

Section VI BRAKES

The layout of the brake system is shown in Fig. 6-1.

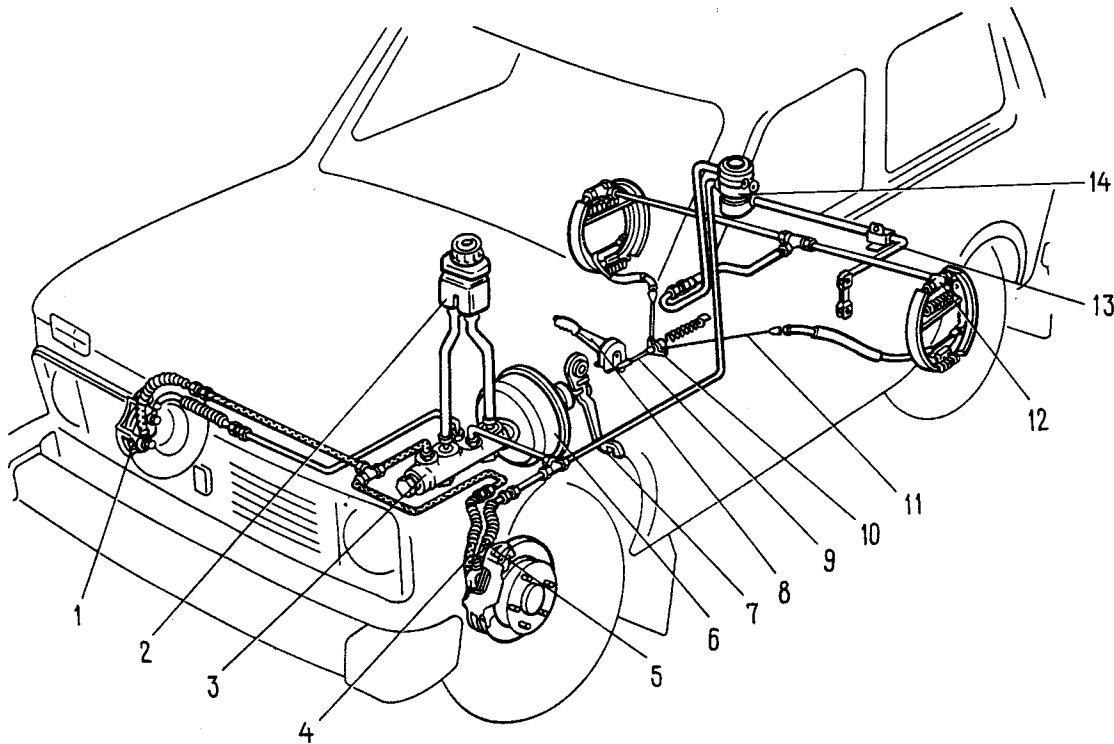


Fig. 6-1. Brake System, Diagrammatic:
1 - front brake cylinder block; 2 - brake fluid reservoir; 3 - brake master cylinder; 4 - primary circuit pipe; 5 - secondary circuit pipe; 6 - vacuum booster; 7 - brake pedal; 8 - parking

brake lever; 9 - parking brake front cable; 10 - rear cable guide; 11 - parking brake rear cable; 12 - rear brake wheel cylinder; 13 - pressure regulator operating lever; 14 - pressure regulator

TROUBLE SHOOTING

Cont'd

Cause	Remedy
<u>Poor Braking Effect</u>	
1. Fluid leaks from wheel cylinders of front or rear brakes	1. Replace faulty parts of wheel cylinders, wash and dry shoes and drums, bleed hydraulic system
2. Air in brake system	2. Bleed system
3. Damaged rubber seals of brake master cylinder	3. Replace seals and bleed system
4. Hydraulic rubber hoses damaged	4. Replace hoses

Cause	Remedy
<u>Spontaneous Braking with Engine Running</u>	
Wrong position of stop-light switch causes infiltration of air between valve body and boot. As a result:	Do the following:
(a) cover seal is damaged, cocked or improperly fixed	(a) replace vacuum booster

Cause	Remedy
due to defective locking parts;	
(b) lubrication of cover seal is insufficient	(b) remove boot and pack seal with lubricant
<u>Incomplete Release of All Wheel Brakes</u>	
No free travel of brake pedal due to wrong position of stoplight switch	1. Adjust position of switch
Protrusion of vacuum booster adjusting bolt from brake master cylinder mounting surface exceeds 1.25_0.2 mm	2. Adjust protrusion of adjusting bolts (See Fig. 6-2)
Jamming of vacuum booster valve body caused by swelling of diaphragm or seizure of booster cover seal or boot	3. Replace vacuum booster
Clogging of master cylinder compensating valve	4. Clear out hole. Bleed hydraulic system
Swelling of master cylinder rubber seals caused by penetration of gasoline, mineral oils, etc. into fluid	5. Wash entire system thoroughly with brake fluid, replace faulty rubber parts, bleed hydraulic system
Jamming of brake master cylinder piston	6. Examine master cylinder, replace it, if necessary; bleed hydraulic system
<u>One Wheel Drags with Pedal Released</u>	
Rear brake shoe return spring weak or broken	1. Replace spring
Jamming of wheel cylinder piston due to corrosion	2. Disassemble cylinder, clean and wash parts, replace faulty ones
Swelling of wheel cylinder sealing rings due to penetration of fuel or oil into fluid	3. Replace rings, wash brake system with fluid
No shoe-to-drum clearance	4. Adjust parking and rear brakes
Wrong position of brake caliper relative to brake disc due to loosening of shoe guide-to-steering-knuckle bolts	5. Tighten bolts; if necessary, replace faulty parts
Excessive runout of brake disc (over 0.15 mm)	6. Grind disc. Replace, if it is thinner than 9 mm

Cause	Remedy
<u>Car Skids or Pulls Sideways on Braking</u>	
1. Fluid leaks from one of wheel cylinders	1. Replace seals and bleed system
2. Jamming of wheel cylinder piston	2. Eliminate jamming, replace faulty parts, if necessary
3. Clogging of one of steel pipe due to denting or soiling	3. Replace or clean out pipe. Bleed system
4. Non-uniform tyre pressure	4. Adjust tyre pressure
5. Wrong front wheel alignment angles	5. Adjust
6. Soiling or oiling of discs, drums and shoe linings	6. Clean brake parts
7. Wrong installation of pressure regulator	7. Adjust position of pressure regulator
8. Pressure regulator faulty	8. Repair or replace pressure regulator
<u>Pedal Pressure Too Hard</u>	
1. Clogging of vacuum booster air filter	1. Replace air filter
2. Booster valve body jamming due to swelling of diaphragm or seizure of booster cover seal or boot	2. Replace vacuum booster
3. Hose between booster and engine intake manifold damaged or loosely fitted on pipe unions	3. Replace hose or tighten its clamps
4. Brake pedal metal bushings oxidized or run dry (drying of lubricant)	4. Replace worn parts or change lubricant
<u>Brakes Squeak or Squeal</u>	
1. Weakening of rear brake shoe return spring	1. Examine return spring and replace, if necessary
2. Rear brake drums out of round	2. Rebore drums
3. Shoe linings smeared with oil	3. Clean linings with wire brush, warm water and detergents. Prevent penetration of fluid or oil to brake shoes
4. Shoe linings worn or fouled with embedded foreign particles	4. Replace shoes
5. Excessive runout or uneven wear of brake disc	5. Grind disc. Replace, if it is thinner than 9 mm

CHECKS AND ADJUSTMENT

CHECKING PIPES AND JOINTS

To prevent sudden failure of the brake system, examine closely all pipes:

- the metal pipes should be free from dents, cracks and should be located sufficiently far from sharp edges which might cause their damage;

- the brake hoses should have no penetrating cracks on the external casing and should be out of contact with mineral oils and lubricants that are apt to attack rubber; depress the brake pedal sharply and see that the hoses do not bulge; bulging is indicative of some defect;

- all the pipe clips should be well tightened since their loosening will result in vibration and breakage;

- there should be no fluid leaks from the pipe unions; if necessary, tighten the nuts home, taking care not to distort the pipes.

Replace the parts by new ones if there is even the slightest doubt as to their serviceability.

It is recommended that the flexible hoses, irrespective of their condition, be replaced by

new ones after 100,000 kilometers of run or five years of service in order to preclude sudden bursting due to ageing.

After five years of operation it is good practice to fill the brake system with fresh fluid.

CHECKING VACUUM BOOSTER

With the engine shut down press the brake pedal 5 - 6 times, thus building up an equal pressure, close to atmospheric, in spaces A and E (Fig. 6-2). At the same time see that valve body is not jammed, judging by the force on the pedal.

Stopping the brake pedal midway of its travel start the engine. If the booster is in order, the brake pedal will sink forward after engine starting.

