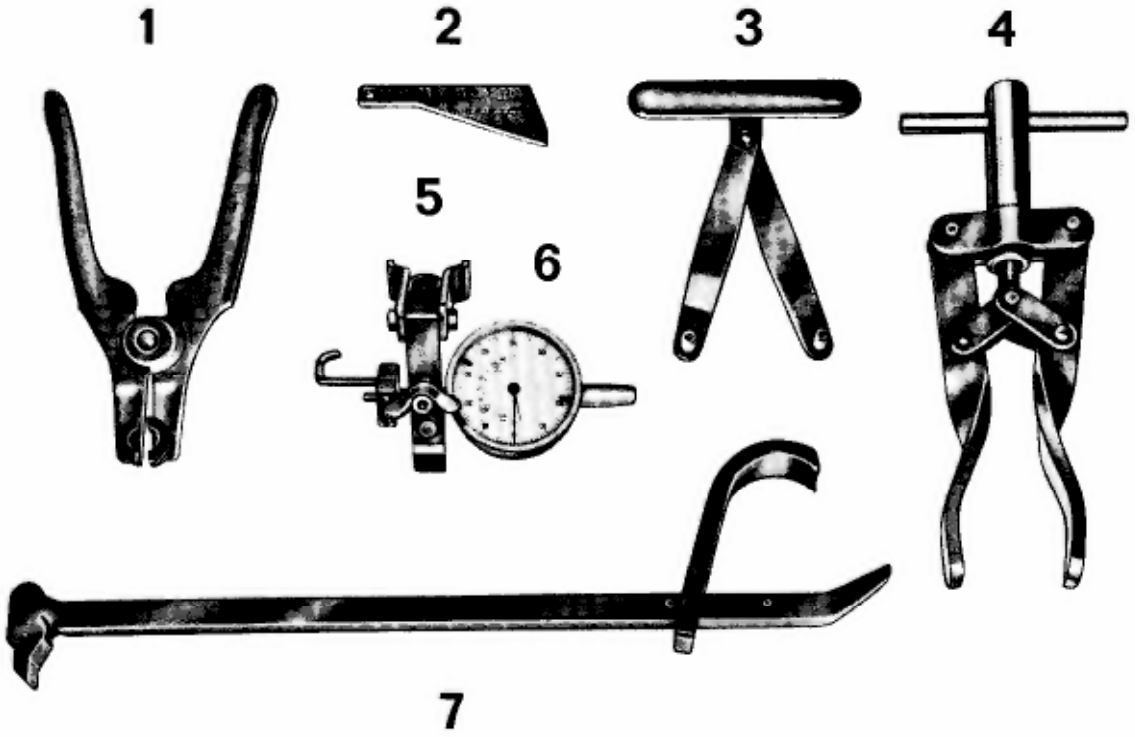
1. Screw brake hose into brake caliper connecting line and fasten to holder in shock absorber strut with the retaining spring clip.

2. Lead hose through the holder on the body side and loosely fasten to the brake master cylinder connecting line.

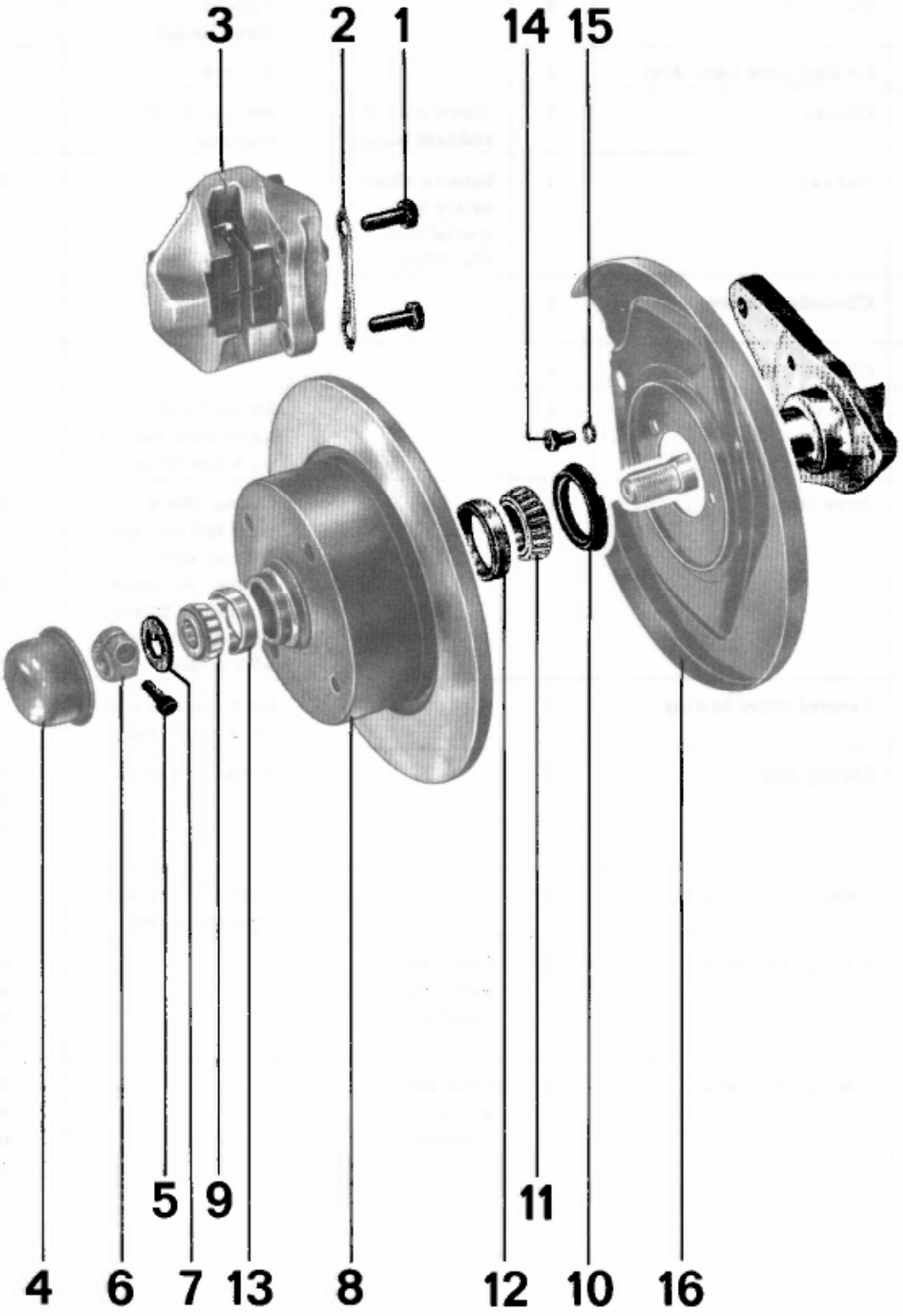
3. Pull hose by hand, downward, whereby the loose hose end will turn itself into the proper angular position. Install the retaining clip with the hose in this position. After this, tighten the threaded coupling without twisting the end piece (hold with wrench).

   (Suspension relaxed, vehicle on stands, and wheels in straight-ahead position).





No.	Description	Special Tool	Explanation
1	Piston rotating pliers		
2	Piston gauge	P 84	
3	Pulling hook	P 86	
4	Piston resetting device	P 83	
5	Measuring gauge	P 87	
6	Dial gauge		local purchase item
7	Hub cover puller	VW 637/2	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No.	Designation	Each	Observe during: Removal	Observe during: Installation	Special Instr.
1	Hex. bolt	2		Tighten to spec. torque	
2	Locking plate (only 914)	1		Replace	
3	Caliper	1	Check only at ambient temp.	and repair, if required	
4	Hub cap	1	Remove alternately with special tool VW 637/2		B-Group 4 2.1-2/1
5	Cheesehead screw	1		Tighten to spec. torque	
6	Clamping nut	1			
7	Nose washer	1		Should barely move when pushed w. screw driver	B-Group 4 2.1-2/1
8	Brake disk	1		Clean, check for wear and damage; fill hub with approx. 40 grams of lithium grease. Coat bearings will with grease.	B-Group 4 914/6 refer to 2.1-3/5
9	Tapered roller bearing	1		Clean, check and replace, if requ.	
10	Sealing ring	1		Replace, if requ.	B-Group-4 914/6 refer to 2.1-3/5
11	Tapered roller bearing	1		Clean, check and replace, if requ.	
12	Bearing outer race	1	Force out with copper mandrel		B-Group 4 914/6 refer to 2.1-3/3
13	Bearing outer race	1	Force out with copper mandrel		B-Group 4 914/6 refer to 2.1-3/3

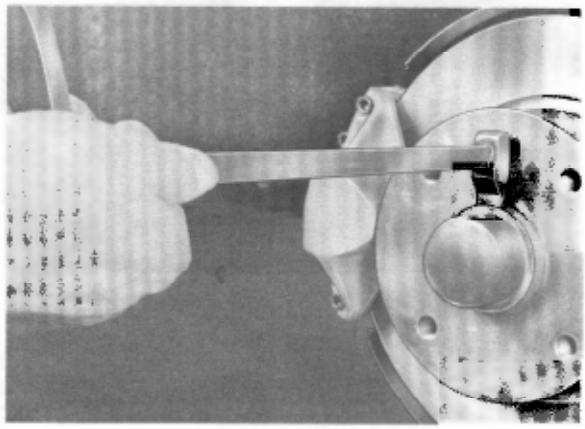
No.	Designation	Each	Observe during: Removal	Observe during: Installation	Special Instr.
14	Hex. bolt	3		Tighten to spec. torque	
15	Spring ring	3		Replace, if requ.	
16	Guard plate	1			

