FILLING, BLEEDING AND ADJUSTING BRAKES

General

The hydraulic system must be refilled and bled whenever one or the other section of a line has been temporarily disconnected or a master brake cylinder or wheel brake cylinder has been removed during repairs on the car. The necessity to bleed the brakes is given whenever the brake pedal can be depressed to the floor board or must be "pumped" to get braking action which very soon diminishes again.

Caution! Brake fluid destroys body finish.

Brake fluid

Only best quality genuine Ate brake fluid or Pentosin Superfluid should be used for the hydraulic brake. They ensure a correct and reliable operation of the brake independent from climatic influences. It is composed of ingredients which will not alter or deform the structure or surface of the brake components. The use of brake fluids (for operation of hydraulic brakes) other than those recommended by the factory will not guarantee perfect and safe operation of the brakes.

Brake Cylinder Lubricant

The sealing components of the hydraulic system must not be lubricated with mineral oil or grease. To ensure a perfect lubrication of the pistons or cylinders resp., the genuine Ate brake cylinder paste has been introduced. This lubricant does not affect the sealing material of the brake system and greatly improves action of the pistons and cups.

The cylinders are taken apart and carefully cleaned in spirit. After they have been allowed to perfectly dry, a thin film of brake cylinder paste is applied onto the pistons and cylinder walls. Then the components are re-assembled. Cylinder paste should be used whenever the cylinders have been disassembled.

13 Ti

Bleeding Brakes using Filling and Bleeding Device

Bleeding Brakes

Two persons are required for bleeding the brakes. Work is always started at the most remote point from the master brake cylinder. The following order should be observed: (Sequence for left-hand drive types)

1. Left rear wheel
2. Right rear wheel
3. Right front wheel, upper wheel brake cylinder
4. Right front wheel, lower wheel brake cylinder
5. Left front wheel, upper wheel brake cylinder
6. Left front wheel, lower wheel brake cylinder

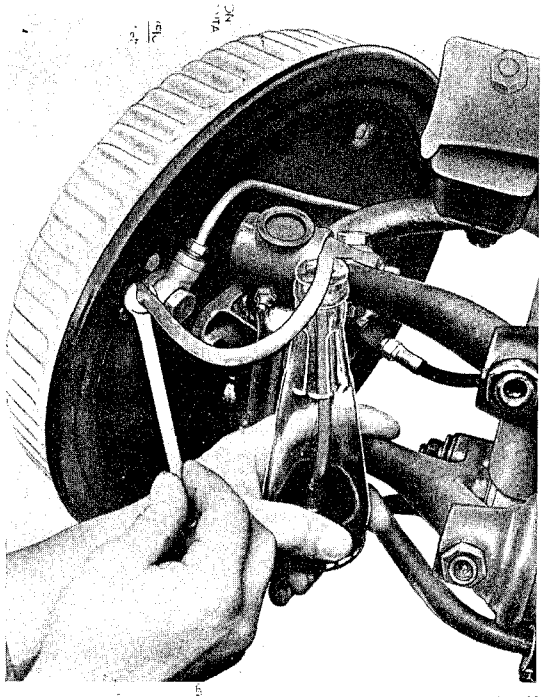

Fig. 33

Bleeding

1. Remove dust cap of bleeder valve at wheel brake cylinder.
2. Push bleeder hose over nipple of bleeder valve.
3. Place free end of bleeder hose in a glass jar which is partially filled with brake fluid.

4. Loosen bleeder valve by approx. one turn, using 7 mm wrench.

5. Strongly depress brake pedal several times and release slowly, repeating until no more bubbles escape from the hose orifice. Whenever releasing the brake pedal close bleeder valve for a short space of time. When doing this, make sure that in any case sufficient brake fluid is available in the reservoir, as otherwise air will be sucked in.

6. When pushing the brake pedal down for the last time, hold it in its lowest position, until bleeder valve is closed.

Brake fluid which is coming out during the bleeding process must on no account be reused.

7. Remove bleeder hose and re-place dust cap.

8. Repeat process on the remaining wheel or wheel brake cylinders respectively in sequence. If necessary, replenish brake fluid in reservoir.

9. Check proper result of bleeding process by depressing brake pedal.

Bleeding Brakes without Bleeding and Refilling Device

14 Ti

General

Bleeding and filling may be accomplished by one mechanic as described below.

For this purpose a filling and bleeding service is required, which on principle operates according to the same method although it may be manufactured by different suppliers.

Before starting work, check whether the device is sufficiently filled with brake fluid. Then the tank is filled with compressed air until the pressure gauge indicates (2,5 atü).

Bleeding

1. Remove dust caps on all bleeder valves.

2. Connect filler hose of bleeder device to upper wheel brake cylinder of left front wheel. Open bleeder valve by approx. one turn.

3. If the reservoir of the master brake cylinder is empty, the shut-off cock at the filler hose of the bleeder device is opened, until the reservoir is filled approx. one third with brake fluid. Close shut-off cock on filler hose.
(If the reservoir is filled with a sufficient amount of brake fluid, point 3 may be omitted.)