If, however, the pedal fails to move forward check the fastening of hose nipple 29, condition and fastening of flange 1, fastening of the hose to the nipple and to the union of the engine intake manifold because a loosely fastened or damaged hose and flange 1 decrease sharply the

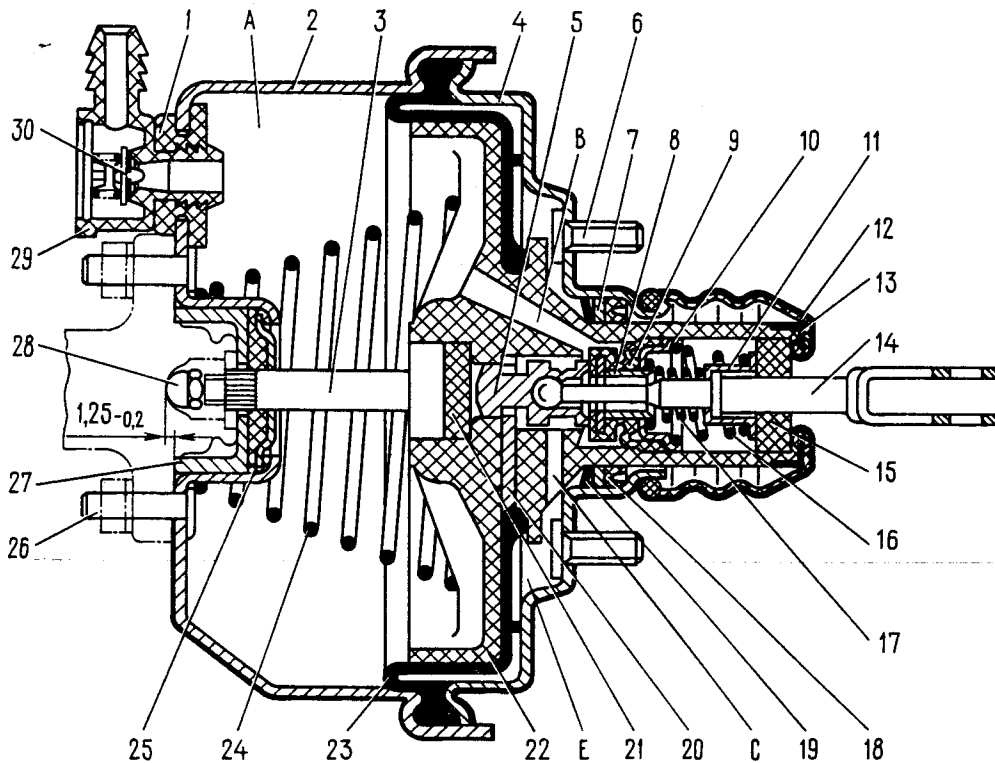


Fig. 6-2. Brake Vacuum Booster:

1 - nipple fastening flange; 2 - booster casing; 3 - rod; 4 - cover; 5 - piston; 6 - booster bolt; 7 - spacer ring; 8 - valve spring seat; 9 - valve; 10 - valve supporting cup; 11 - return spring seat; 12 - boot; 13 - boot holder; 14 - pushrod; 15 - air filter; 16 - valve return spring; 17 - valve spring; 18 - casing cover seal; 19 - seal locking; 20 - thrust plate; 21 - buf-

fer; 22 - valve body; 23 - diaphragm; 24 - valve body return spring; 25 - rod seal; 26 - master cylinder bolt; 27 - rod seal holder; 28 - adjusting bolt; 29 - hose nipple; 30 - valve
A - vacuum space; B - channel from vacuum space to inside space of valve; C - channel from inside space of valve to atmospheric pressure space; E - atmospheric pressure space

vacuum in space A and the efficiency of booster operation.

If the car gets braked spontaneously check the vacuum booster for tightness with the engine running, first by releasing the brake pedal, then pressing and holding it so. Sticking of boot 12 to the extension of the valve body and the hissing sound of infiltrating air will indicate insufficient tightness of the booster.

Even in the absence of boot sticking, seal 18 should be examined as follows:

- remove boot 12 carefully then shift it from the flange of the hole in cover 4;
- with the engine running, rock the protruding extension of the valve body laterally with a force of 29.4 - 39.2 N (3-4 kgf); there should be no characteristic hissing of the air entering the booster past cover seal 18.

If the vacuum booster is found to be leaky, disconnect pushrod 14 from the brake pedal, remove boot 12 and pack 5 g of ЦИАТИМ-221 grease between the seal and the flanges of the cover and valve body; then examine air filter 15, replace it, if necessary, and put the boot back in position.

If these measures fail to do away with the infiltration of air, replace the vacuum booster.

ADJUSTMENT OF BRAKE OPERATING MECHANISM

Free travel of the brake pedal should be 3-5 mm with the engine inoperative. This travel is ensured by moving stoplight switch 6 (Fig. 6-3).

If the stoplight switch is too close to the pedal, the latter fails to come back to the initial position; as a result, valve 9 (Fig. 6-2) bears against body 22 and disconnects spaces A and E which causes incomplete releasing of the wheel brakes when the pedal is released.

To adjust the position of the stoplight switch back off nut 5 (Fig. 6-3) and move the

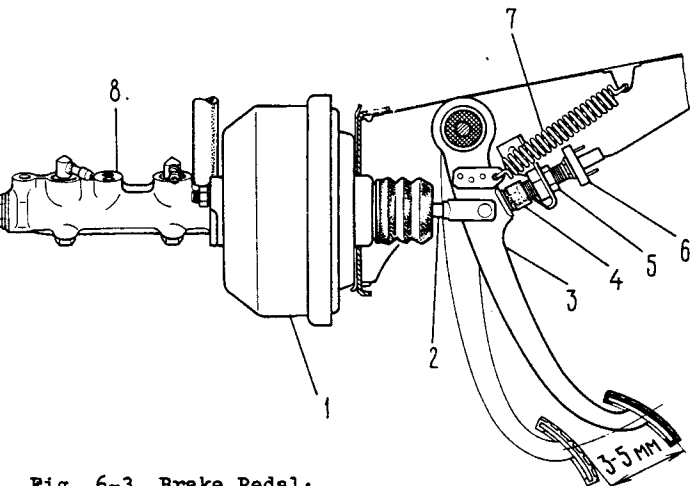


Fig. 6-3. Brake Pedal:

- 1 - vacuum booster; 2 - pushrod; 3 - brake pedal;
- 4 - stoplight switch buffer; 5 - switch nut;
- 6 - stoplight switch; 7 - pedal return spring;
- 8 - master cylinder

switch so that its buffer is in light contact with the brake pedal stop. In this position free travel of the brake pedal should be within 3 and 5 mm. After adjustment do not fail to tighten nut 5.

Caution

Free travel of the brake pedal should be adjusted with the engine shut down.

If it proves impossible to eliminate incomplete releasing of brakes by moving the stoplight switch, disconnect the brake master cylinder from the vacuum booster and check the protrusion of adjusting bolt 28 (Fig. 6-2) relative to the mounting surface of the master cylinder flange (1.25_{-0.2} mm). This distance can be set by holding the end of rod 3 with a special wrench and turning adjusting bolt 28 in or out with another wrench.

ADJUSTMENT OF PARKING BRAKE

If the parking brake fails to hold the car reliably on a 30 % gradient or is applied only after its lever has been shifted by more than 4-5 teeth of the ratchet mechanism, adjust the brake as follows:

- jack up the rear end of the car until the wheels are free to rotate and move the lever all the way down;
- loosen locknut 5 (Fig. 6-4) of the tensioning device and keep turning in adjusting nut 6 to tension the cable until the rear wheels are braked and cannot be turned by hand;

Note. If the cables have been replaced by new ones, apply the parking brake 2-3 times, pulling the lever with a force of about 392 N (40 kgf). This will stretch out the cables.

- unscrewing the adjusting nut set a 4-5-tooth travel of the lever on the quadrant and tighten the nut.

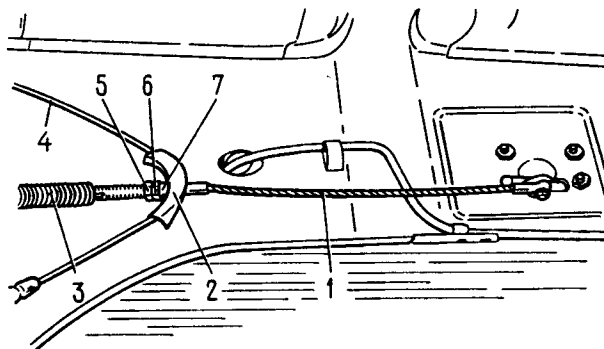


Fig. 6-4. Parking Brake Control Linkage:

- 1 - front cable; 2 - rear cable guide; 3 - front cable return spring; 4 - rear cable; 5 - locknut;
- 6 - adjusting nut; 7 - spacer bushing

Apply the brakes several times to make sure that the lever travel has not changed, and the wheels are free to rotate without dragging when the lever is pushed to the downmost position.

CHECKING SERVICEABILITY OF PRESSURE REGULATOR

Put the car on a lift or an inspection pit and clean the pressure regulator and its protective boot.

Take off the boot carefully, remove remnants of lubricant and clean the torsion lever-piston joint.

Ask an assistant to press the brake pedal with a force of 686 - 784 N (70-80 kgf), at the same time watching the protruding part of the pressure regulator piston.