REMOVAL AND INSTALLATION OF FRONT BRAKE DISK

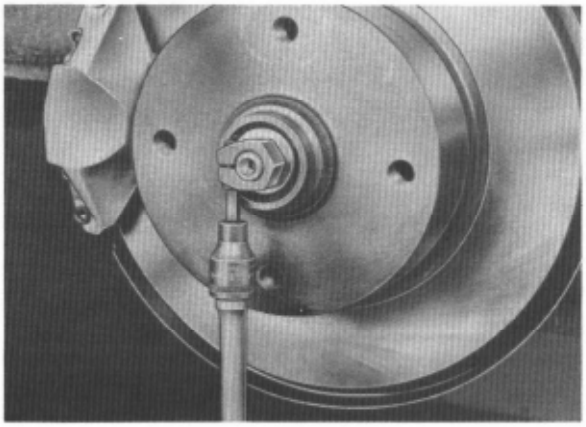
Removal

1. Unscrew brake line on ring fitting of caliper (push brake pedal with pedal arrester down first and lock, so that the brake fluid cannot flow out of brake fluid tank).

Caution!
Remove caliper only at ambient temperature.



2. Remove cap for front wheel hub alternately with VW 637/2.

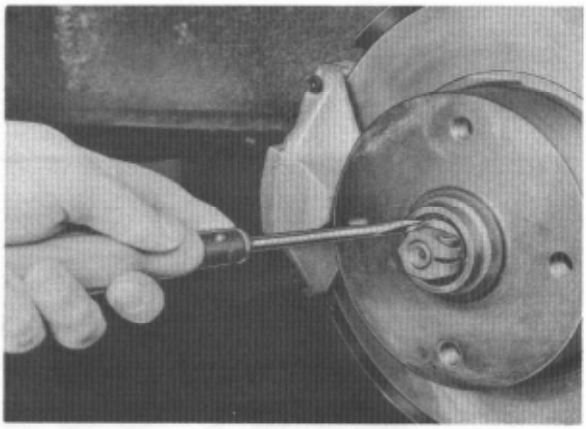


3. Loosen cheesehead screw for clamping nut, unscrew clamping nut and remove brake disk together with wheel bearing.
On vehicle type 914/6, mark brake disk and hub, loosen bolts on brake disk and remove hub.

Installation

1. Watch out for correct adjustment of wheel bearing.

   a. Tighten clamping nut slightly (approx. 1.5 mkp = 11 ft.lbs) while turning the wheel or hub, so that the taper rollers can rest well against bearing races.



   b. Loosen clamping nut until the nose washer can be just pushed along from the side with a screw driver and no noticeable bearing play is indicated during axial movements of the wheel hub.
   Caution!
   Do not support screw driver against hub but hold freely in hand.

   c. Tighten cheesehead screw of clamping nut to specified tightening torque. Check adjustment once again by moving nose washer and without turning clamping nut, and correct, if required.
   Caution!
   The slot width of the clamping nut should be 2.5 + 0.5 mm (.1 + .02"), so that perfect clamping is obtained even under unfavorable tolerance overlaps.

2. Tighten caliper bolt to specified torque. Use new lock washers (on vehicle type 914/6 use new spring washers).

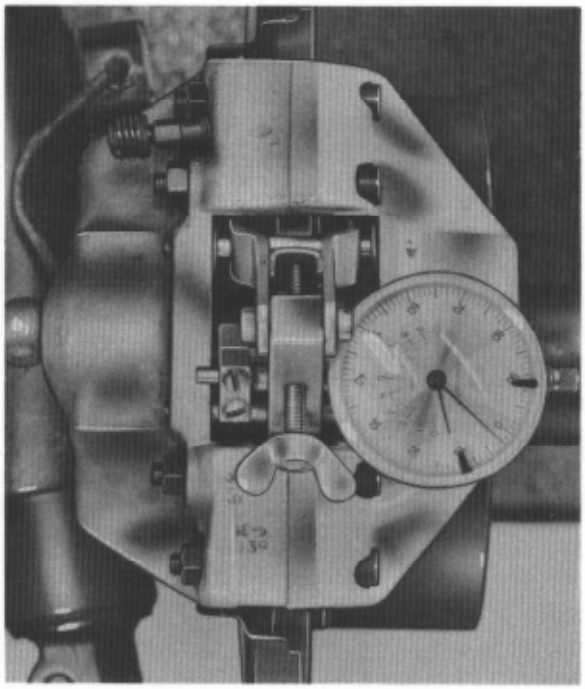
3. Bleed brake.

INSPECTION OF LATERAL WOBBLE

1. Remove brake lining.

2. Adjust front wheel bearing play as specified.

3. Fasten measuring tool P 87 with holding pins, align and tighten with wing screw. (Install measuring tool in such a manner that the wing screw points downwards).



4. Insert dial gauge and tighten with fastening screw.

5. Slide feeler pin on dial gauge and attach with some pretension. The feeler tip should make contact approx. 10 to 15 mm (.4 to .6") below brake disk OD.

6. In borderline cases, the lateral wobble must be measured on both brake surfaces, for which purpose the dial gauge must be displaced by 180°. The max. permissible lateral wobble is 0.2 mm (.008").

7. Brake disks with a higher lateral wobble must be replaced.

8. Install brake lining.

RECONDITIONING OF BRAKE DISCS

Check brake discs for wear whenever performing maintenance. Also replace worn or cracked brake discs or if their thickness is below 9,5 mm (.375 in.). Type 914/6 brake discs must be replaced when they reach 18.0 mm (.709 in. thickness).

Brake discs must not be machined thinner than 10.0 mm (.394 in.). The 914/6 brake discs should not be machined below 18.6 mm (.732 in.).

Note

Final reconditioning (grinding) must be made on both sides of the disc in order to prevent the brake disc from pulsating or squeaking.

The maximum permissible thickness tolerance of the brake disc in 0.02 mm (.0008 in.)

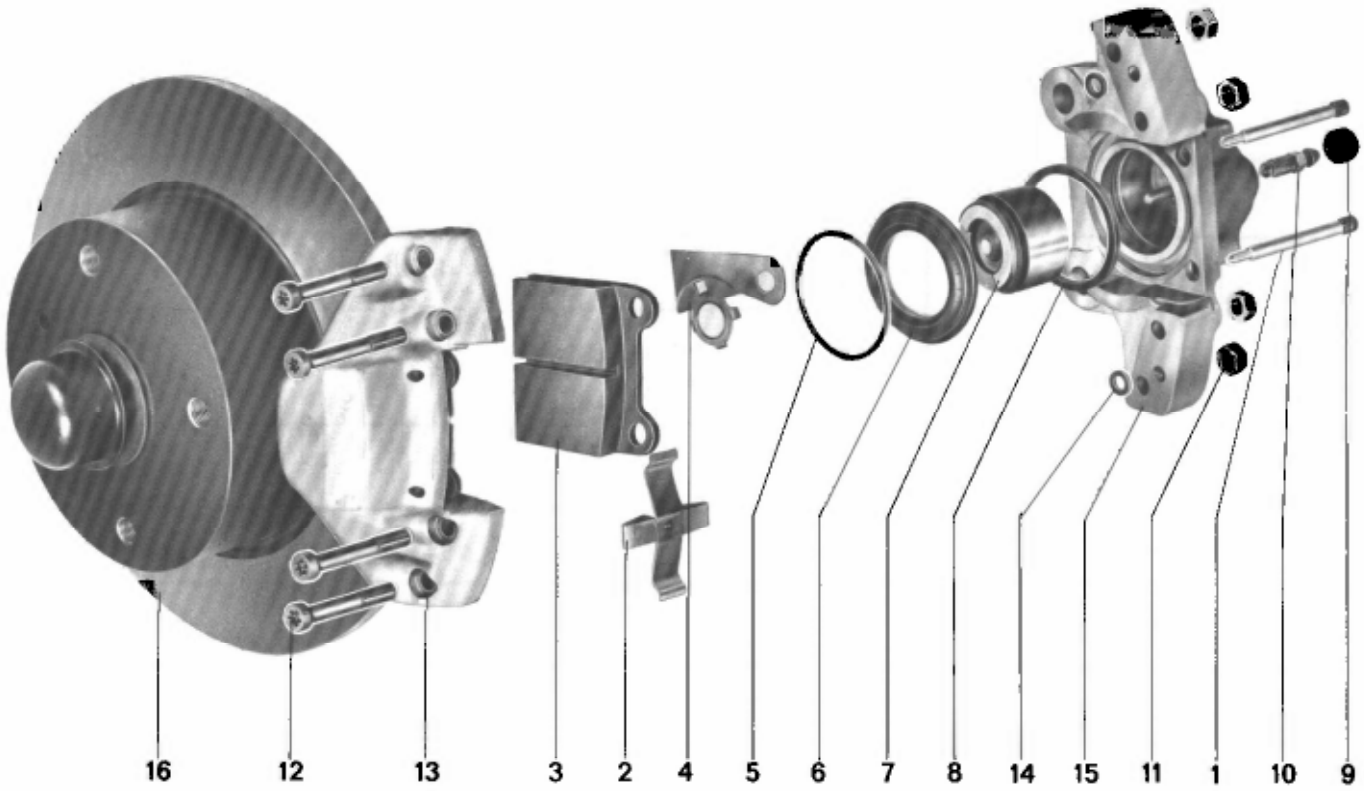
The thickness of the disc should not deviate more than 0.02 mm (.008 in.) when measured at several points.

