



Alfa Romeo

ATE

DISC BRAKES

REPAIR AND MAINTENANCE INSTRUCTIONS



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"ATE" DISC BRAKES for GIULIA Models

Repair and Maintenance instructions

A) HYDRAULIC SYSTEM

1) General

The hydraulically-operated brake system consists of four disc-type brakes actuated through a master cylinder. The friction pads of front and rear brakes are directly actuated by the cylinders integral with the calipers.

The brakes automatically compensate for friction pad wear.

Each brake comprises a disc attached to the wheel hub and revolving between the jaws of a caliper installed on a suitable support.

Each caliper consists of two halves, joined together with four bolts, with cylinder cast integral with each half-caliper; in the cylinder bore a groove houses the piston seal.

Water and dust are prevented from entering the cylinder by proper excluders which are held in place by a retaining ring to the caliper and by their own elasticity on the piston; the friction pads bonded to a backing plate are simultaneously forced toward the disc by pistons.

Two opposite retaining pins keep the pads in the calipers: the pad mounting slots are elongated to allow for slight movements of pads.

Furthermore two cross-shaped springs (mounted under the retaining pins) hold the pads pressed down in order to prevent vibrations and noise.

Each half-caliper has internal passages to transfer the fluid to the pistons. The inboard half-caliper has also the supply and the bleed fittings.

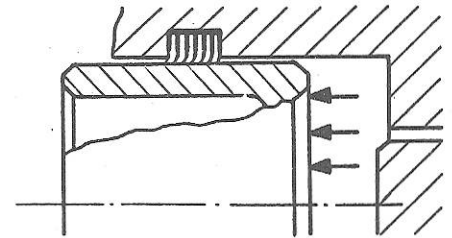
The components of front and rear calipers are not interchangeable.

2) Operating principle

When the brake pedal is depressed the fluid in the system (pipes, cylinders) is put under pressure by the displacement of plunger in master cylinder: such a pressure acts on the pistons which move inwards until the friction pads clamp the disc thus resulting in the braking action.

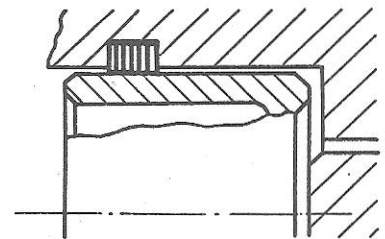
As the effort on the pedal increases, the pressure on pads also increases proportionately.

The movement of piston in the cylinder causes the seal (located in a groove in the cylinder bore) to deflect.



Piston in working position

When the brake pedal is released the plunger in the master cylinder comes back to starting position under the action of the return spring thus relieving pressure in the system. At the same time the piston seal recovers and pushing back the piston restores the running clearance, .15 mm (.006") each side, between disc and friction pads.



Piston in released position

Consequently, on brake release, the discs can again rotate freely. As the pads wear down the pistons travel a little further toward the disc because the pressure on piston overcomes the friction between piston and seal.

In this way the wear is automatically compensated for.

3) Maintenance directions

a) General

When servicing or greasing the car be careful not to let lubricants come in contact with discs and friction pads. Before cleaning the underside of car mask off the brake units.

b) Check and replacement of brake fluid

Every 3.750 mi. (6000 Km) check level of fluid in the reser-

voir; if necessary fill up with fluid freshly drawn from sealed containers.

When checking or filling up, take care not to contaminate the fluid with foreign matter, moisture or water.

A remarkable drop in fluid level is undoubtedly caused by fluid leakage in the system: this should be traced and remedied immediately.

- Every 11,250 mi. (18,000 Km), or once a year whichever comes first, replace the brake fluid (specified fluid: CASTROL GIRLING BRAKE FLUID AMBER).

For effective and reliable operation of brake system, the pipes must always be full of fluid and free from air bubbles. Excessive and resilient pedal travel is an indication of the presence of air in the system.

The use of compressed air guns for recharging the pipe lines is not permitted.

Should the flushing of brake circuit be required, use exclusively fluid of the specified type.