4. Keep brake pedal in braking position by clamping it with pedal support.

5. Open shut-off cock on filler hose.

6. Connect bleeder hose to rear left wheel brake cylinder, submerge free end of bleeder hose in a glass container filled partially with brake fluid. Allow the air existing in the brake system to escape by opening the bleeder valve.
Repeat the bleeding process until the brake fluid flows out clear and without any bubbles.

7. Close shut-off cock.

Do not re-use brake fluid which has been employed for bleeding!

8. Repeat procedures 5 through 7, at the right rear wheel, right front wheel upper and lower wheel brake cylinder and left front wheel lower wheel brake cylinder.

9. Release brake pedal. Do not forget dust caps on bleeder valves.

10. Check brake fluid level in reservoir, if necessary replenish.

11. Check whether system is properly bled by depressing brake pedal.

For all other procedures refer to the instruction manual which is supplied along with each device by the respective manufacturers.

For bleeding the brakes, Messrs. Teves recommend to use their device ARC 50.

15 Ti

Flushing the Brake System

When flushing and cleaning the brake system use only best quality brake fluid. Do not use gasoline and other solvents or mineral oil. To use spirit is only allowed if provisions have been made that it is completely removed and no remainders are still in the system.
For flushing the brake system Messrs. Teves recommend to use their device ARC 50.

16 Ti

Adjusting Brakes

General

Due to the loss of brake lining material through normal wear, periodic brake adjustments are necessary.
Wear is indicated when excess free play of the brake pedal is noticed, and the brake shoes require individual adjustment at all four wheels.

Before adjusting brakes, check front wheel bearing play.

Since all of the brake adjusting nuts and screws have a right-hand thread, attention should be paid to the following information:

Brake location	Adjusting nut	Direction of screwdriver handle for tightening
Right rear wheel	Front nut	turn downward
	Rear nut	turn upward
Left rear wheel	Front nut	turn upward
	Rear nut	turn downward
Right front wheel	Upper nut	turn upward
	Lower nut	turn downward
Left front wheel	Upper nut	turn downward
	Lower nut	turn upward

Adjusting

1. Jack up car and release parking brakes, pull off wheel hub cap.

2. Prior to adjusting, completely depress the brake pedal several times to allow the brake shoes to centralize in the brake drums.

3. Rotate brake drum forward until the adjusting hole in the drum is in line with one of the adjusting nuts.

4. Insert a screwdriver through the hole and turn the adjusting nut, using the screwdriver as a lever, until the brake lining contacts the brake drum tightly. Back off adjusting nut by 7 or 8 notches to allow the brake drum to rotate freely.

5. Repeat with other adjusting nut.

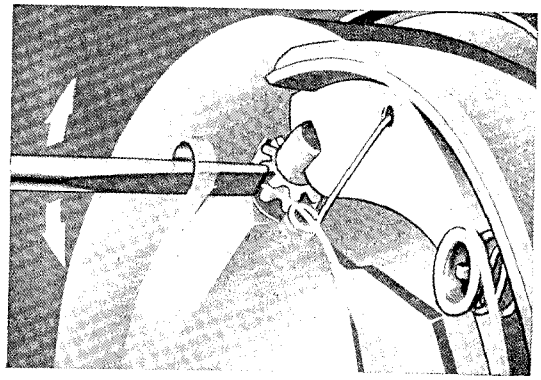

Fig. 34

6. Adjust remaining wheels in similar way.

7. Check brake pedal travel and subject car to a road test.

Readjusting Parking Brake

17 Ti

General

Normal wear of the rear wheel brake linings results in excessive play in the parking brake linkage. Therefore, periodic adjustments to the parking brake are necessary.

To obtain the full braking effect of the parking brake and to eliminate unnecessary adjustment work on the parking brake cables, it is important that the foot brakes be adjusted properly first.

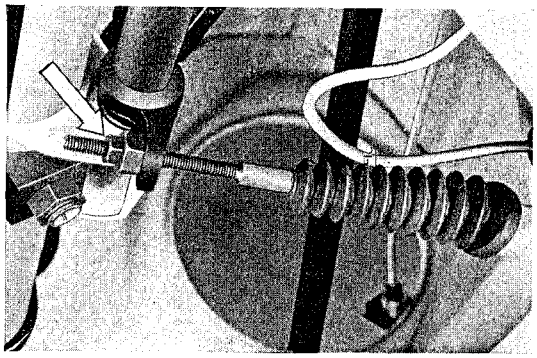

Fig. 35

If the braking effect on both rear wheels is equal during application of the parking brake, adjustment of the nut and center brake cable (see fig. 35) is usually sufficient. If the braking effect is unequal, the parking brake must be readjusted.

Readjusting

1. Jack up car.
2. Pull parking brake and check to see whether brake effect of both rear wheels is equal.
3. Tighten parking brake lever by approx. .275" to .315" (7 to 8 cm).
4. Loosen lock nut of adjusting nut (see fig. 35), tighten adjusting nut until the rear wheels drag, tighten lock nut.