Type 914 (Front brakes)

Brake disc thickness (new)	11.0 mm	+0.05 mm -0.15 mm	(.433 in.) (+.002 in.) (-.005 in.)
Minimum thickness of brake disc after refinishing		10.0 mm	(.394 in.)
Wear limit of brake disc (with symmetric wear)		9,5 mm	(.375 in.)
Thickness tolerance of brake disc	max.	0.02 mm	(.0008 in.)
Lateral wobble (deflection) of brake disc installed	max.	0.2 mm	(.008 in.)

Type 914/6 (Front brakes)

Brake disc thickness (new)	20.0-0.2	mm	(.787 - .008 in.)
Minimum thickness of brake disc after refinishing		18.6 mm	(.732 in.)
Wear limit of brake disc (with symmetric wear)		18.0 mm	(.709 in.)
Thickness tolerance of brake disc	max.	0.02 mm	(.0008 in.)
Lateral wobble (deflection) or brake disc installed	max.	0.2 mm	(.008 in.)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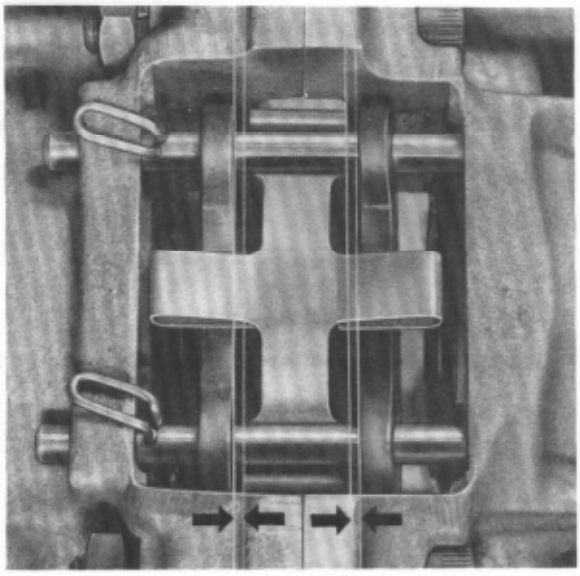
No.	Description	Qty.	Note when Removing	Note when Installing	Special Instr.
1	Friction pad retaining pin	2		Replace if necessary	
2	Spreader spring	1			
3	Brake friction pad	2	Pull out with special tool P86	Replace at a final thickness of 2 mm (.079 in.)	
4	Piston retaining plate	2			
5	Clamp ring	2			
6	Seal	2		Replace if necessary	
7	Piston	2	Blow out with compressed air	Do not tilt piston	
8	Rubber seal	2		Replace	
9	Dust cap	1			
10	Bleeder valve	1			
11	Hexagon nut	4			
12	Fillister head bolt	4			
13	Cover housing	1		Cannot be replaced separately, (replace complete caliper only)	
14	Seal	2		Replace	
15	Flange housing	1		Cannot be replaced separately, (replace complete caliper only)	
16	Brake disc	1			

INSPECTION OF BRAKE LINING

Replace brake lining at the latest when the remaining thickness is two mm.

Caution!
Always change the four brake linings of one axle simultaneously. Replacing only one lining or the two linings of one wheel is not permitted.
In addition, also replace the speading springs of both calipers when changing brake linings.



CHECKING THE VENTING CLEARANCE

If the pedal travel is too long though the brake is correctly adjusted and bled, the fault is often excessive venting clearance of the front brake linings. The venting clearance is measured with a feeler gauge between the brake lining and the brake disk and should be approx. 0.05 - 0.20 mm (.002 - .008").

A venting play in excess of 0.20 mm is generally the result of the stationary rubber ring "glueing" to the piston. When the lining wears down, the piston will no longer slip through the rubber ring and will tighten it more than specified. After the braking operation, the piston is then pulled back to far.

This glueing may occur above all after long parking periods of a vehicle.

Remedies

1. Remove one brake lining and slide a wooden board into shaft which is at least 6 mm (.2") thick.
2. Step energetically on brake pedal to release piston and make it run smoothly.
3. Push piston back with piston resetting pliers.

4. Repeat several times and reinstall brake lining.

Proceed likewise with other pistons.

If this is unsuccessful, remove caliper and recondition, including replacement of the stationary rubber ring.

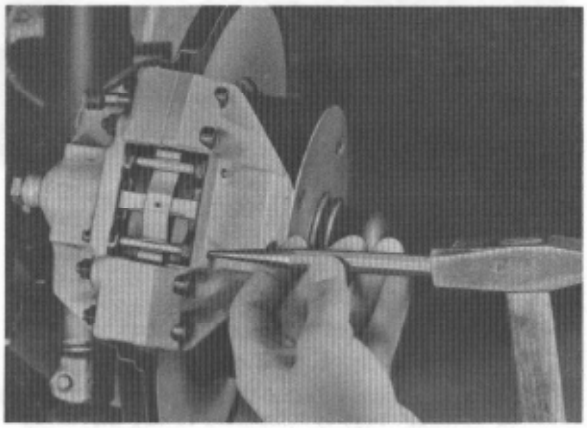
Caution!

When the piston is set back, brake fluid will be forced back out of the caliper into the refilling tank, resulting in overflow; for this reason, suck some brake fluid out of the refilling tank prior to starting the work and fill up again when finished.

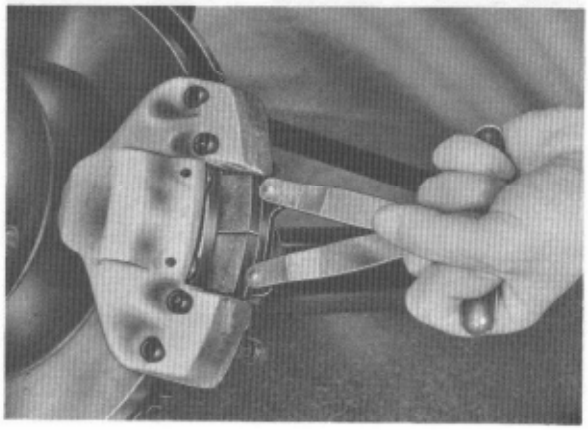
REMOVAL AND INSTALLATION OF FRONT BRAKE LININGS

Removal

1. Knock out holding pins for brake linings with a punch toward vehicle center. On vehicle type 914/6, pull out locking eyes first.



2. Pull brake linings out of caliper with pulling hook P 86. Do not push holding bolt of pulling hook on brake lining too far inwards, since the hook might be caught on the piston anti-rotation lock and the brake lining can no longer be pulled out (Type 914/6 is without such a piston anti-rotation lock).

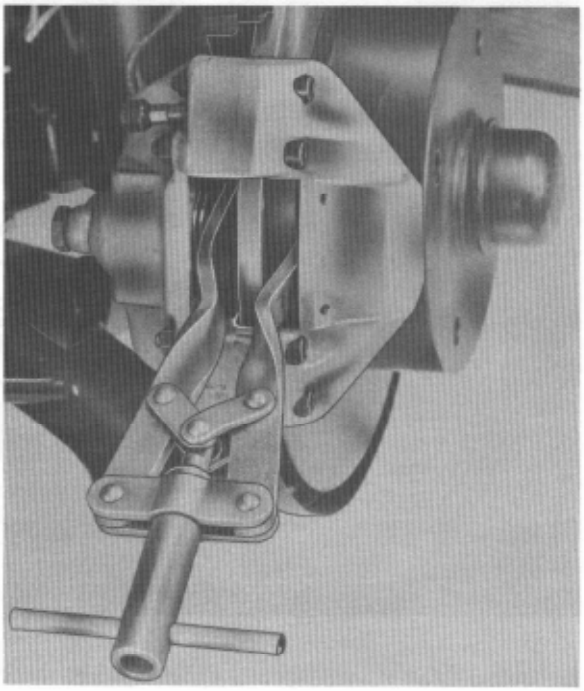


Caution!
If the brake linings are to be used again, they must be marked after removal in relation to the housing halves. Exchanging the linings from the outside to the inside and vice versa or from the righthand to the lefthand wheel is not permitted and may result in non-uniform braking.

Installation

1. Replace oily brake linings or linings which are showing deep cracks or have become loose from lining plate.
In such a case, also replace all the our linings against new ones.