Compressed air or alcohol must on no account be used to dry a flushed system.

c) Bleeding the system

Bleeding is required when, due to the presence of air in the system a brake pedal spongy travel and sluggish response is felt. Proceed as follows:

- fill up the reservoir with the specified fluid (drawn from original CASTROL containers opened just prior to use). Take care that during bleeding the fluid in the reservoir is main tained (not more than a quarter below full);
- start bleeding procedure with rear brakes:
 - fit a rubber pipe to the bleed screw and sink the other end into a small quantity of fluid in a glass container;
 - loosen the bleed screw;
 - slowly pump the brake pedal several times until the pipe discharges fluid free from air bubbles;
 - hold the pedal down and tighten the bleed screw.

If the bleeding has been carefully performed it will be found that when the brake pedal is pressed a firm and direct action on the fluid can be felt, immediately at the end of free travel.

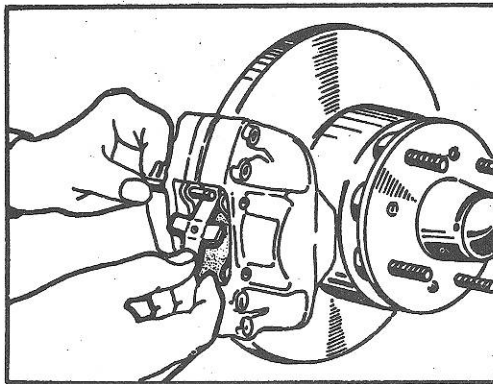
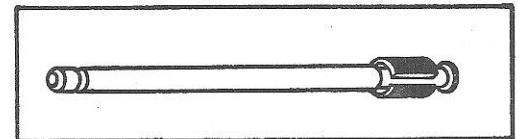
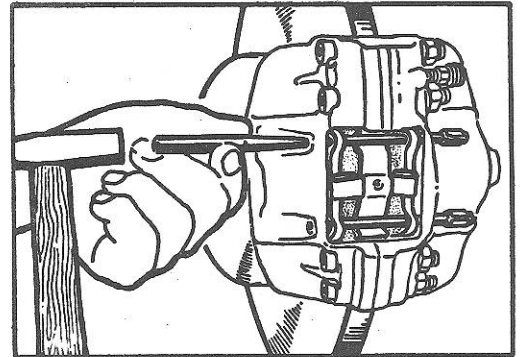
If not repeat the procedure.

d) Check and replacement of pads

Friction pads should be checked for wear every 3750 mi. (6000 Km).

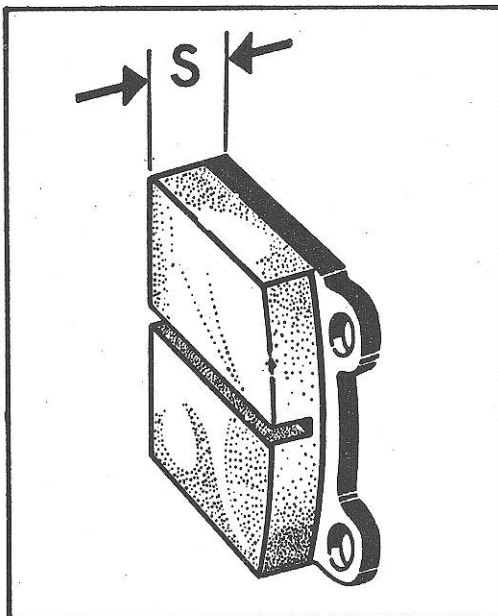
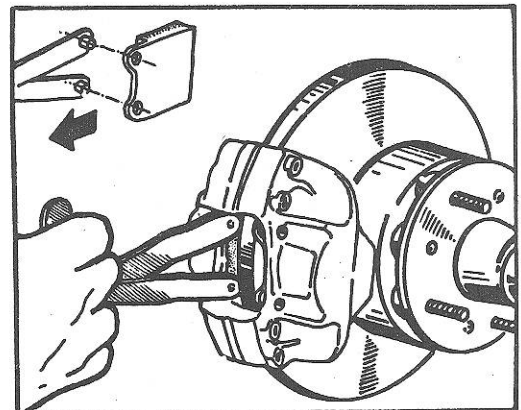
Proceed as follows:

- remove wheel from car;
- drive the upper retaining pin out of caliper by means of a punch;



- remove the cross-shaped spring;
- drive out the lower retaining pin;

- withdraw the pads with the puller no. A.2.0150.