If the piston moves 0.5 - 0.9 mm relative to the regulator body and twists the torsion lever, it means that the pressure regulator is in order. Press the brake pedal again 2 or 3 times to make certain that the pressure regulator is fully serviceable.

If the piston stays still after depression of the brake pedal (this is caused by sticking of the corroded piston to the body), replace the regulator.

On ascertaining that the pressure regulator is fully serviceable and there are no fluid leaks between the regulator piston and body, apply a thin layer of AT-1 grease to the axle and to the protruding portion of the piston, pack 5-6 g of the same lubricant into the rubber boot and put the latter back in position.

ADJUSTMENT OF SHOE-TO-DRUM CLEARANCE

Proceed as follows:

- press the brake pedal with a force of 98 - 117.5 N (10-12 kgf) to bring the shoes in contact with the drum;
- holding the shoes in the position, turn the hex heads of eccentrics A and B (Fig. 6-5) in the direction shown by arrows in the figure until they come in contact with the shoes;

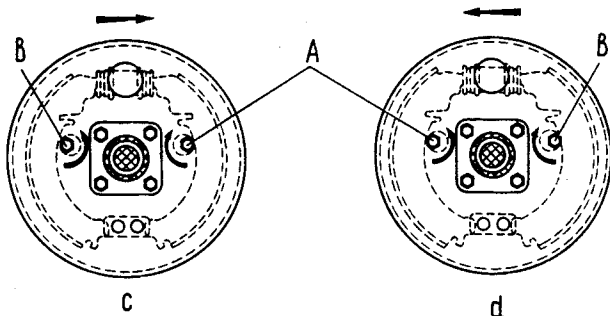


Fig. 6-5. Shoe-to-Drum Clearance Adjustment: A - front shoe adjusting eccentrics; B - rear shoe adjusting eccentrics. Arrows above show the direction of car travel; C - L.H. wheel; d - R.H. wheel

- let go off the brake pedal and turn the adjusting eccentrics in the opposite direction through 10° approximately;

- press the brake pedal sharply 3 - 4 times, release it and rotate the jacked-up wheels; the shoes should be clear of the drums.

After adjustments it is good practice to drive the car 5 - 7 km without using the brakes, then to stop and hand-feel the brake drums to make sure they are not heated because of friction against the shoes. If the drums feel hot which should be attributed to friction between the shoes and drums, repeat the adjustments.

If adjustments fail to set the required shoe-to-drum clearance, remove the brake drum, examine the shoes and the drum; if necessary, replace or recondition the worn parts, then assemble the brake and adjust once again.

ADJUSTING POSITION OF PRESSURE REGULATOR

If the regulator fastening bolts become loose, adjust the regulator position first jacking up the rear axle of the car.

Then disconnect lever 4 (Fig. 6-6) from link and attach fixture 67.7820.9519 to the end of the lever. Direct the spindle of the fixture upward to bear against the car body floor (Fig. 6-7). This will set a distance "X" of (150 ± 5) mm between the end of the lever and the body sidemember (Fig. 6-6).

Lift rubber boot 6 (Fig. 6-6) a little and, turning the pressure regulator on its bolts, establish a light contact between the lever and piston 2.

Holding the regulator in this position, tighten bolts 1 and 7 as far as they will go and

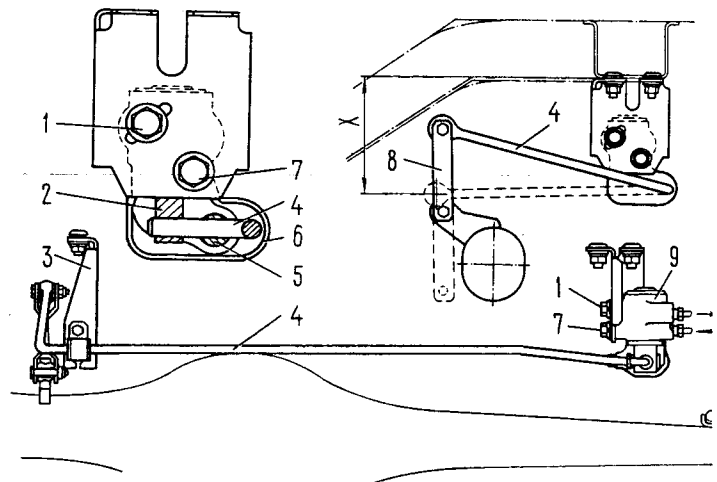


Fig. 6-6. Installation and Adjustment of Rear Brake Pressure Regulator:

- 1, 7 - regulator fastening bolts; 2 - piston;
- 3 - supporting bushing bracket; 4 - regulator operating lever; 5 - axle; 6 - boot; 8 - link;
- 9 - pressure regulator; X = (150 ± 5) mm

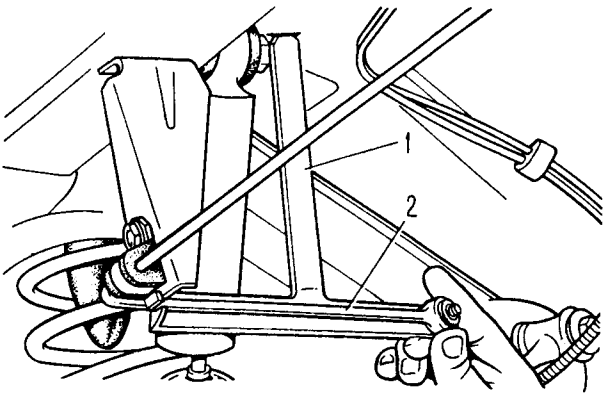


Fig. 6-7. Fixture 67.7820.9519 for Rear Brake Pressure Regulator Adjustment:
1 - fixture 67.7820.9519; 2 - pressure regulator operating lever

Apply a thin coat of AT-1 grease to axle 5 and to the protruding part of piston 2. Pack 5 - 6 g of the same lubricant into rubber boot 6 and put it back in position.

Remove fixture 67.7820.9519 and connect the end of the lever with link 8.

BLEEDING HYDRAULIC BRAKE SYSTEM

The air getting into the hydraulic brake system during replacement of the pipes, hoses, sealing rings or through loose joints increases free travel of the brake pedal, causes it to feel spongy and impairs the braking effect considerably.

Prior to bleeding the system, make sure that all the units of the brake operating mechanism and their joints are pressure-tight, check the amount of fluid in the reservoir and top it up, if necessary, with brake fluid NEVA ("HEBA"). Then clean the bleeder unions (valves) carefully of dirt and dust and remove the rubber boots (caps) from them.

Attach a rubber bleeding hose (Fig. 6-8) on the head of the union and dip the other end of the hose into a transparent vessel partly filled with the brake fluid.

Depress the brake pedal sharply 3-5 times with 2-3 s intervals between successive depressions, unscrew the union $\frac{1}{2}$ - $\frac{3}{4}$ of a revolution with the pedal depressed, then keep depressing the pedal to remove the fluid with air from the system through the hose into the vessel. As soon as the pedal reaches its foremost position and the fluid ceases to flow from the hose, screw in the bleeder union all the way. Repeat these operations until the spray of fluid flowing from the hose becomes free of air bubbles. Holding the pedal depressed, unscrew in the bleeder union all the way and remove the hose. Wipe dry the bleeder union and put in place the rubber boot.

Perform all the above operations first through the upper unions of the rear R.H. wheel which is

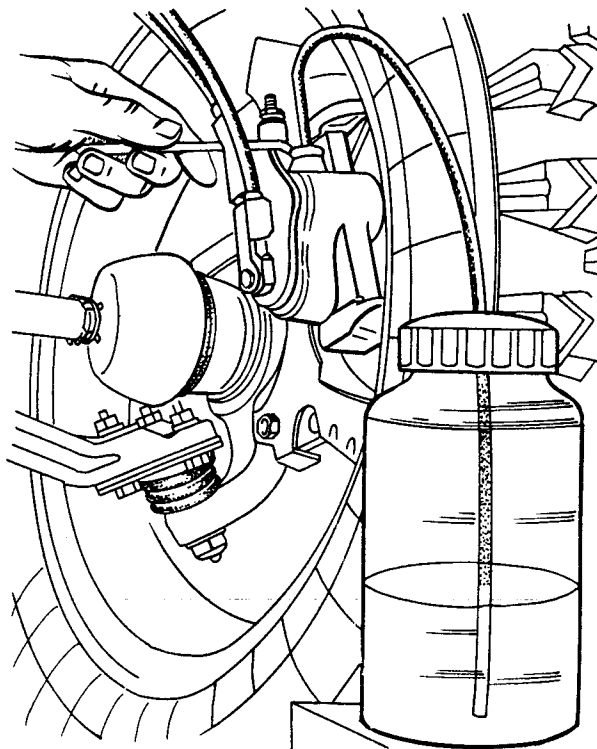


Fig. 6-8. Bleeding Hydraulic Brake System

farthest from the master cylinder, then work in the clockwise direction, i.e. L.H. rear wheel, L.H. and R.H. front wheels. This will expel air from one of the brake circuits. Bleed the other circuit through the lower unions on the block of cylinders of the L.H. and R.H. front brakes. Bleeding may be started either from the R.H. or L.H. wheel.