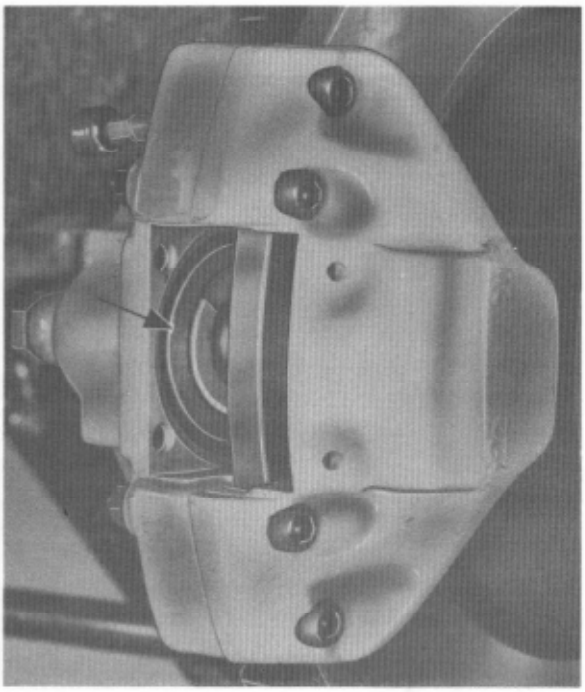
2. Push both pistons back to their basic position with piston resetting tool P 83.



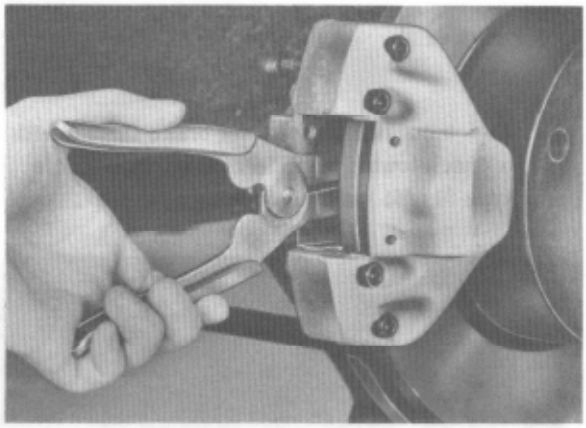
Caution!
This will force the brake fluid in the cylinder behind the piston back into the brake fluid container. As a protection against overflow in the brake fluid container, suck some fluid out of container prior to pushing piston back, if required. Use a siphon which will only come into contact with brake fluid.
Brake fluid is toxic and should never be sucked off with a hose.

3. Clean seat and guide surfaces of brake linings in caliper, which requires removal of piston anti-rotation locks.
Caution!
For cleaning, use only spirit of alcohol - never mineral oil-containing solvents. Sharp-edged tools are also not permissible.
Then blow out caliper with compressed air.

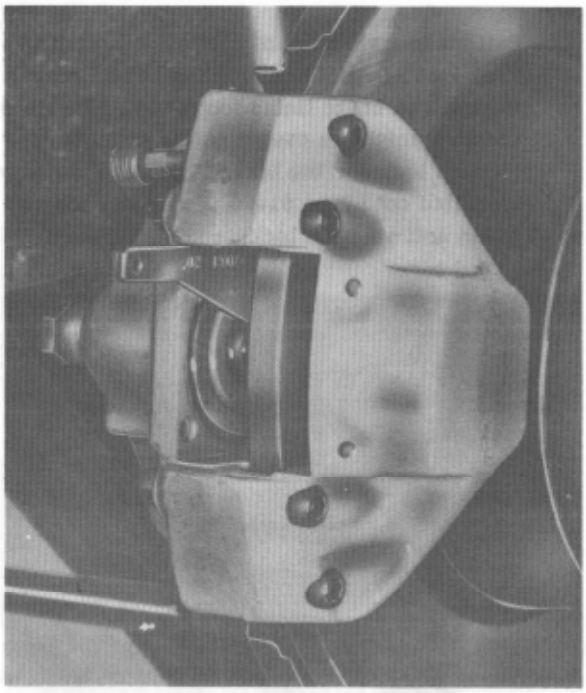
4. Check protective cap (arrow) for damage.
Hardened, brittle or torn protective caps must be replaced.



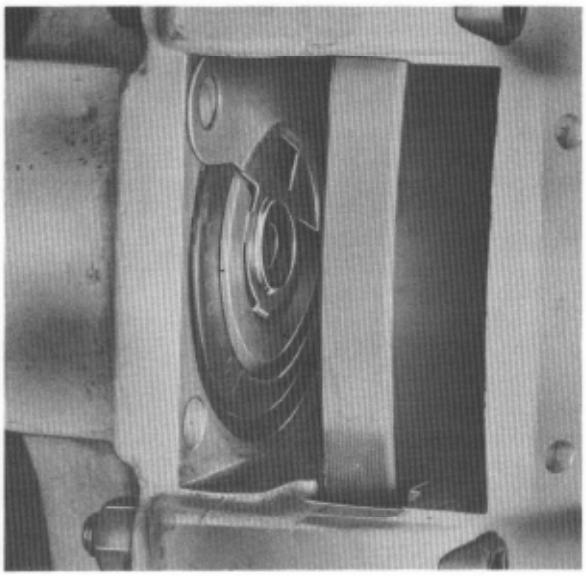
5. Correct position of piston with piston rotating pliers, if required.



6. Accurately check position of piston with piston gauge P 84. The piston gauge should always be held against the upper guide surface in caliper, that is, opposite to the direction of rotation of the brake disk when driving forward.



7. Install piston anti-rotation lock in correct position.
The ring-shaped portion of the anti-rotation lock (arrow a) should be pushed down well into piston head. In addition, the anti-rotation lock should be under the piston recess (arrow b). A perfect seat of the piston anti-rotation lock therefore also guarantees the specified 20° position or the piston.



Corroded or damaged piston anti-rotation locks must be replaced.

8. Check brake disk for wear.

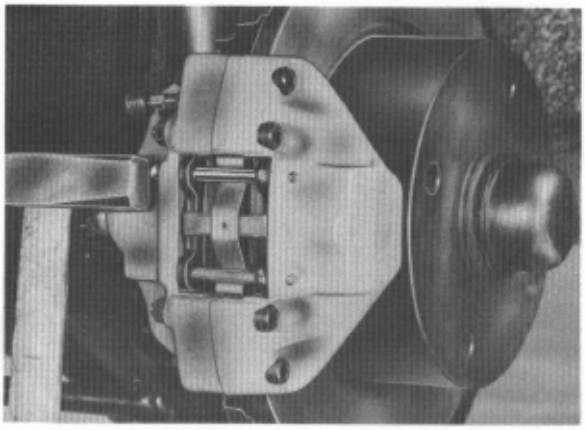
9. Insert brake lining into caliper.

Caution!
Install used linings in accordance with their marks on housing halves.

10. Insert new spreading spring for brake lining in correct position.

11. Install holding pins for brake lining in caliper.

Caution!
Never knock holding pin in with a punch that is smaller in diameter than the holding pin, since this may cause the front collar to be cut off by the clamping sleeve.
The holding pins should always be knocked in with a hammer, that is, without an additional tool.



Corroded or damaged holding pins must be replaced.

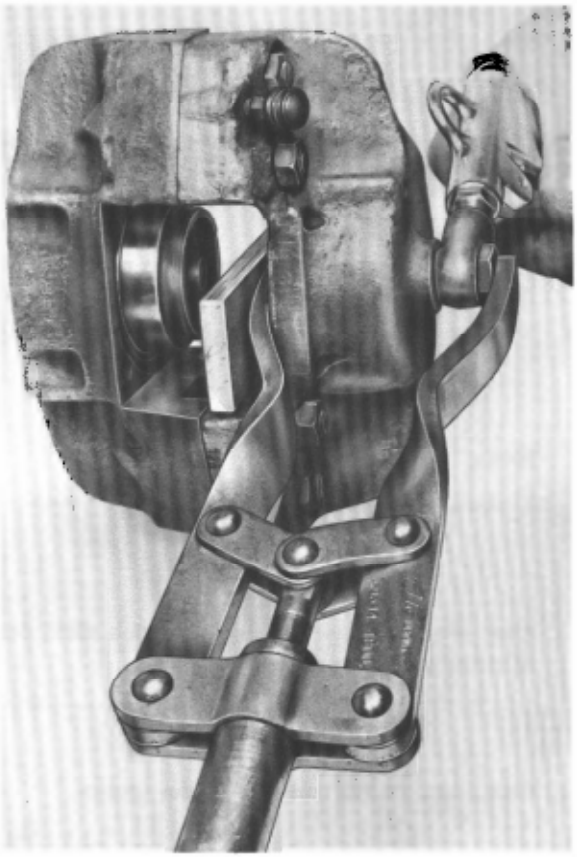
Caution!

12. Step several times energetically on brake pedal with the vehicle stopped, so that the pistons and the brake linings will take their proper seat for correct operation. Then check level of brake fluid in brake fluid container and replenish, if required.

Running-in of Brake Linings

Brake linings straight from the factory are showing a one-time reduction of their braking effect (heat fading), which will disappear after a running-in period of approx. 200 km (120 miles). During this time the brakes should be used for braking from high speed only in emergencies. New Linings must be run in at medium pedal pressures and in larger intervals. The full braking power of the linings will become effective following this running-in period.