Check the pads for proper thickness:

$$S = \begin{cases} \text{New} & 15 \text{ mm } (.6") \\ \text{wear limit} & 7 \text{ mm } (.28") \end{cases}$$

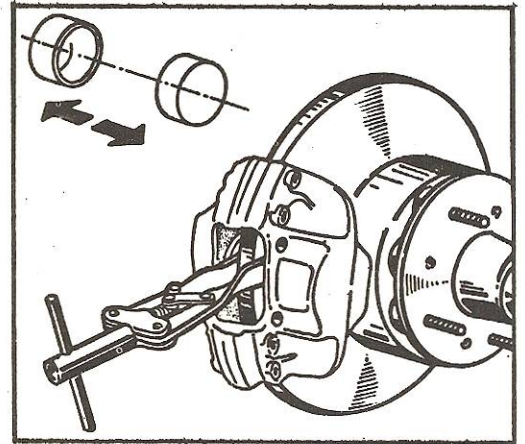
Replace pads with new ones if necessary.

In case of uneven wear of a pad it is advisable to replace the whole set of front or rear brake pads.

Before reinstalling the pads:

- clean the pad housing: never use mineral base solvents or sharp edged tools;
- check the dust excluder and the retaining ring for sound conditions: if not so, replace them. Pack the inside of dust excluders with a suitable grease;

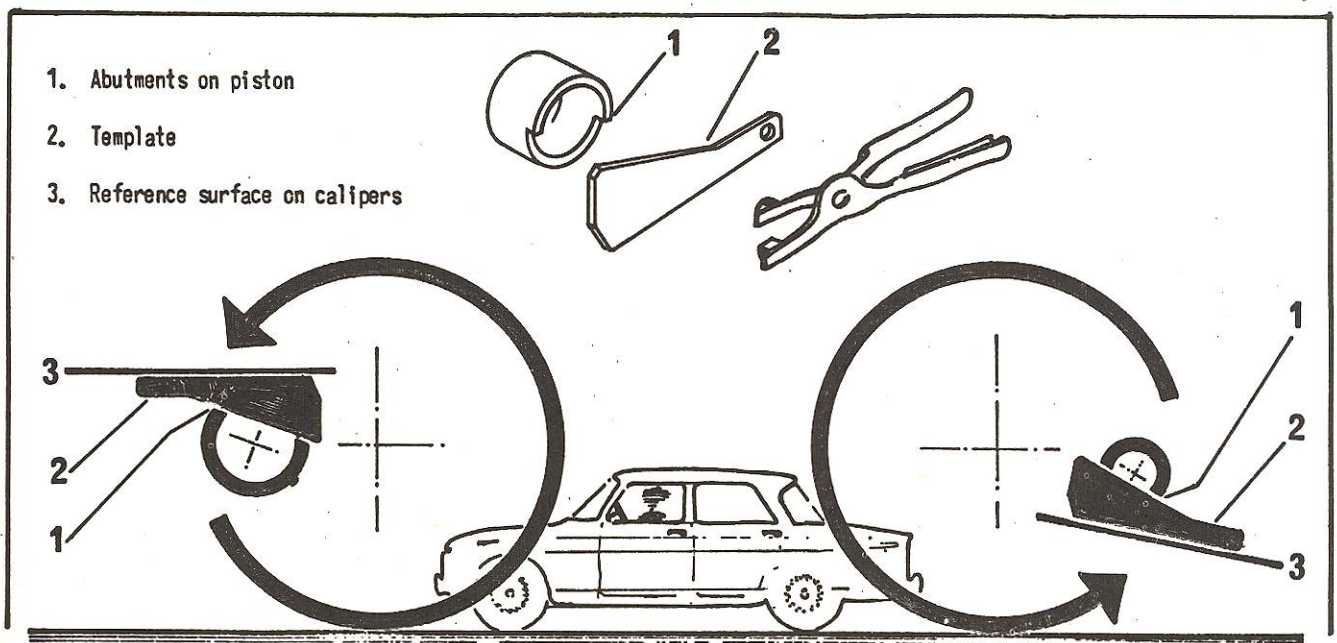
- press the pistons to the bottom of cylinders with the aid of the resetting tool (no. A.2.0147) shown in the figure: do not use chance tools which might damage the pistons or the disc.