While bleeding the hydraulic brake system take care to maintain a normal fluid level in the brake fluid reservoir. If there is no air in the hydraulic brake system, the brake pedal should move not farther than $\frac{1}{2}$ - $\frac{2}{3}$ of its travel.

To exclude the influence of the vacuum booster and pressure regulator on the bleeding operation, do it with the engine shut down and the rear wheels loaded (do not jack up the rear end of the car).

If the hydraulic system has been completely drained, the bleeding operation should be preceded by the following:

- unscrew the bleeder unions 1.5 - 2 revolutions on the brake cylinders of all wheels;
- pressing the brake pedal sharply and releasing it slowly, screw in the unions as the fluid has flowed out. Then bleed the system as described above.

If the air bubbles continue to emerge from the hose even after prolonged bleeding, it means that air penetrates into the system through damaged pipes, leaky joints or faulty master or wheel cylinders.

If the hydraulic system is being bled on the car whose brake system has been operating for a long time, it is recommended that the system be filled with fresh fluid.

The fluid considered fit for reuse should be carefully filtered and settled in a tightly closed vessel.

CLUTCH AND BRAKE PEDAL BRACKET

Removal and installation. To remove the pedal bracket:

- take off the steering shaft bracket as advised under "Steering gear";
- detach the vacuum booster pushrod from the brake pedal by removing locking clip 26 (Fig. 6-9) and pin 24;
- unscrew the nuts which fasten the vacuum booster and clutch master cylinder to the bracket;
- unscrew the bracket-to-body nuts and remove the bracket, disconnecting the wires from the stop-light switch.

To install the bracket reverse the removal operations seeing that the pushrod is properly installed in the socket of the clutch master cylinder piston.

Disassembly and assembly. To disassemble remove clutch pedal servo spring 14, springs 8 and 17, unscrew nut 2 of bolt 20, take out the bolt and remove the pedals complete with their bushings.

The springs should be removed and installed by the use of tool A.70017.

To assemble proceed in the reverse sequence of operations. Before assembly apply ЛИТОЛ-24 grease to pedal bushings, to the ends of the springs, the joints of the pushrods with the pedals and to the end of the pushrod contacting the piston of the clutch master cylinder.

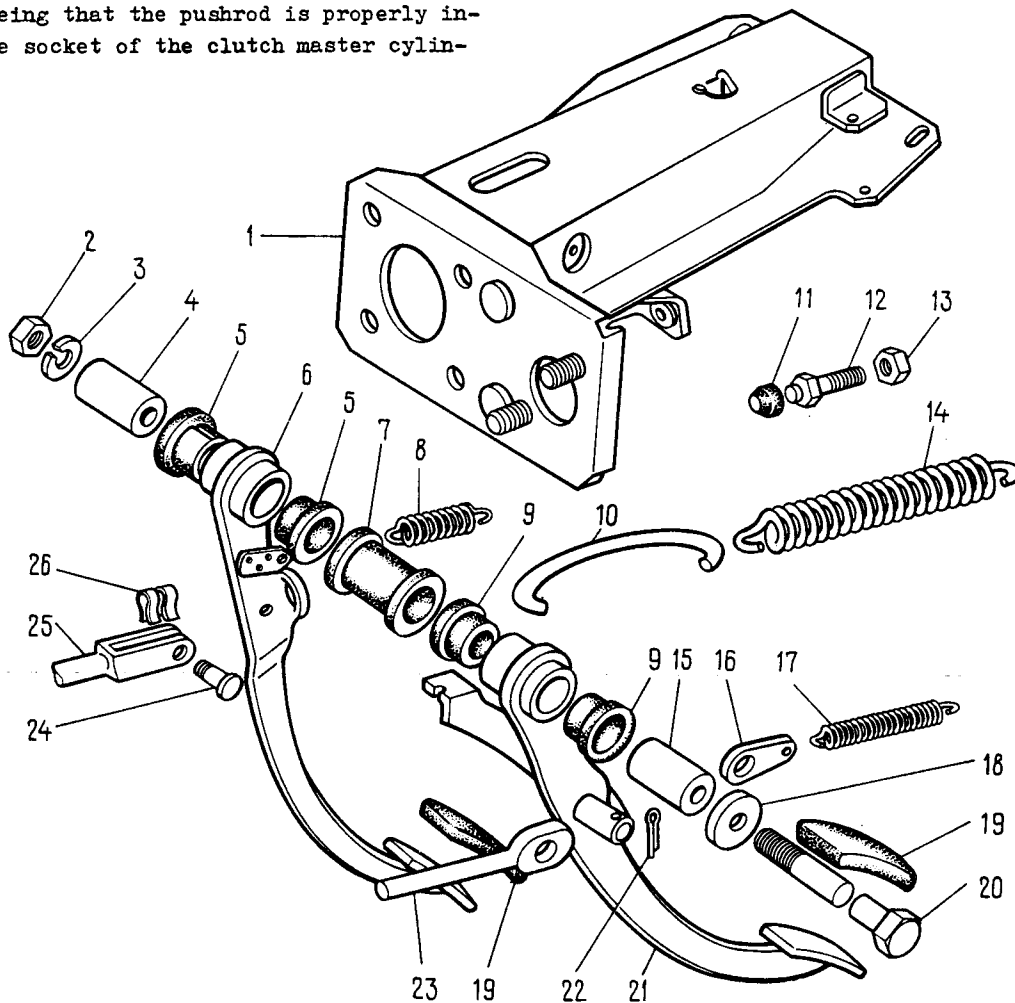


Fig. 6-9. Parts of Clutch and Brake Pedals Bracket:
 1 - bracket; 2 - nut; 3 - spring washer; 4 - brake pedal inner bushing; 5 - brake pedal outer bushings; 6 - brake pedal; 7 - spacer bushing; 8 - brake pedal return spring; 9 - clutch pedal outer bushings; 10 - hook; 11 - cap; 12 - clutch pedal stop

screw; 13 - nut; 14 - servo spring; 15 - clutch pedal inner bushing; 16 - plate; 17 - clutch pedal retracting spring; 18 - washer; 19 - pedal pads; 20 - bolt; 21 - clutch pedal; 22 - cotter pin; 23 - clutch pedal pushrod; 24 - pin; 25 - vacuum booster pushrod; 26 - locking clip

Checks and repairs. If the pedals move with difficulty examine the working surfaces of the pedals, bushings and shaft.

If the metal parts are found to be lightly scratched or oxidized, it is enough to dress them with abrasive cloth; the outer plastic bushings of the pedals, if worn, should be replaced by new ones.

Check the springs for resilience. The length of the brake pedal spring should be 80 mm under a force of (12.8 ± 1.96) N $[(1.3 \pm 0.2)$ kgf] and

160 mm under a force of (117.5 ± 5.88) N $[(12 \pm 0.6)$ kgf].

The length of the clutch pedal retracting spring should be 130 mm under a force of (32.34 ± 3.92) N $[(3.3 \pm 0.4)$ kgf] and 155 mm under a force of (45.08 ± 4.41) N $[(4.6 \pm 0.45)$ kgf]. The length of the clutch servo spring should be 120 mm under a force of (199.92 ± 19.6) N $[(20.4 \pm 2)$ kgf] and 152 mm under a force of (587.02 ± 58.8) N $[(59.9 \pm 6)$ kgf].

VACUUM BOOSTER

REMOVAL AND INSTALLATION

When removing the vacuum booster, leave the brake master cylinder in place to prevent air from getting into the hydraulic system.

To remove the booster:

- disconnect the booster pushrod from the pedal;
- unscrew the nuts which fasten the master

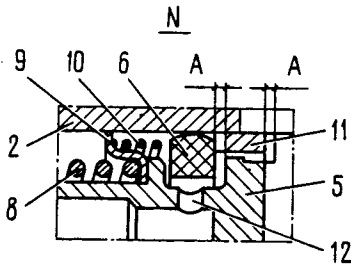
cylinder to the booster, take the cylinder off the studs and shift it sidewise;

- disconnect the hose from the booster;
- unscrew the nuts which hold the booster to the clutch and brake pedal bracket and take off the booster.

To install the booster reverse the removal operations.

BRAKE MASTER CYLINDER

The design of the master cylinder is shown in Fig. 6-10.



REMOVAL AND INSTALLATION

Disconnect the flexible hoses from the master cylinder and stop the holes of the cylinder hoses and unions to keep the fluid in and dust and dirt out.

Disconnect from the master cylinder the steel pipes leading to the wheel cylinders of the front and rear brakes, first unscrewing the pipe nuts.

Remove the master cylinder, unscrewing the nuts which fasten it to the vacuum booster.

To install the master cylinder reverse the removal operations. After installation bleed the brake system.

DISASSEMBLY AND ASSEMBLY

Remove unions 3 (Fig. 6-11) with sealing washers 4, take off cap 5, turn out screws 7 and take out all parts in the order shown in Fig. 6-11.

Assemble the cylinder in the reverse order of steps, using mandrel 67.7853.9543 and lubricating the parts with brake fluid.

Checking Master Cylinder Parts

Before assembly wash all parts with isopropyl alcohol, dry them with compressed air or wipe with clean rags, keeping the parts out of contact with mineral oils, kerosene and diesel fuel which are apt to attack the seals.