RECONDITIONING BRAKE CALIPER



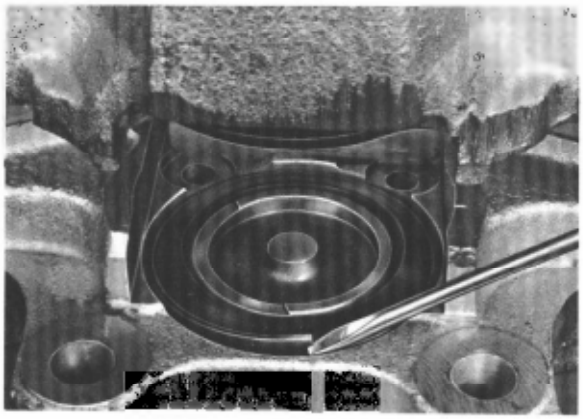
Disassembling

1. Remove caliper from vehicle.

2. Loosen bleeder valve and blow brake fluid carefully out of caliper. Use approximately 1 kg/cm^2 (14.2 psi) air pressure.

3. Clamp caliper with flange into vise. Use soft vise jaws.

4. Remove piston retaining plate, clamping ring and protective cap (type 914/6 without piston retaining plate).



Note
The cylinders can only be repaired one at a time, since no pressure can be built up in the caliper when one piston has been removed.

5. Push one piston out of caliper with compressed air, start with approximately 2 kg/cm^2 (28.4 psi) and increase if necessary. Hold piston in position with piston resetting fixture P 83. In addition, a hardwood or rubber block about 5 to 10 mm (.20 in. to .40 in.) thick must be inserted into the housing grooves so that the piston is not damaged.

6. Remove rubber seal using a plastic or hard rubber rod so that the seal ring groove is not damaged.

Assembling

1. Clean all parts only with alcohol or brake fluid.

2. Check parts for wear and replace as necessary. If a cylinder is damaged, the entire caliper must be replaced.

Note

Replace seals when repairing caliper.

3. Coat piston and new rubber seal with a thin coat of brake cylinder paste.

4. Install new rubber seal in cylinder groove.

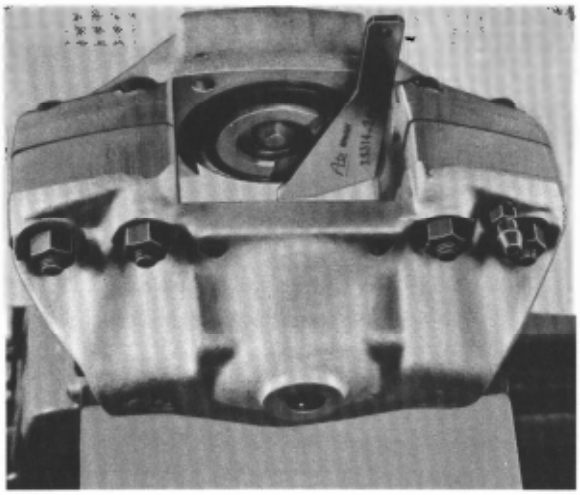
5. Insert piston into correct position using piston gauge P 84 and push into cylinder with piston resetting fixture P 83 if necessary.

Note

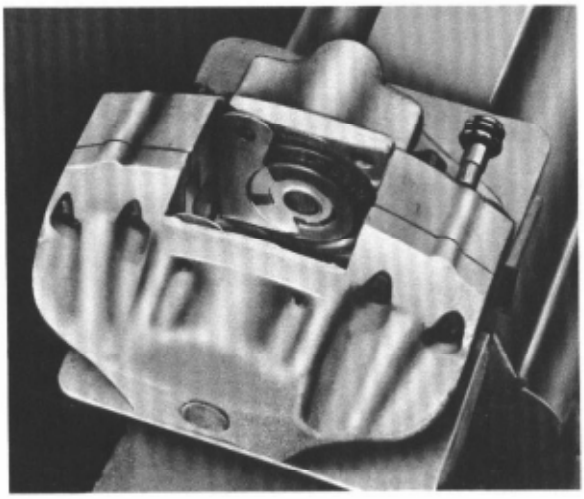
Do not cant piston, always use piston retaining tool.

6. Install new seal and clamp ring.

7. Check 20° position of piston with piston gauge P 84, correct with piston rotating pliers if necessary.



8. Insert piston retaining plate in correct position (Type 914/6 without piston retaining plate).



9. Push second piston out of caliper and repeat the respective steps in sequence.

RECONDITIONING BRAKE CALIPER HOUSING

The brake caliper may be disassembled only if the joint between the two housings becomes leaky and the fluid channel O-rings have to the replaced.

Disassembling

1. Remove the four fillister head caliper housing bolts.

2. Remove cover housing (on Type 914/6 the vented brake disc requires an intermediate plate between the two caliper housing halves).

Assembling

Note the following:

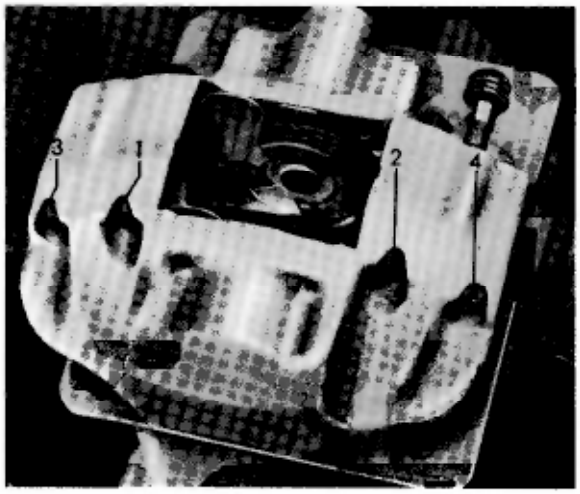
1. Install two new fluid channel O-rings.

2. Use new nuts and bolts.

   Note
   Observe differing bolt lengths. The shorter bolts are on the outside.

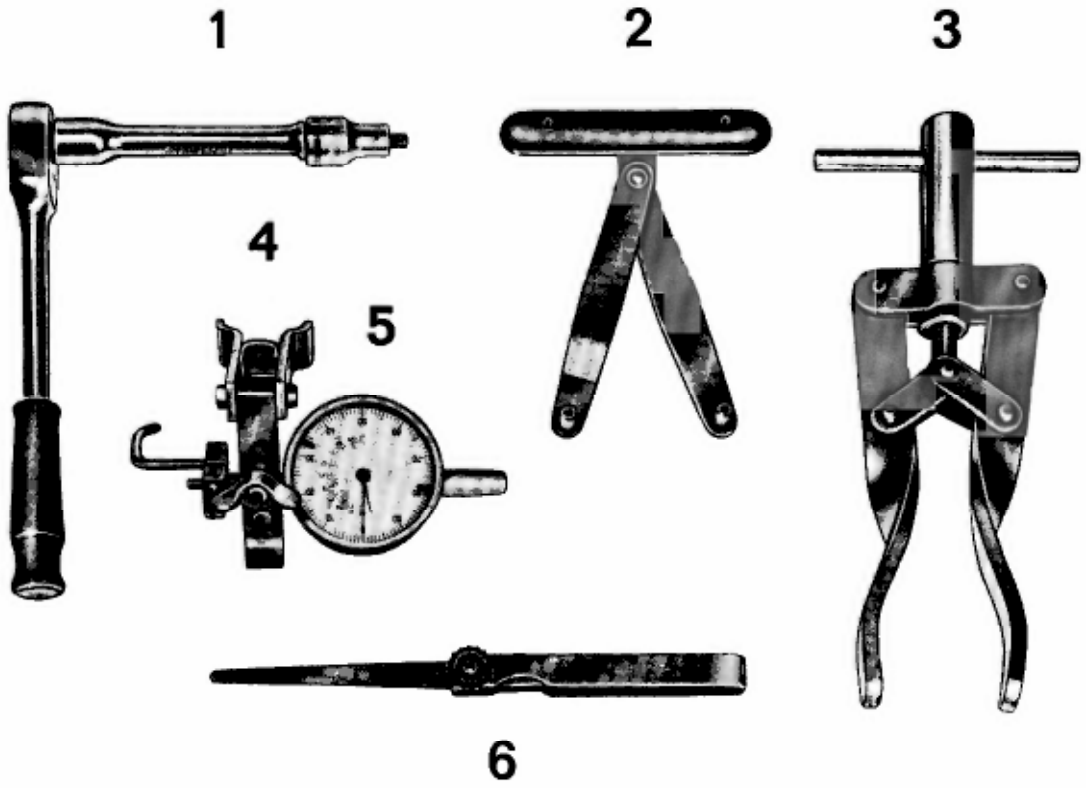
3. Align housing halves with each other.