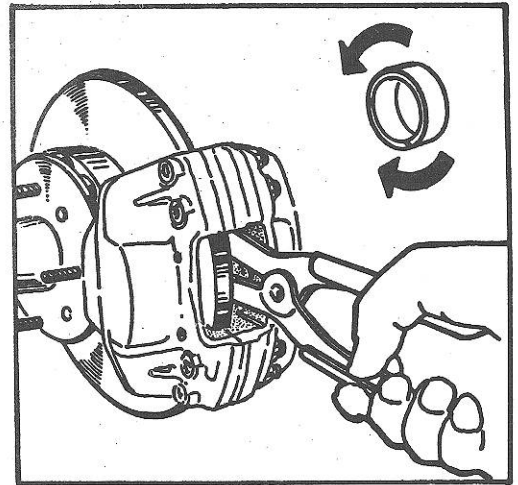
- Check that the cross-shaped spring and the retaining pins are in good conditions: if not, replace them. These components must however be replaced whenever the pads are renewed.

When resetting pistons, care should be taken to prevent fluid overflow from the reservoir.

- Make sure the pistons are correctly positioned in the caliper. To do so, rest the template 2 (no. A.2.0149) against the reference surface of the caliper and make the check as shown below.



- If the pistons are not in the correct position true them with the suitable pliers (no.A.2.0148) as shown.



- Insert the pads in the caliper; if new pads are installed make sure they slide freely in their housing and that upper edge of friction material does not protrude beyond disc outside diameter: if necessary remove the excess material until flush with the disc.
- Fit a retaining pin and then the cross-shaped spring; press down the free end of spring so as to permit the installation of the other retaining pin.
- With a suitable drift push the retaining pins fully home.

4) Removal and reinstallation of caliper

a) Removal from car

- disconnect the fluid supply line;
- loosen the attaching screws and remove the caliper.

C a u t i o n : avoid disassembling calipers when not at room temperature.

b) Inspection and reinstallation:

- Check the attaching parts for good conditions and replace, if necessary;
- tighten the screws evenly to the following torque:
 - Front caliper attaching screws 57.8 lb-ft (8. Kgm)
 - Rear caliper attaching screws 43.4 lb-ft (6 Kgm)

5) Disassembly of brake calipers (only if strictly necessary)

When reassembling keep in mind the following:

- clean the half-caliper joining surfaces with methylated spirit;
- replace the rubber rings sealing the fluid passages and the joining bolts particularly when show sign of damage or during major overhauls.

- tighten the joining bolts only by hand firstly; check that half calipers match properly, then lock in this sequence the inner bolts and the outer bolts in two stages:

1st stage 50 %
2nd stage 100 %

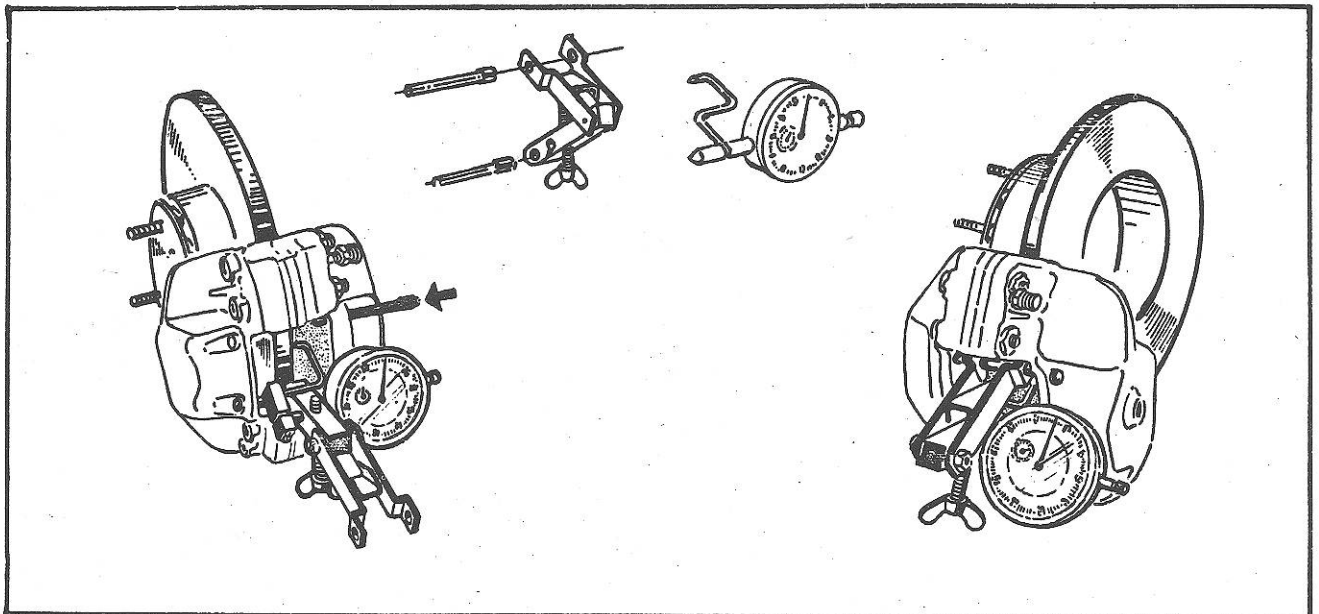
to the following torque:

front calipers: 24.6 lb-ft (3.4 Kgm)
rear calipers : 15.9 lb-ft (2.2 Kgm)

6) Checking the disc for true rotation

When a brake disc is replaced it is necessary to check it for run-out after installation:

- use a dial indicator and the special tool A.2.0151 which is mounted to the caliper by means of the pad retaining pins.



Maximum permissible run out as measured at the swept surface should not exceed .2 mm (.0078").

N o t e : run-out readings can be misleading if bearing clearance is not as specified; therefore, check and adjust if necessary, according to factory instructions.

7) Regrinding the brake discs

If the disc is scored, the grinding of the swept surfaces is allowed providing not to exceed an underside of 1 mm (.0394"), equalized on both faces, i.e. .5 mm (.0197") each face;

wear limit { front disc: 10 mm (.394") thick
 rear disc : 8,5 mm (.335") thick

Inspection specifications after regrinding of disc surfaces:

- Max. out of parallelism with disc mounting plane .05 mm (.0020");
- Max. out of flat .025 mm (.0010") and max. difference in thickness .038 mm (.0015") as measured along any radial line;
- Max. out of flat .025 mm (.0010") and max. difference in thickness .015 mm (.0006") as measured along any circular line;
- The surface should show no sign of scoring or porosity.