This procedure requires that the rear parking brake cables and adjusting nuts of the brake shoes are properly adjusted, i.e. that the rear wheels show equal braking effect.

Adjusting Parking Brake

18 Ti

Adjusting

1. Jack up car ,remove wheel hub caps.
2. Release parking brake, loosen adjusting nut (spherical nut) on the center parking brake cable by some turns.
3. Adjust foot brake (16 Ti).
4. Pull parking brake until rear wheels turn freely.
5. Adapt parking brake effect on rear wheels by adjusting sleeves on rear parking brake cables. Secure adjusting sleeves by lock nuts.
6. Tighten adjusting nut on center parking brake cable until the rear wheels drag, the parking brake lever should then be tightened to .275"–.315" (7–8 cm).
7. After adjustment has been made, check again whether both rear wheels rotate freely.
8. Secure adjusting nuts by means of lock nuts.

Hydraulic Brake Troubles and Their Cure

Trouble	Cause	Cure
Excessive brake pedal travel	a) Worn brake linings b) Worn brake drums c) Inside dia. exceeding 10.10" (282 mm)	a) Adjust brakes a) Replace brake shoes b) Install oversize shoes c) Replace brake drums
Excessive brake pedal play	a) Missing or worn rubber stop b) Incorrect play of foot brake pressure rod	a) Replace rubber stop b) Correct play between foot brake pressure rod and piston in master brake cylinder
No resistance to brake pedal action or brake pedal can be pushed down to floor board Braking effect only after fully depressing pedal several times	a) Air in brake system b) Fluid amount insufficient in reservoir	a) Bleed brake system b) Replenish brake fluid, then bleed
Brake pedal can be easily depressed, no resistance	a) Torn, burst, chafed or loose-fitting brake line or hose b) Damaged master or wheel brake cylinder cup	a) Replace or tighten brake line or hose b) Replace defective cup
Brake gets hot during driving without being actuated	a) Adjustment of the foot brake too tight b) Broken or weak return spring of brake shoes c) No or insufficient play between brake pedal and piston in master brake cylinder d) Bypass port in master brake cyl. clogged e) Swollen rubber parts caused by unsuitable brake fluid	a) Adjust foot brake correctly b) Replace return spring c) Correct play (Bypass port is covered) d) Debur port and clean master brake cylinder e) Disassemble and clean master and wheel brake cylinders, replace rubber parts. Flush hydraulic system
Rear wheels get hot during driving	a) Parking brake pulled b) Rear wheels do not rotate freely although parking brake is released	a) Release parking brake b) Correct parking brake adjustment

Trouble	Cause	Cure
Poor braking effect despite depressing brake pedal properly	a) Brake linings and drums oiled or greasy	a) Replace defective oil seals, clean drums and replace shoes
	b) Brake linings or drum surfaces burnt	b) Replace shoes, machine or replace drums
	c) Front wheel brake cyl. incorrectly mounted	c) Mount cylinder correctly
Brake blocking when pedal is slightly depressed	a) Burnt or cracked brake linings or drums	a) Replace shoes, machine or replace drums
	b) Brake shoes are jamming or sticking in plungers or adjusting screws resp.	b) Remove burr or rust film on shoes, adjusting screws and plungers to allow easy moving of brake shoes
Brakes do not operate equally	a) One wheel brake oiled up or greasy	a) Replace defective oil seal, Clean brake drum and replace brake shoes
	b) Seizing piston in wheel brake cylinder	b) Overhaul or replace wheel brake cylinder
	c) Different wheel brake cylinders mounted on one axle	c) Install only wheel brake cylinders with equal inside dia. 19.05 mm
	d) Faulty attached or weak return springs	d) Correct position of return springs or replace
	e) Different brake linings mounted on one axle	e) Install only brake linings of equal make
	f) Different brake shoes mounted on one axle	f) Install only shoes of equal make
	g) Different brake drum inside diameter on one axle	g) Machine drums to equal inside diameter
	h) Unequal adjustment of foot brake	h) Adjust foot brake equally
	i) Wear of tires varying or different makes	i) Use only equally worn tires or equal make
	j) Loose brake back plate	j) Tighten brake back plate
	k) Different brake surfaces on one axle	k) Mount only brake drums with equal surfaces on one axle

Trouble	Cause	Cure
Brakes are squealing	a) Brake surfaces oxidized or very dirty (brake dust)	a) Clean brake linings and drum
	b) Brake shoe surface burnt	b) Replace brake shoes
Brakes are rattling	a) Brake surface has uneven contact, only contact on outer ends	a) Adapt brake shoe radius to brake drum radius. Check whether surface appearance print is correct
	b) Brake shoes are not parallel to brake surface. Brake back plate bent	b) Replace brake back plate
	c) Poor tires, tend to rattling noises	c) Replace poor tires by new ones
	d) Brake drums out-of-true	d) Machine brake drums or replace
	e) Excessive play in wheel suspension or back plate, or loose	e) Adjust bearing play or collar pin play. Replace worn parts. Tighten loose bolts
Stop light does not go out	a) No play at foot brake pedal, brake system	a) Bypass port covered, adjust play on brake pedal