4. Tighten bolts in specified sequence to 1 mkp (7.2 ft/lb) first.

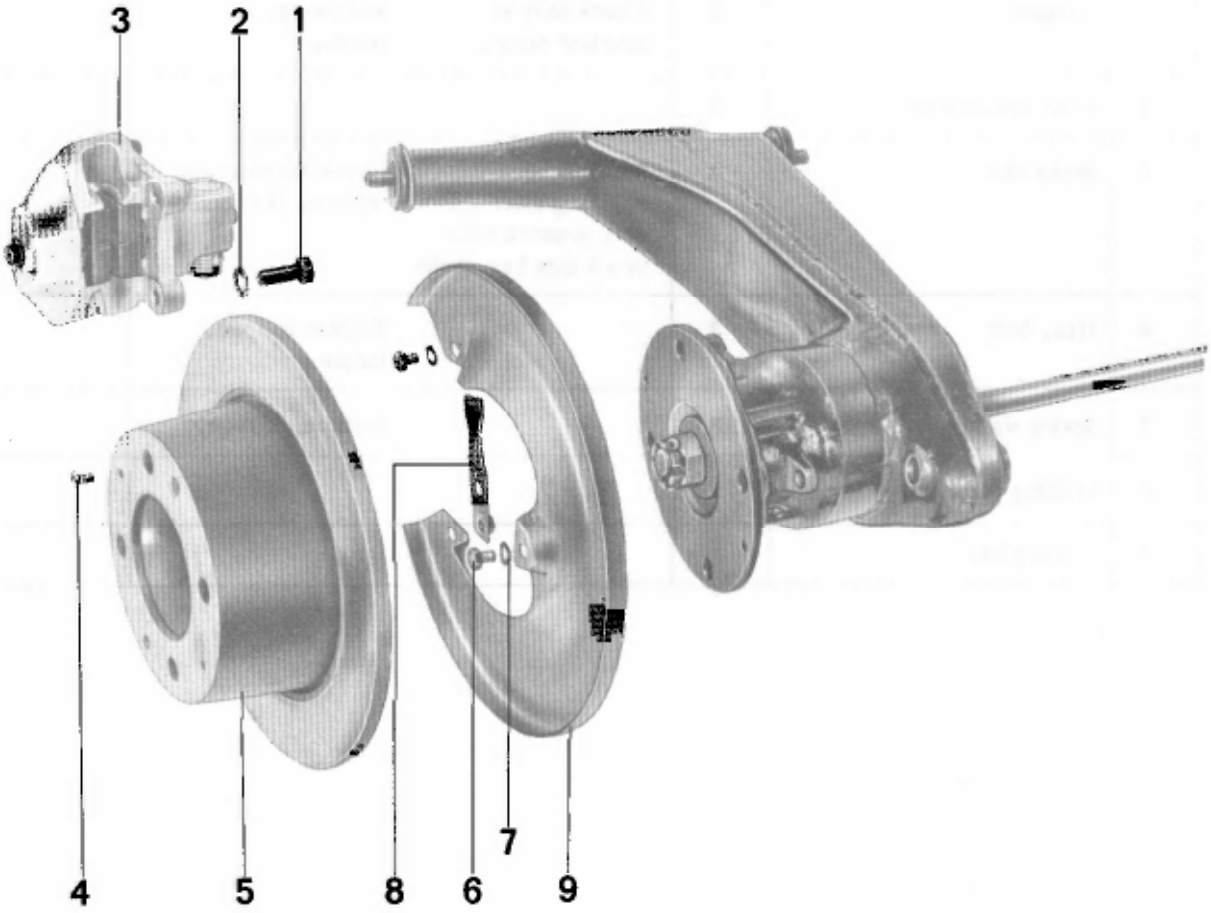


5. Check the position of the housing halves to each other once again.

6. Tighten bolts in same sequence to the specified torque.



No.	Description	Special Tool	Explanation
1	Ratchet, 3/8" extension and 4 mm hex. socket		local purchase item
2	Extractor	P 86	
3	Piston retaining tool	P 83	
4	Measuring device	P 87	
5	Dial indicator		local purchase item
6	Feeler gauge		local purchase item


3
2
1
4
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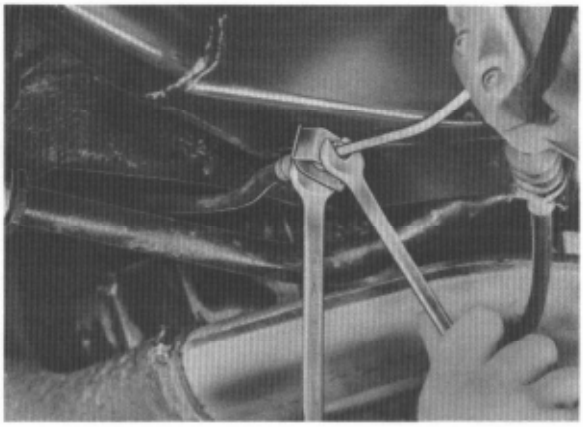
9

No.	Designation	Each	Observe during: Removal	Installation	Spec. Instr.
1	Hex. bolt	2		Tighten to spec. torque	
2	Spring washer	2		Replace, if requ.	
3	Caliper	1	Check only at ambient temp.	and repair, if required	
4	Countersunk screw	2			
5	Brake disk	1	Press off by applying alternate pressure with two 8 mm hex. bolts	Check for wear and replace, if requ.	
6	Hex. bolt	3		Tighten to spec. torque	
7	Spring washer	3		Replace, if requ.	
8	Holding plate	1			
9	Cover plate	1			

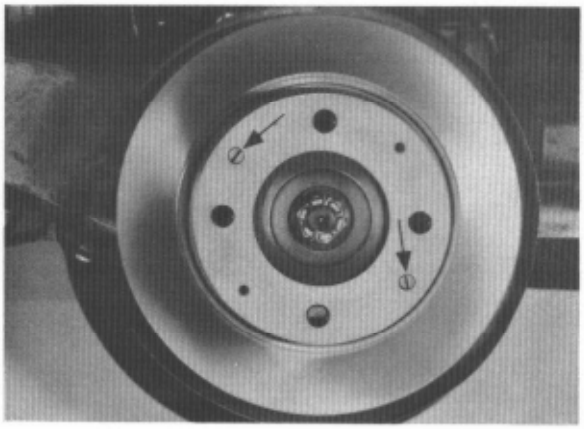
REMOVAL AND INSTALLATION OF REAR BRAKE DISK

Removal



1. Unscrew brake line on brake hose of rear axle control arm. (First push brake pedal down slightly with pedal arrester and lock, so that the brake fluid cannot escape out of brake fluid container.)

2. Loosen countersunk screws on brake disk and remove brake disk.



Caution!
If brake disk is stuck, press off uniformly by means of two M 8 bolts of pertinent length.

Installation

1. Clean all parts from contaminations.

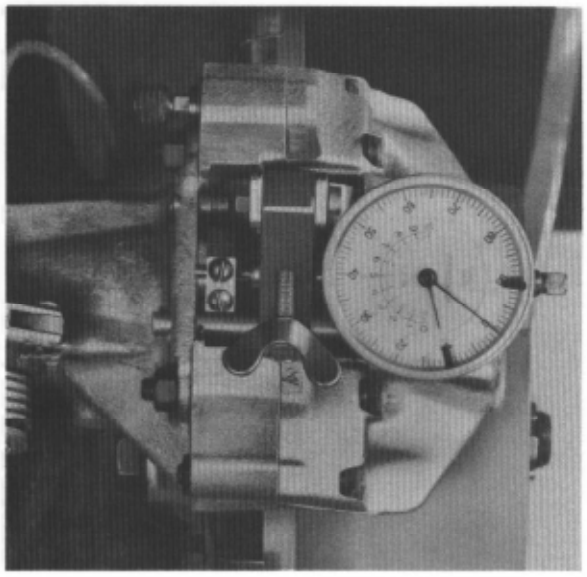
2. Replace worn parts.

3. Tighten caliper to specified torque.

4. Bleed brakes.

INSPECTION OF LATERAL WOBBLE

1. Attach measuring device, as described under "Inspection of Front Axle Brake Disk Lateral Wobble".



2. Pull brake disk toward hub by means of wheel studs (on Type 914/6 wheel nuts). To eliminate distortion of the disk, place flat steel washers under wheel studs or wheel nuts. Tighten wheel studs or wheel nuts to specified torques.
   The max. permissible lateral wobble is 0.2 mm (.008").

3. Replace brake disks, if lateral wobble is higher.

RECONDITIONING OF BRAKE DISC

The wear test of the rear brake discs and the reconditioning jobs (refinishing) are the same as for the front brake discs.

Type 914

Brake disc thickness (new)		9.5-0.2 mm	(.374-.008 in.)
Minimum thickness of brake disc after refinishing		8,9 mm	(.351 in.)
Wear limit of brake disc (with symmetric wear)		8.5 mm	(.335 in.)
Thickness tolerance of brake disc	max.	0.02 mm	(.0008 in.)
Lateral wobble (deflection) of brake disc installed	max.	0.2 mm	(.008 in.)

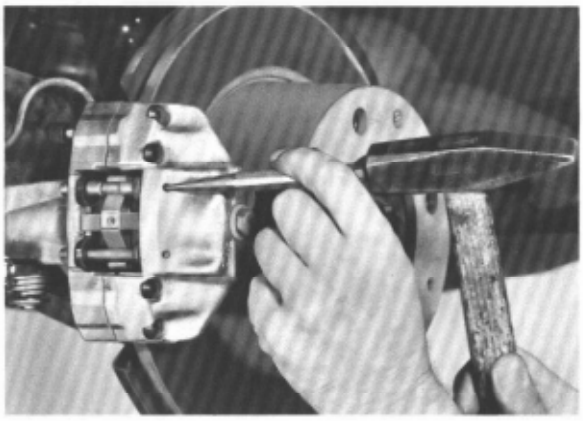
Type 914/6

Brake disc thickness (new)		10.5-0.2 mm	(.413 - .088 in.)
Minimum thickness of brake disc after refinishing		9.5 mm	(.374 in.)
Wear limit of brake disc (with symmetric wear)		9.0 mm	(.354 in.)
Thickness tolerance of brake disc	max.	0.02 mm	(.0008 in.)
Lateral wobble (deflection) of brake disc installed	max.	0.2 mm	(.008 in.)