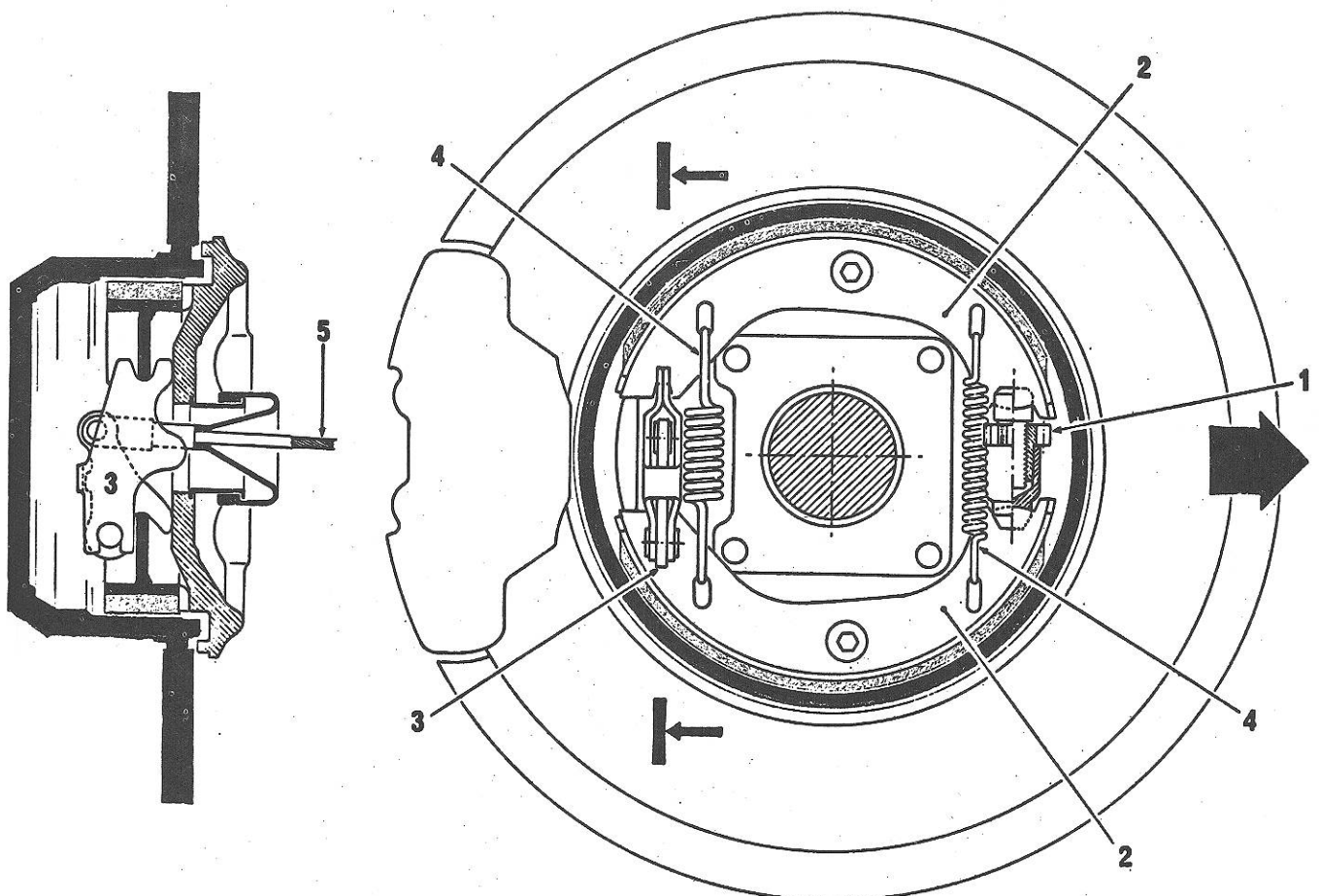
The surface roughness should be:

- 26 microinches as measured circularly;
- 36 microinches as measured radially.

B) HAND BRAKE

It is mechanically operated and acts on the rear wheels through the shoes 2 which spread apart against a drum machined in the disc casting.

Pulling the hand brake handle causes the shoes, through the control linkage and the operating levers, to expand thus locking the wheels.



1 Adjuster - 2 Shoe - 3 Operating levers - 4 Return springs - 5 Control cable

a) Running clearance adjustment with new linings

When new shoes have been installed adjust the running clearance as follows:

- with the rear wheels removed, fully release the hand brake and make sure the control cables to the calipers are slackened;
- to adjust rotate the adjuster 1 with a screwdriver inserted through the hole in the disc brought into alignment with the adjuster;
- rotate the adjuster one notch at a time as shown in the illustration until hand brake shoes are just contacting the drum without locking: then back the adjuster by two/four notches so that the disc rotates freely.