Fig. 6-10. Brake Master Cylinder:
 1 - plug; 2 - cylinder barrel; 3 - front brake control piston; 4 - washer; 5 - rear brake control and front brake auxiliary control piston; 6 - sealing ring; 7 - stop screws; 8 - piston return springs; 9 - spring seat; 10 - seal holddown spring; 11 - spacer ring; 12 - inlet hole; A - compensating hole (clearances between sealing ring 6, ring 11 and piston 5)

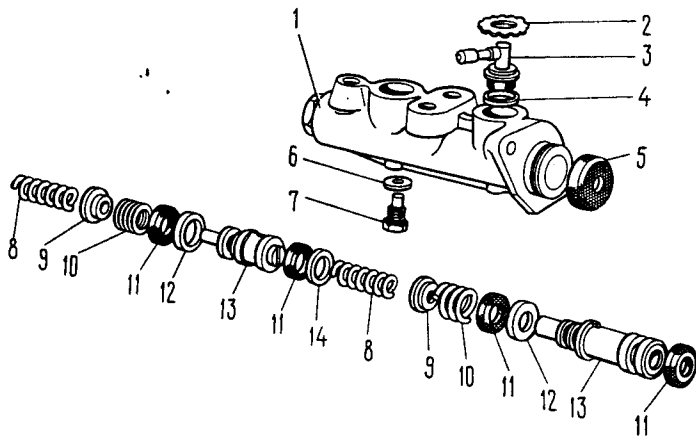


Fig. 6-11. Parts of Brake Master Cylinder:
 1 - cylinder barrel; 2 - lock washer; 3 - union;
 4 - sealing washer; 5 - dust cap; 6 - sealing
 washer; 7 - piston locating screw; 8 - piston
 return spring; 9 - seat; 10 - seal holddown spring;
 11 - seal; 12 - spacer ring; 13 - floating piston;
 14 - washer

Note. The washing time of the sealing rings in isopropyl alcohol should not be over 20 s, with subsequent blowing the rings with compressed air.

The cylinder inner face and the working surfaces of the pistons should be perfectly clean and free of rust, notches and other defects. Excessive clearance between the cylinder and pistons is impermissible.

Each time when disassembling the cylinder, take care to replace the seals by new ones, even if the old seals appear to be quite serviceable.

Check the piston spring for resilience; its length should be 36 mm under a load of $34.3^{+6.86}$ N

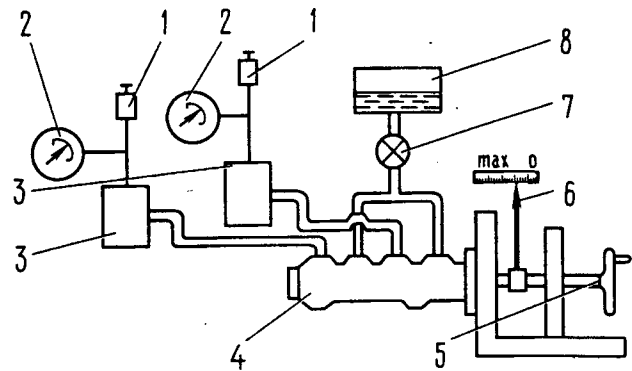


Fig. 6-12. Checking Master Cylinder for Tightness:

- 1 - stand priming valve; 2 - pressure gauge;
 3 - receiving cylinder; 4 - master cylinder;
 5 - handwheel; 6 - pushrod travel indicator;
 7 - cock; 8 - vessel

($3.5^{+0.7}$ kgf), 21 mm under a load of $62.23^{+9.8}$ N ($6.35^{+1.0}$ kgf) and 57.5 mm when noncompressed.

BRAKE MASTER CYLINDER TIGHTNESS CHECK

Mount the master cylinder on a stand and connect it to the latter as shown in Fig. 6-12.

Open stand priming valves 1 and, moving the master cylinder pistons a few times through their complete stroke, prime the system. Then close valves 1. Rotating handwheel 5, move the master cylinder pistons slowly until the pressure read by pressure gauges 2 reaches 12.5 MPa (125 kgf/cm^2). In this position lock the master cylinder pushrod. This pressure should stay constant for at least 5 s.

In case of fluid leaks or when pressure fails to remain constant for 5 s, replace the cylinder piston seals.

FRONT BRAKES

The design of the front brake is illustrated in Fig. 6-13.

CLEANING

Prior to repairing the brakes wash them thoroughly with warm water and a special detergent and dry immediately with compressed air.

Caution

Under no circumstances should gasoline, diesel fuel, trichloroethylene or any other mineral solvents be used for cleaning the brakes since these liquids destroy cylinder seals.

REMOVAL AND INSTALLATION

Removal. Jack up the front end of the car, put it on supports and remove the wheel.

Take off the guide brackets of the hoses. Unscrew the bypass bolts, detach hoses 10 (Fig. 6-13) from the block of cylinders, keeping dirt from getting into the cylinders. Stop the inlet holes of the block and hoses.

Unbend the edges of the front brake guard, unscrew the brake-to-steering-knuckle bolts (Fig. 6-14) and remove the brake as a complete unit.

To install the front brake proceed in the reverse order of steps.

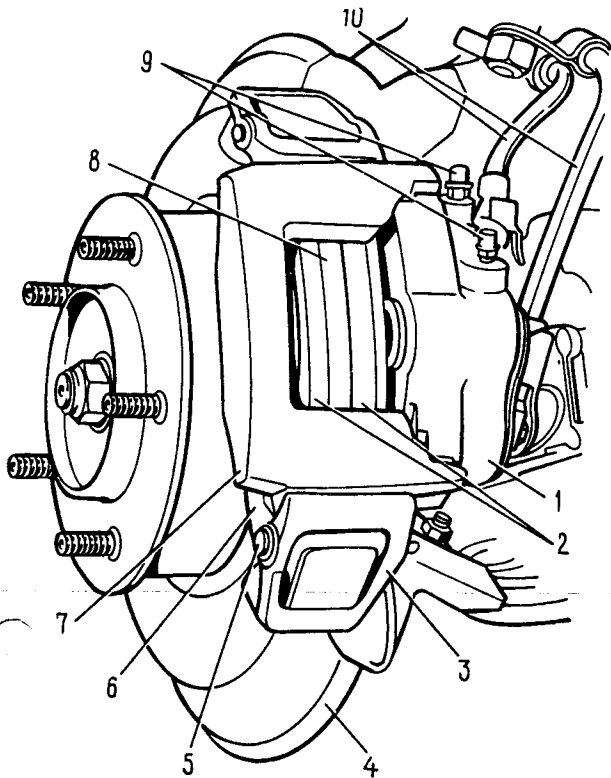


Fig. 6-13. Front Wheel Brake Mechanism:
 1 - cylinder block; 2 - brake shoes; 3 - caliper holddown lever; 4 - guard housing; 5 - holddown lever axle; 6 - shoe guide; 7 - brake caliper; 8 - brake disc; 9 - bleeder unions; 10 - brake hoses

After installation restore the fluid level in the reservoir and bleed the brake system.

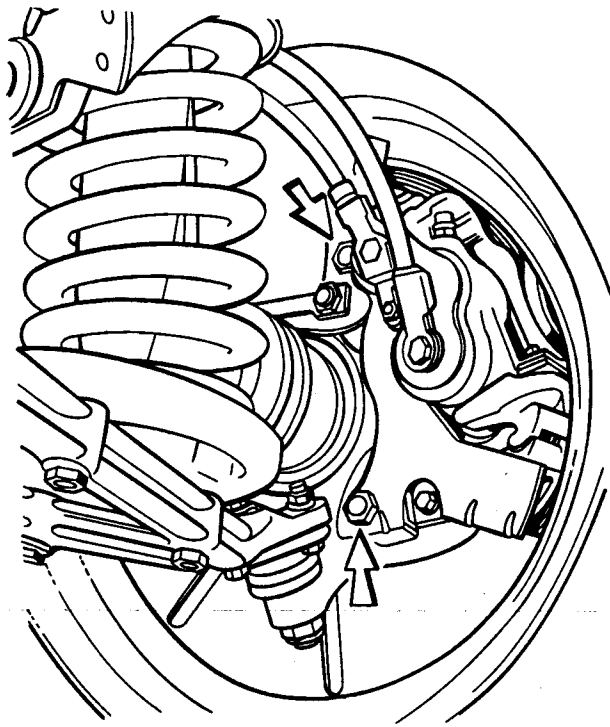


Fig. 6-14. Removing Front Brake:
 Arrows show bolts to be unscrewed for removing brake

DISASSEMBLY AND ASSEMBLY

Pull out the cotter pins, then axles 5 (Fig. 6-13), holding levers 3 to prevent the springs from getting out.

Remove the holddown levers and their springs, then caliper 7 complete with cylinder block 1. Remove brake shoes 2.

Take cylinder block 1 from the slots in the caliper, spreading apart the caliper slots to 118.5 mm. Remove dust caps 3 (Fig. 6-15) from the cylinders.