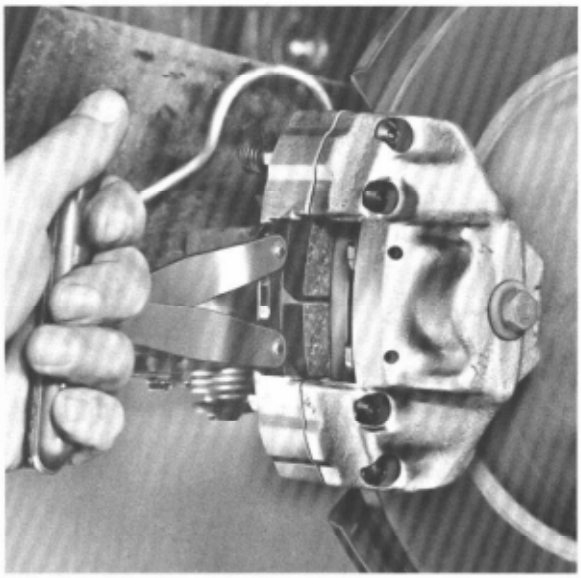
REMOVING AND INSTALLING REAR BRAKE FRICTION

Removing

1. Pull out clips and drive out friction pad retaining pins toward vehicle center using a punch.



2. Pull friction pads out of caliper with extractor P 86.



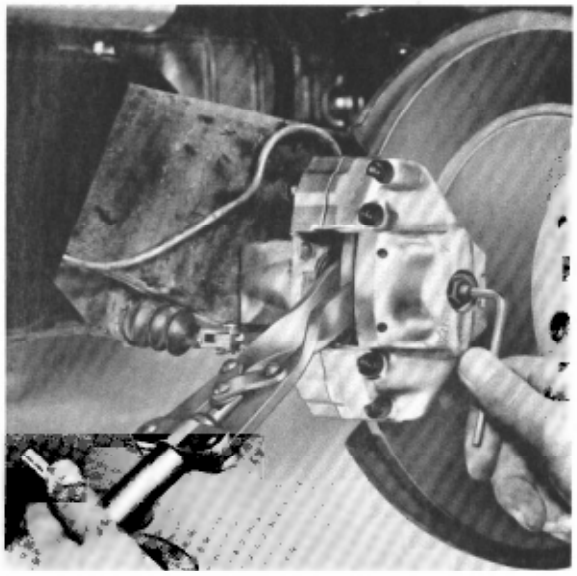
Note!
If the friction pads are to be reused, they must be marked to match their respective housing halves. Friction pads must not be interchanged, i.e. from outside to inside or vice versa or from one wheel to another as this can cause uneven braking.

Installing

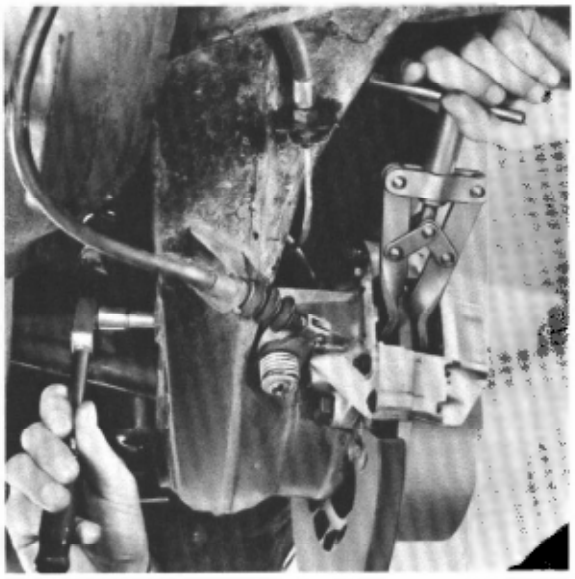
Note
Oily or cracked friction pads or pads which have become loose on the metal plate must be replaced. Here too, all four rear linings must be replaced.

1. Place piston retaining tool P 83 in between pistons and lightly preload pistons.

2. Remove closing screw on cover housing of caliper, loosen lock nut and set piston back by turning the spindle clockwise with hex. pin spanner 4 mm, maintaining preload on resetting pliers.



a. Remove closing screw on flange end of caliper by using a 3/8" in. extension with a 4 mm hex. socket through bore of rear axle arm. By turning the adjusting screw counter clockwise, set piston back while maintaining preload of the retaining tool.

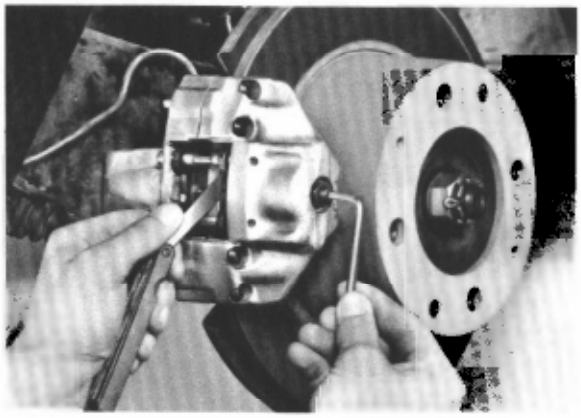


Note:
On vehicle Type 914/6 the telescoping shock absorber at the right must be removed.
By raising the rear axle arm, accurate adjustment can be made.

3. Insert brake friction pads into caliper.

Note
Install used friction pads into housing halves according to their markings from removal.

4. Position friction pads with retaining pins without expanding spring and set for 0.2 mm (.079 in.) clearance on both sides of brake disc.



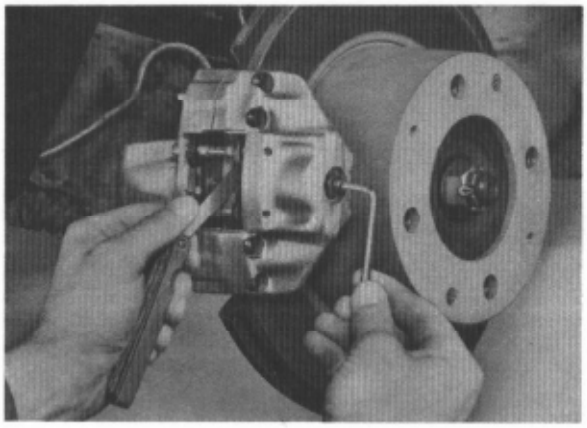
5. Remove retaining pins again and reinstall with expanding spring and secure.

Note
Do not disassemble rear caliper, since disassembly of the piston may damage the automatic adjusting fixture.

ADJUSTMENT OF VENTING CLEARANCE

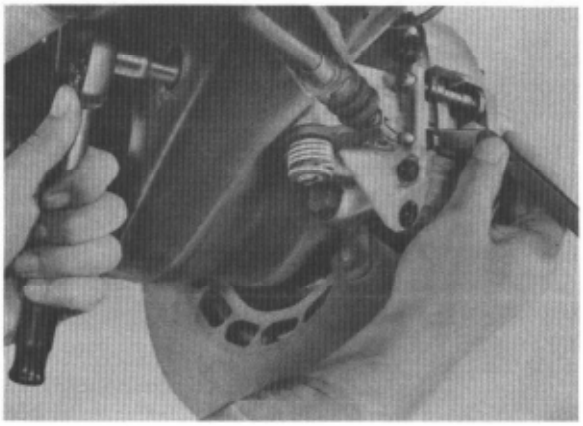
For better adjustment of venting clearance, remove spreading spring and locate brake linings with holding pins. In addition, the brake disk wobble should not exceed 0.2 mm (.008").

1. Remove closing screw on cover housing of caliper, loosen counter nut and adjust venting play between brake disk and brake lining by means of a 0.2 mm feeler gauge by rotating spindle with hex. pin spanner SW 4.



2. Tighten counter nut.

3. Remove closing screw on flange end of caliper. This requires a 3/8" extension with a pertinent 4 mm (.16") hexagon socket spanner, which is introduced through the bore of the rear axle control arm. Adjust venting clearance as described under Item 1 by rotating resetting shaft with 4 mm hex. socket spanner.



4. Actuate hand brake once and check venting clearance, readjust, if required.

5. Mount closing screw.

Caution!
When new calipers are installed, the venting clearance also requires adjustment, since the calipers are supplied with a larger adjusting dimension due to the permitted adjusting limits.
Do not actuate caliper until venting clearance has been set.

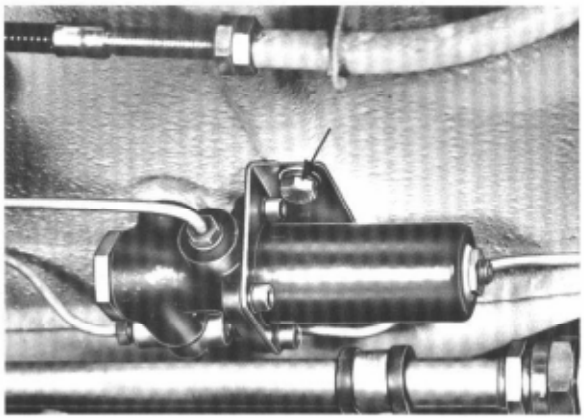
REMOVING AND INSTALLING BRAKE PRESSURE REGULATOR

Removing

1. Depress brake pedal slightly with pedal retainer and lock, so that the brake fluid will not run out when the brake lines are disconnected.