Proceed the same way for the other wheel.

- The hand brake is correctly adjusted when the wheels become locked as the handle is drawn through half its total travel. Make sure that, when the handle is released, the wheels rotate freely.

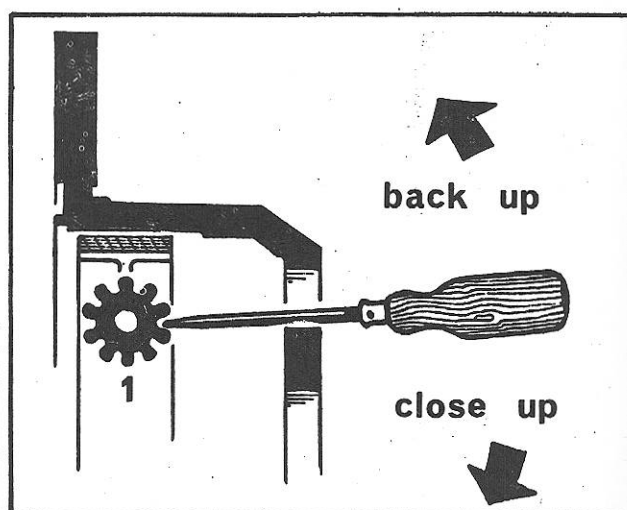
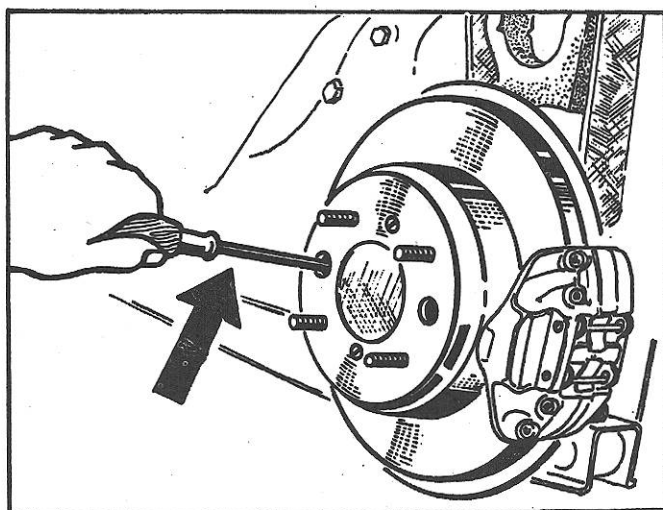
b) Running clearance adjustment with worn linings

To take up the excessive travel of hand brake handle, due to worn-down linings, proceed as follows a wheel at a time:

- jack up the wheel and with the hand brake in released position check that the wheel can rotate freely;
- act on the adjuster 1 as directed under a) above until shoes just contact the drum; then, back up the adjuster by two/four notches.

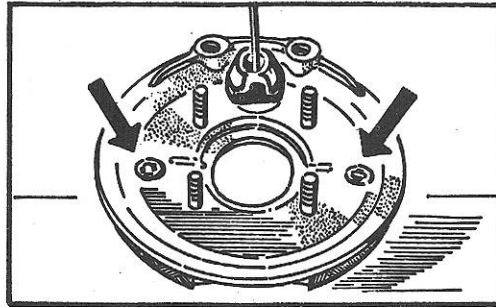
If necessary, adjust the control linkage too, by acting on the suitable adjusters.

Warning : to facilitate the hand brake adjustment it is advisable to remove the friction pads of rear service brakes.



I M P O R T A N T N O T E

Whenever a hand brake assembly is removed for replacement of parts or overhaul, on reassembly apply the sealing compound Minnesota EC 5305 in correspondence of the seats for the shoe mounting pins (as shown by arrows in the figure) in order to prevent dust or foreign matter from entering the brakes.



Furthermore, it is recommended that, when reassembling the operating levers, a slight quantity of grease AGIP F1 Gr SM or SHELL Retinax AM is applied to the pivot points and rubbing surfaces of levers.

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