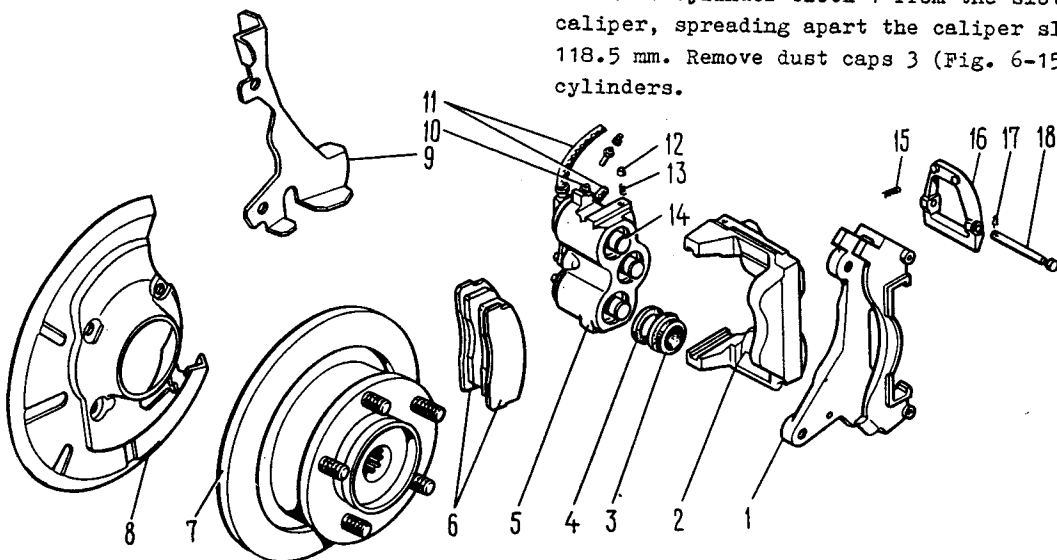


Fig. 6-15. Front Brake Parts:
 1 - shoe guide; 2 - brake caliper; 3 - dust cap; 4 - sealing ring; 5 - cylinder block; 6 - brake shoes; 7 - brake disc; 8 - front brake guard housing; 9 - caliper guard; 10 - bleeder union;

11 - brake hoses; 12 - cylinder block detent; 13 - detent spring; 14 - piston; 15 - holddown lever spring; 16 - holddown lever; 17 - cotter pin; 18 - holddown lever axle

Feeding compressed air through the fluid inlet hole, push pistons 14 out of the cylinder block and remove sealing rings 4.

Assemble the front brake in the reverse sequence, coating the sealing rings, pistons and cylinder faces with brake fluid at assembly; pack the caps with AT-1 grease.

CHECKING BRAKE PARTS

Wash all parts with lukewarm water and detergent, dry them with compressed air and examine carefully.

If traces of wear or jamming are discovered on the piston or cylinder face, replace the cylinder block by a new one, complete with pistons.

Note. In all cases when the piston is removed from the cylinder, it is good practice to replace the sealing ring in the cylinder grooves and the dust cap to ensure satisfactory performance of the system.

RUNOUT CHECK OF BRAKE DISC

Check the brake disc for face runout without removing it from the car (Fig. 6-16). The maximum permissible runout is 0.15 mm shown by an indica-

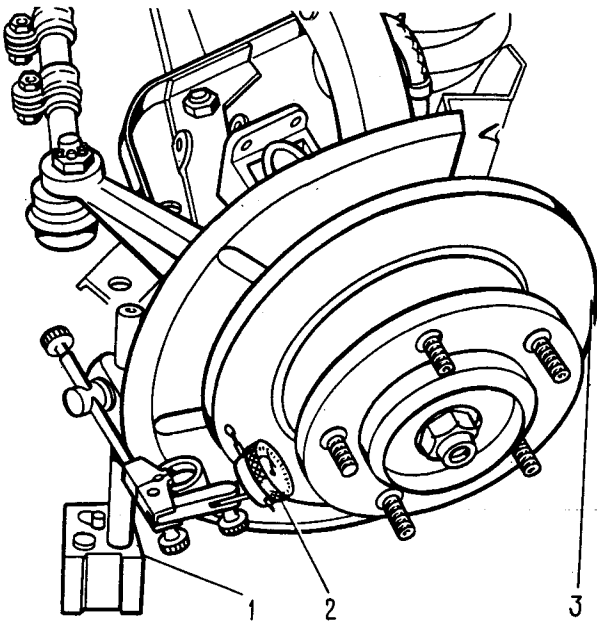


Fig. 6-16. Checking Brake Disc for Face Runout: 1 - magnetic support; 2 - indicator; 3 - brake disc

tor; if it is larger, grind the disc, bearing in mind that the thickness of the disc after grinding should be not under 9.5 mm. If the disc is damaged, deeply notched or worn in excess of 1 mm on each side, replace it by a new one.

REPLACEMENT OF BRAKE SHOES

The brake shoes must be replaced by new ones if the thickness of the linings has diminished to 1.5 mm.

To replace the shoes:

- uncotter the axle of the upper holddown lever, take out the axle and remove the lever; remove the caliper assembly and pull the worn shoes from the slots of the guide (Fig. 6-17);
- push the pistons gently into the cylinders all the way, taking care that the fluid is not splashed out of the brake reservoir and insert new shoes into the guide slots;
- bringing the lower guide slant of the caliper under the lower holddown lever, press the caliper against the shoes, insert the lever axle with its head at the wheel side and cotter up the axle.

The brake shoes must be replaced simultaneously on the R.H. and L.H. wheels.

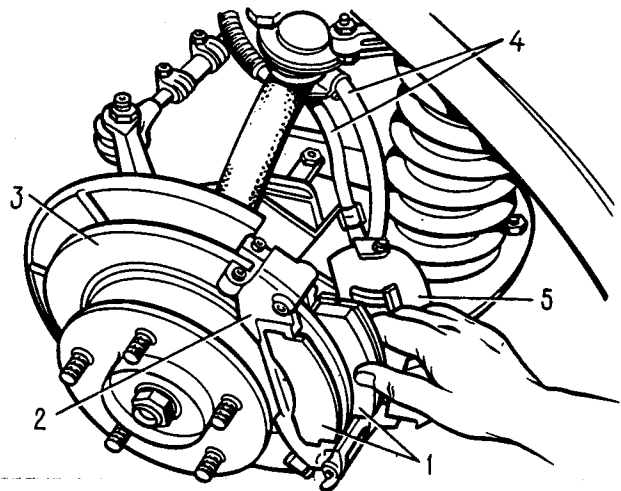


Fig. 6-17. Replacing Brake Shoes: 1 - brake shoes; 2 - shoe guide; 3 - brake disc; 4 - brake hoses; 5 - cylinder block (assembled with caliper)

REAR BRAKES

The design of the rear brake is illustrated in Fig. 6-18.

REMOVAL AND DISASSEMBLY

Lift the rear end of the car and remove the wheel.

Take measures to prevent fluid leaks from the reservoir.

Using remover tool 67.7823.9519 (Fig. 6-19), remove the brake drum.

Disconnect the end of cable 5 (Fig. 6-18) from hand-operated shoe control lever 2, pull out the

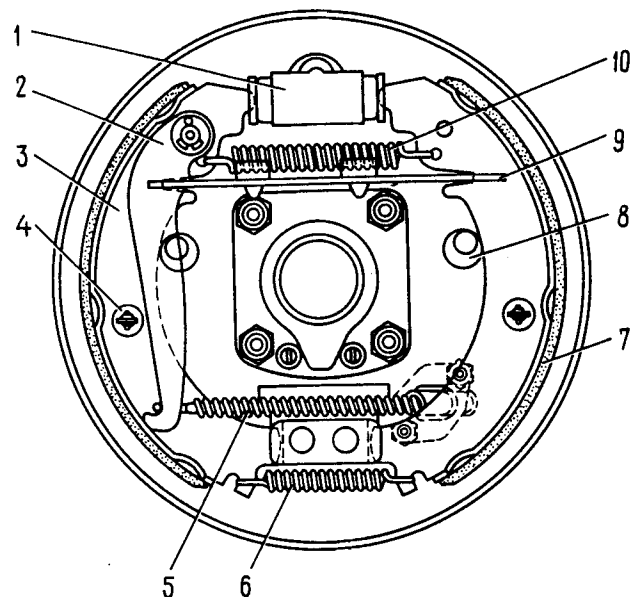


Fig. 6-18. Rear Brake Mechanism:
 1 - wheel cylinder; 2 - hand-operated shoe control lever; 3 - brake shoe; 4 - cup and shoe guide; 5 - parking brake operating cable in casing; 6 - lower pull-back spring; 7 - friction lining; 8 - shoe-to-drum clearance adjusting eccentric; 9 - expander strap; 10 - upper pull-back spring