2. Remove brake lines at brake pressure regulator.

3. Remove bolts on flange of regulator and remove regulator.



Checking and Adjusting

To determine whether or not the brake pressure regulator is operating, one mechanic must step down hard on the brake pedal while another mechanic places his hand on the valve to feel if the piston in the regulator is moving. (When the brake pedal is released, a slight knock should be felt on the regulator.)

An accurate pressure check and adjustment of the regulator required two high-pressure gauges with hoses and connections.

Check the following items in the sequence shown:

1. Remove bleeder valve on left front caliper and install connector (M 7 thread).

2. Install a similar connection (M 6 threads) on left rear caliper, remove the caps from the hose connections and connect both hoses.

3. Bleed both hoses and pressure gauges via the bleeder valves of the pressure gauges.

4. Apply the brake pedal several times with force so that a pressure of at least 100 kg/cm^2 (1420 psi) is attained in the front brake circuit.

Installing

Note the following:

Bleed brake system and check operation of brake pressure regulator.

5. Then apply load to brake pedal until the pressure gauge of the front brake circuit shows a pressure of 65 kg/cm^2 (924 psi). At this pressure the second pressure gauge in the rear brake circuit should indicate 55.8 kg/cm^2 ± 2 kg/cm2 (795 psi ± 28 psi).

   (On Type 914/6 at a pressure of 50 kg/cm^2 (711 psi) in the front brake circuit, the pressure in the rear brake circuit should be 43 kg/cm^2 ± 2 kg/cm^2 (612 psi ± 14 psi).

6. The same measurements must be made at a pressure of 100 kg/cm^2 (1420 psi) in the front brake circuit. Here the pressure in the rear brake circuit should be 72 kg/cm^2 ± 3 kg/cm^2 (1024 ± 42 psi). (On vehicle Type 914/6 for the same test and at 100 kg/cm^2 in the front brake circuit, the pressure in the rear brake circuit should be 66 kg/cm^2 ± 3 kg/cm^2 (939 psi ± 42 psi). If the specified pressures in the rear brake circuit are not attained or are exceeded, the preload of the spring should be changed by turning the adjusting screw until the required pressure is attained. By turning in, the pressure increases in rear axle circuit; by turning out, the pressure decreases.

   If the specified test pressure is not attained even after making adjustments, the brake pressure regulator must be replaced.

7. Seal adjusting screw and nut with D 14 sealing compound after tightening lock nut.

8. Bleed the brake system, if necessary.

   Note:
   Do not disassemble the 914 or 914/6 brake pressure regulators since they can only be replaced as a unit.

Symptom	Cause	Remedy
1. Rear brakes apply with too much force	a. Changover point too high	Adjust regulator
	b. Piston is corroded and does not move (valve cannot close)	Replace regulator
2. Regulator cannot be adjusted to maintain the permissible tolerances during both pressure tests	Sealing ring leaks	Replace regulator
3. No "knock" is felt during operation check of regulator	Piston is corroded and does not move	Replace regulator

Standard wheels and tires for vehicles Type 914 and 914/6.

Type	Standard Rims	Tires	Optional Equipment	
			Authorized Rims	Tires
914/4	Perforated disc 4 1/2 J x 15 (enameled steel)	155 SR 15	4 1/2 J x 15	165 SR 15 *
			5 1/2 J x 15	165 SR 15 *
914/6	Perforated disc 5 1/2 J x 15 (enameled steel)	165 HR 15	5 1/2 J x 14	185 HR 14

(*) If subsequently installed, different speedometer will be required.

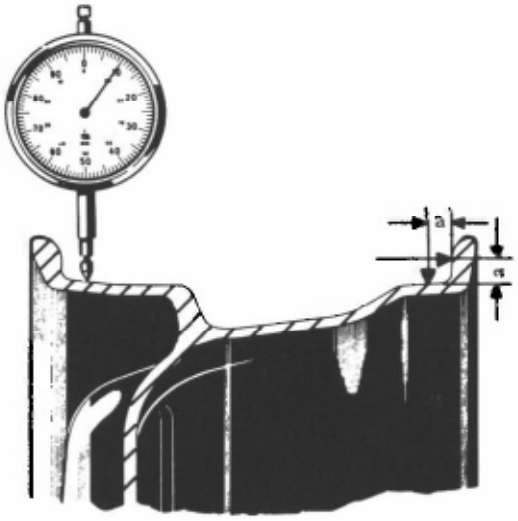
CHECKING WHEELS

Measuring points for vertical and lateral runout in inside of rim

Dimension "a" = 8 mm (0.315 in.)

Maximum permissible vertical and lateral runout

= 1.25 mm (0.05 in.)



Caution:
Warped rims must be replaced, they can n o t be straightened!

TIRE DIMENSIONS

	Type 914		Type 914/6	
Tire Designation	155 SR 15	165 SR 15	165 HR 15	185 HR 14
Rim	4 1/2 J x 15	4 1/2 J x 15	5 1/2 J x 15	5 1/2 J x 14
(*) Outer diameter	632 mm (24.9 in.)	646 mm (25.4 in.)	646 mm (25.4 in.)	650 mm (25.6 in.)
(*) Tire nominal width	157 mm (6.2 in.)	172 mm (6.8 in.)	172 mm (6.8 in.)	188 mm (7.4 in.)
(*) Static effective radius	288 mm (11.3 in.)	295 mm (11.6 in.)	295 mm (11.6 in.)	293mm (11.5 in.)
(*) Dynamic effective radius	307 mm (12.0 in.)	3.5 mm (12.4 in.)	315 mm (12.4 in.)	314 mm (12.3 in.)

(*) Tire dimensions are approximate

Tire pressures

(measured on cold tires)

Vehicle Type 914

	front:	1.6 atm (23 psi)
	rear:	1.8 atm (26 psi)
Snow tires:	front:	1.8 atm (26 psi)
	rear:	2.0 atm (28 psi)

Vehicle Type 914/6

	front:	1.8 atm (26 psi)
	rear:	2.0 atm (28 psi)
Snow tires:	front:	2.0 atm (28 psi)
	rear:	2.2 atm (31 psi)

Note: If the vehicle is stored for longer periods of time without being put on blocks, the tires must be inflated to 4 atm (57 psi) in order to prevent the formation of flat spots.

List of Factory installed wheels and tires (1975 Modells)

Type	Standard Wheel	Tire	Optional Extras Approved Wheels	Tire
914 - 1.8 ltr.	ST. 5 1/2 x 15	165 SR 15	LMgs 5 1/2 x 15	165 SR 15
			LMg 5 1/2 x 15	165 SR 15
914 - 2.0 ltr.	St. 5 1/2 x 15	165 HR 15	LMgs 5 1/2 x 15	165 HR 15
			LMg 5 1/2 x 15	165 HR 15

WINTER TIRES

Wheel	Tire
5 1/2 x 15	165 SR 15 MS (E)

LMg = Cast light alloy wheel
LMgs = Forged light alloy wheel
St = Painted steel wheel

All wheel sizes listed have J contour rims with inner and outer humps.
e.g. 5 1/2 J x 15 H 2

TIRE PRESSURES (measured on cold tire)

front 1.8 kp/cm^2/26 psi
rear 2.0 kp/cm^2/29 psi

The pressure of all winter profile tires is increased by 0.2 kp/cm^2/3 psi.

Mounting Instructions

When mounting tires be sure to note that the color coding on the tire is opposite the valve stem. Tires with tubes must be rubbed with talcum on the inside before mounting so that the tube will not stick to tire later.

Note

Be sure to coat tire beads with assembly paste when mounting, for better contact with rim during inflation.

To prevent damage to aluminum disc wheels the tires can be mounted or removed from the inner side of the wheels. Protect contact points of outer surfaces of wheel on wheel mounting fixtures by using leather shims or something similiar.

Tubes

For safety reasons, tubes should be mounted only once. When mounting new tube tires, always use new tubes. Use tubes of the same make and the same size of tires. Never use repaired tubes.

Wheel Change

Observe the following:

1. Coat ball surfaces of wheel bolts with an MoS_2 paste.
   (Type 914/6 has wheel nuts.)

2. Be sure that the ball surfaces of the wheel bolts (Type 914/6 wheel nuts) are centered in the countersunk recesses of the perforated disc wheel.

3. Tighten wheel bolts crosswise to 15 mkp (108 ft/lb). Type 914/6 has wheel nuts, torque to 13 mkp = 94 ft/lb).

Balancing the Wheels

The high speeds the vehicle can be driven make it absolutely necessary to balance the wheels. Non-balanced wheels may result in wobble and shimmy, which would result in unsteady steering. Unbalance means non-uniform distribution of weight in a rotating body. This unbalance is detencted by means of a balancing machine and is compensated by lead weights. Be sure to remove the old weights prior to balancing. Clean excess dirt from wheels so that no incorrect measurements will be made. The wheels should be regularly rebalanced, since tire wear will change the measurements. The maximum dynamic and static unbalance should not exceed 10 p (.3 oz).

Static balance indicates the uniform distribution of the weight of rim and tire around the center of rotation (horizontal axis) of the wheel. Any fault will be noticed while driving by shaking and hopping wheels.

Dynamic balance additionally indicates the uniform distribution of the weights in relation to the vertical axis of the wheel. Any faults are indicated by wheel flutter.