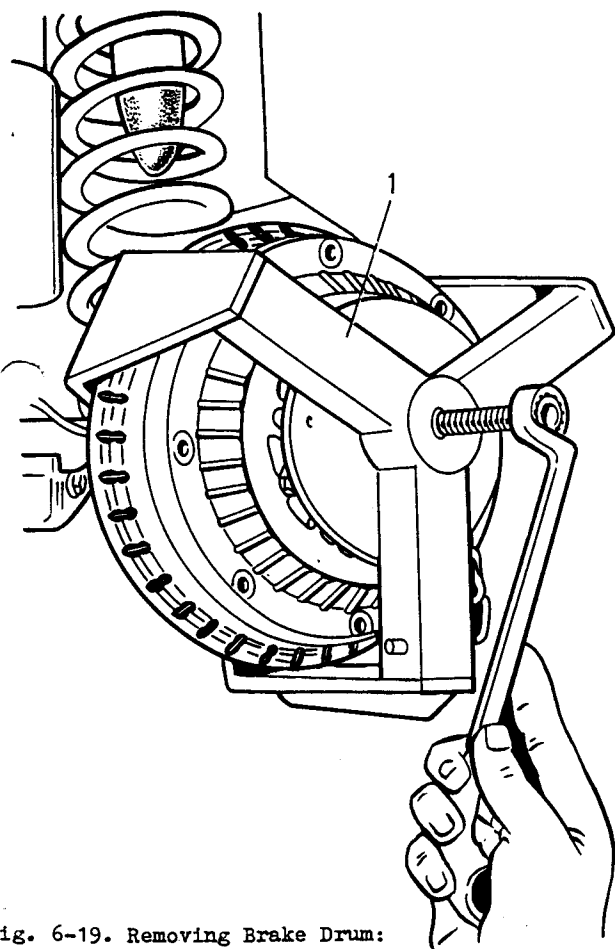


Fig. 6-19. Removing Brake Drum:
 1 - remover tool 67.7823.9519

cotter pin, press on the pin and take off lever 2. Disconnect upper 10 and lower 6 pull-back springs. Turn the shoe guide cups and take them out complete with the shoe guides, springs and lower cups; then remove the shoes complete with expander strap 9.

Detach the fluid feed pipe from the wheel cylinder and stop the inlet holes of the cylinder and pipe.

Remove wheel cylinder 1.

When replacing the backing plate, take off the axle-shaft as prescribed under "Rear Axle" and disconnect the parking brake control cable, unscrewing two bolts which hold it to the brake backing plate.

ASSEMBLY AND INSTALLATION

Mount and secure the wheel cylinder on the backing plate, connect the fluid inlet pipe to it and tighten home the union nut.

Connect hand-operated lever 2 to the shoe and install the brake shoes with expander strap 9; then install shoe guides with springs and lower cups, install the upper cups and secure them on the shoe guides by turning right or left. Make sure that the ends of the brake shoes fit properly into the sockets of the wheel cylinder and on the backing plate.

Install the shoe pull-back springs and connect the end of shoe hand-operating cable 5 to lever 2.

Install the brake drum, first coating the mounting band on the axle-shaft and its flange contacting the drum with graphite or MCH-15 grease and tighten the drum bolts securely. The grease will facilitate subsequent removal of the brake drum.

If the wheel cylinder has been removed during disassembly, bleed the rear brake hydraulic circuit.

INSPECTION OF PARTS

Wheel cylinders. Dismantle the wheel cylinders as follows: take off caps 1 (Fig. 6-20) and pistons 2, take out seals 3, spring seats 5 and spring 7. Then unscrew bleeder union 6. Check the active surfaces of the cylinder and pistons for cleanliness. These surfaces should be perfectly smooth, without roughness so as to rule out fluid

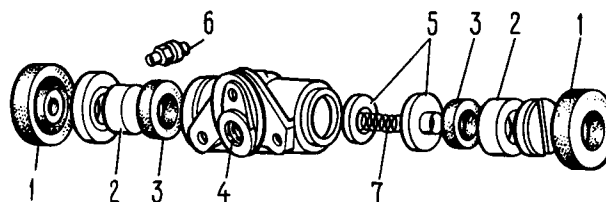


Fig. 6-20. Wheel Cylinder Parts:
 1 - cap; 2 - piston; 3 - seal; 4 - barrel; 5 - spring seats; 6 - bleeder union; 7 - spring

leaks and premature wear of the seals and pistons. Eliminate any defects on the cylinder face by lapping or grinding. However, bear in mind that the cylinder bore must not be enlarged.

Replace seals 3 by new ones. Examine caps 1 and replace them, if necessary.

Examine spring 7. Its free length should be 34 mm, while under a load of (34.3 ± 1.96) N $[(3.5 \pm 0.2)$ kgf], 17.8 mm. Replace it, if necessary.

Coat all parts liberally with brake fluid before assembly. Install the parts in the reverse sequence of operations. After assembly check the pistons for smooth and free motion.

Shoes. Inspect the shoes carefully for damage and distortion.

Check both the upper and lower pull-back springs for resilience and replace them by new ones, if necessary.

There should be no permanent deformations after the lower and upper springs have been stretched by a force of 343 N (35 kgf) and 412 N (42 kgf), respectively.

Check the linings for cleanliness; if dirt or oil is discovered, clean them thoroughly with a wire brush and wash with white spirit; besides, look for penetration of lubricant or oil into the drum; correct any discovered defects.

Replace the shoes by new ones if the thickness of their linings has diminished below 1.5-2 mm.

Brake drums. Examine the brake drums. If the working surface is deeply scored or excessively out of round, rebore the drums on a lathe.

After reborning finish the working surface of the drum on a turning lathe with fine-grain abrasive stones. This will extend the service life of the linings and promote the uniformity and efficiency of braking.

The nominal diameter of the drum (250 mm) after reborning and grinding should not be increased by more than 1 mm. This limit should be strictly observed, otherwise the strength of the drum and the braking efficiency will be impaired.

STAND CHECKS OF REAR BRAKE WHEEL CYLINDERS

Mount the cylinder on the stand, connect a pipe from the pressure gauges to it (Fig. 6-21) and bleed the system.

Adjust stops 1 so that they bear against the wheel cylinder pistons.

Check for absence of fluid leaks. Connect a low pressure gauge; rotating slowly the handwheel of the stand cylinder, set a fluid pressure of 0.05 MPa (0.5 kgf/cm²).

Make sure that this pressure remains constant for 5 min. Repeat a similar test under a pressure of 0.1; 0.2; 0.3; 0.4; 0.5 MPa (1, 2, 3, 4, 5 kgf/cm²).

Reduce the pressure and connect a high-pressure gauge. Observing the above rules, repeat the tests under a pressure of 5, 10, 15 MPa (50, 100, 150 kgf/cm²).

There should be no pressure drop caused by fluid leaks past the sealing elements, pipe joints and bleeder unions or through the casting pores.

A slight pressure drop [not over 0.5 MPa (5 kgf/cm²) within 5 min] is permissible, particularly at high pressures, when it is caused by the shrinkage of the seals.

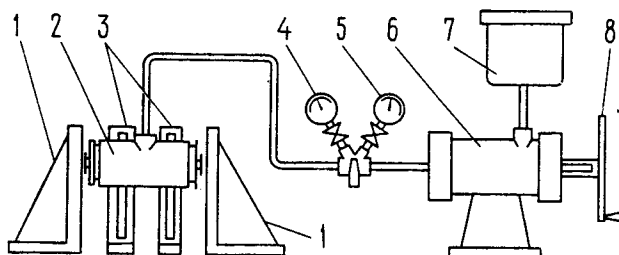


Fig. 6-21. Rear Wheel Cylinder Checking Setup: 1 - piston stops; 2 - cylinder under test; 3 - cylinder bracket; 4 - low-pressure gauge; 5 - high-pressure gauge; 6 - pressure build-up cylinder; 7 - vessel; 8 - handwheel

REAR BRAKE PRESSURE REGULATOR

REMOVAL AND INSTALLATION

Disconnect lever 12 (Fig. 6-22) from link 7, then detach holder 18 from bracket 14 and the clips of the pipes leading to the pressure regulator.

Disconnect the muffler mounting parts from the car body and shift aside the pipeline with mufflers.

Unscrew the regulator-to-bracket and bracket-to-body bolts. Remove the regulator bracket, ease down the regulator and disconnect its pipes.

Remove the regulator and detach its operating lever. Stop the inlet and outlet holes of the pressure regulator and pipes.

To install the pressure regulator reverse the removal operations. Before tightening the regulator bolts install fixture 67.7820.9519 (Fig. 6-7) on the end of the regulator operating lever. Direct the fixture spindle upward to bear against the car body. This will set a distance of (150 ± 5) mm (see under "Adjusting Position of Pressure Regulator") between the end of lever 2 and the body sidemember.

Lift boot 3 (Fig. 6-22) a little and, turning the regulator on its bolts, bring the end of the lever in light contact with the regulator piston.

Holding the regulator in this position

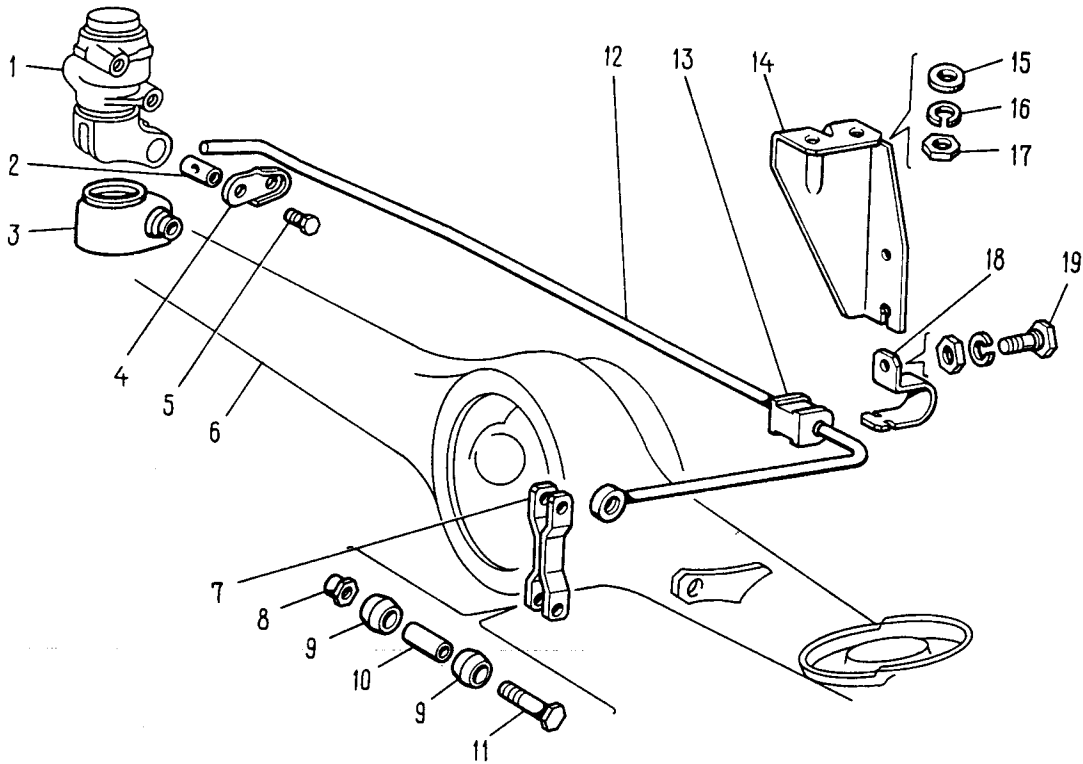


Fig. 6-22. Pressure Regulator Control Linkage:
 1 - pressure regulator; 2 - pressure regulator operating lever axle; 3 - boot; 4 - locking plate; 5 - bolt with spring washer; 6 - rear axle beam; 7 - link from pressure regulator operating lever to rear axle bracket; 8 - nut of bolt 11;

9 - plastic bushing; 10 - spacer bushing; 11 - link bolt; 12 - pressure regulator operating lever; 13 - operating lever supporting bushing; 14 - supporting bushing bracket; 15 - washer; 16 - spring washer; 17 - nut; 18 - supporting bushing holder; 19 - holder-to-bracket bolt

tighten its fastening bolts all the way, then apply a coat of AT-1 grease to axle 2 and to the protruding part of the piston. Put rubber boot 3 in position, having packed 5-6 g of the grease into the boot.

Remove fixture 67.7820.9519 and connect the end of the lever with link 7, first applying AT-1 grease to the bushings of the link-to-lever articulated joint.

Fasten the exhaust system pipes to the car body.

Bleed the brakes to remove any air from the rear brake system.

DISASSEMBLY AND ASSEMBLY

Using wrench A.56124, unscrew the plug, remove gasket 5 (Fig. 6-23), take out piston 10,

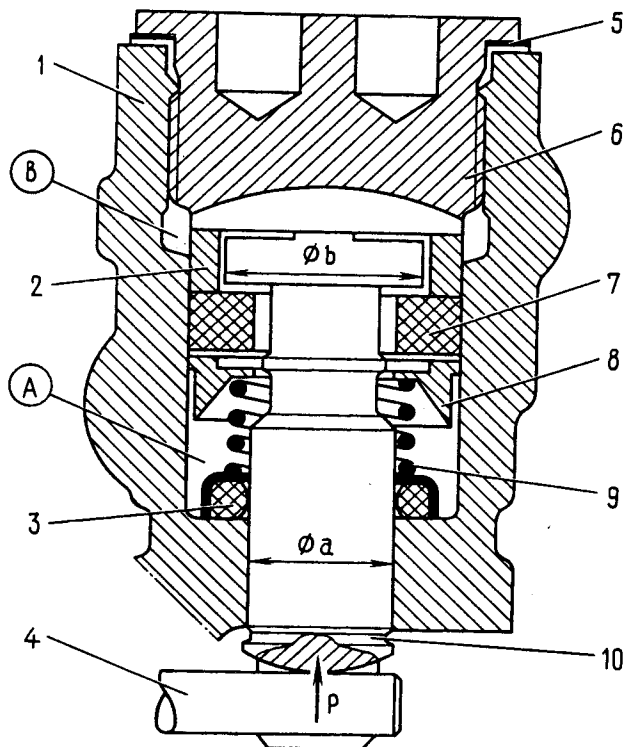


Fig. 6-23. Rear Brake Pressure Regulator (Inactive Position):

A - normal pressure chamber; B - controlled pressure chamber; P - force exerted by regulator lever 4

1 - regulator body; 2 - spacer bushing; 3 - sealing ring; 4 - regulator operating lever; 5 - gasket;

6 - plug; 7 - rubber seal; 8 - spring seat; 9 - piston spring; 10 - piston

spacer bushing 2, seal 7, spring seat 8, spring 9, and thrust washer with sealing ring 3.

To assemble reverse the disassembly operations, lubricating all parts with brake fluid.

Caution

The pressure regulator of the VAZ-2121 car has a recess on the lower part of the piston, to distinguish it from the like regulators of other car models.

Wash the parts with isopropyl alcohol or brake fluid and inspect them. The surfaces of the parts should be free of scratches and rough spots.

Check the condition and resilience of the spring; its free length should be 17.8 mm, while under a load of $(68.6^{+7.84}_{-3.92})$ N $[(7^{+0.8}_{-0.4})$ kgf], 9 mm.

Replace all damaged parts, the seal and the sealing ring.

PARKING BRAKE

REMOVAL AND INSTALLATION

Shift the parking brake lever to the downmost position and disconnect the ends of the cables from the brake shoe operating levers (see "Rear Brakes").

Loosen locknut 5 (Fig. 6-4) and adjusting nut 6, remove return spring 9 (Fig. 6-24) and unscrew completely the locknut and the nut.

Take the front-end fittings of the rear cable from the body floor brackets and the cable casing out of the brackets on the rear axle beam and remove rear cable 12.

Take off the lever guard case, the lever assembly and the front cable.

Pull out the cotter pin, take off the thrust washer and disconnect the front cable from the parking brake lever.

To install the parking brake reverse the removal operations, then adjust it (see "Adjust-

ment of Parking Brake"). During installation apply ЛитоЛ-24 or ЛЦУ-15 grease to the rear cable guide, parking brake lever axle and front cable end fitting.

CHECKS AND REPAIRS

Inspect the parking brake parts carefully.

Replace the cable if its strands are broken or chaffed.

Make sure that the quadrant teeth and the handle latches are intact; replace excessively worn parts.

Check the condition of the spring. It must return the lever reliably to the inactive position.

Examine the casing of the rear cable and the fastening of the end fittings to the casing and make sure that the cable is free to slide inside the casing. Replace the cable if its casing is damaged or the end fittings are loose.

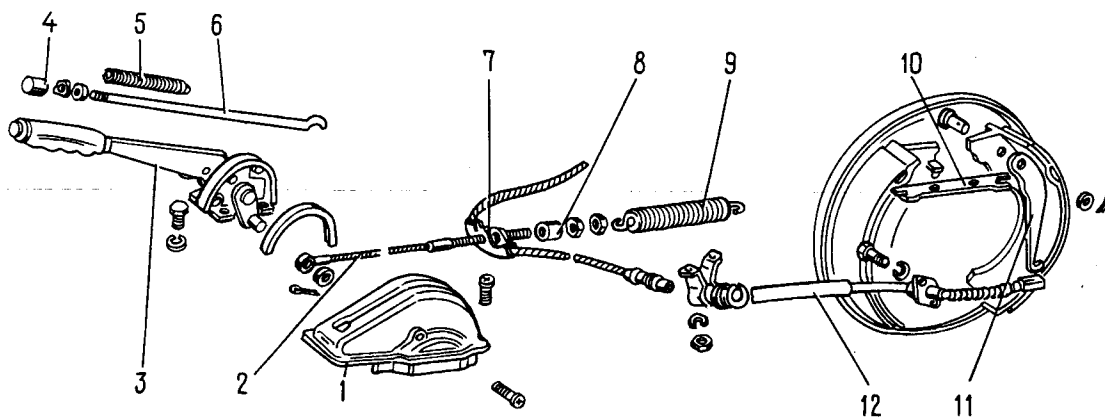


Fig. 6-24. Parking Brake Control Linkage:
1 - case; 2 - front cable; 3 - lever; 4 - button;
5 - rod spring; 6 - pawl rod; 7 - rear cable

guide; 8 - spacer bushing; 9 - return spring;
10 - expander strap; 11 - hand-operated shoe control lever; 12 - rear cable