

In The Garage

Brake System Service

This is the third installment of Getting Your Pontiac Roadworthy, our focus this month is on the brake system. We are primarily covering cars with hydraulic brakes, those from 1935 on, as these represent the majority of our member's vehicles. Bear in mind that much of the information regarding the brake assembly at the wheel is applicable to either mechanical or hydraulic brake systems. Inspection, adjustment or replacement of brake shoes and/or drums is really independent of the actuating method that applies the brakes.

The brake system on our vintage Pontiac's is rela-

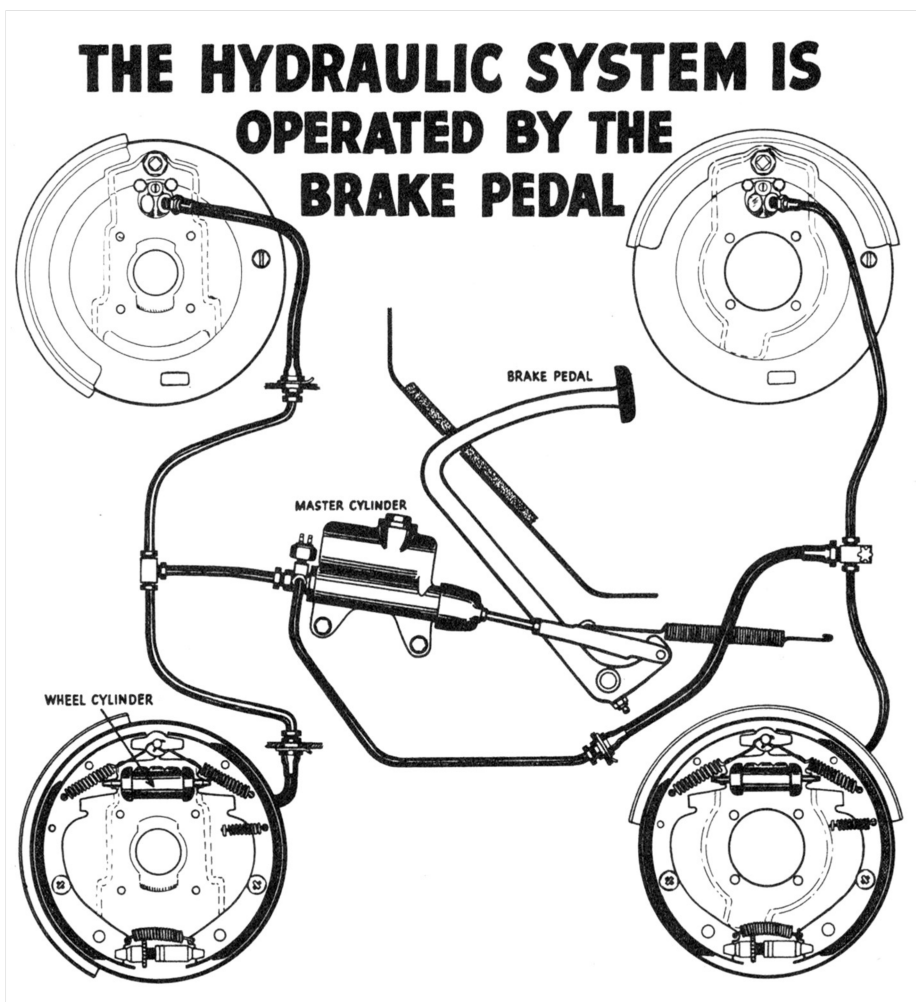
wheel brakes. This differs from cars with 4-wheel mechanical brakes, which often engaged all four wheels from the "hand" brake.

The hydraulic system is a single-circuit system which consists of a master cylinder and four wheel cylinders connected by steel tubing and rubber hoses to allow for steering and suspension movement. Single-circuit means that all four wheels are connected together and a fluid leak, and subsequent loss of pressure, results in a complete loss of braking force. All automobiles built since 1967 require a dual-circuit hydraulic system, which means a single leak point only causes 2 wheels to lose braking ability. It is possible to install a dual-circuit brake system by changing to a split master cylinder and then running brake lines accordingly.

The early dual-circuit systems were split front to back, but since 70% of braking force comes from the front brakes, having only the rear brakes meant very long stopping distances. Try stopping your Pontiac on a deserted country road with only the hand brake and see how far you travel before your car stops moving! Most dual-circuit systems now split the car by opposite corners, so a failure in either circuit means you still have one front and one rear brake working. The car will stop equally well no matter which circuit failed.

The real key here is to prevent having a hydraulic failure by careful inspection and proper maintenance! We will start by checking the level of brake fluid in the master cylinder. It should be between $\frac{1}{2}$ and $\frac{7}{8}$'s of an inch below the opening, if the level is low you will want to visually inspect the entire hydraulic system for any signs of leakage and repair/replace parts as necessary. It may be helpful to have someone hold pressure on the brake pedal while you inspect the line and hose connections. A leaking wheel cylinder is apparent due to brake fluid leaking out of the brake drum onto the inside of the tire, although water will wash it off. A leaking rear axle seal will also leave gear oil streaks on the inside of a rear tire, in either case you will need to remove the wheel and brake drum for further examination.

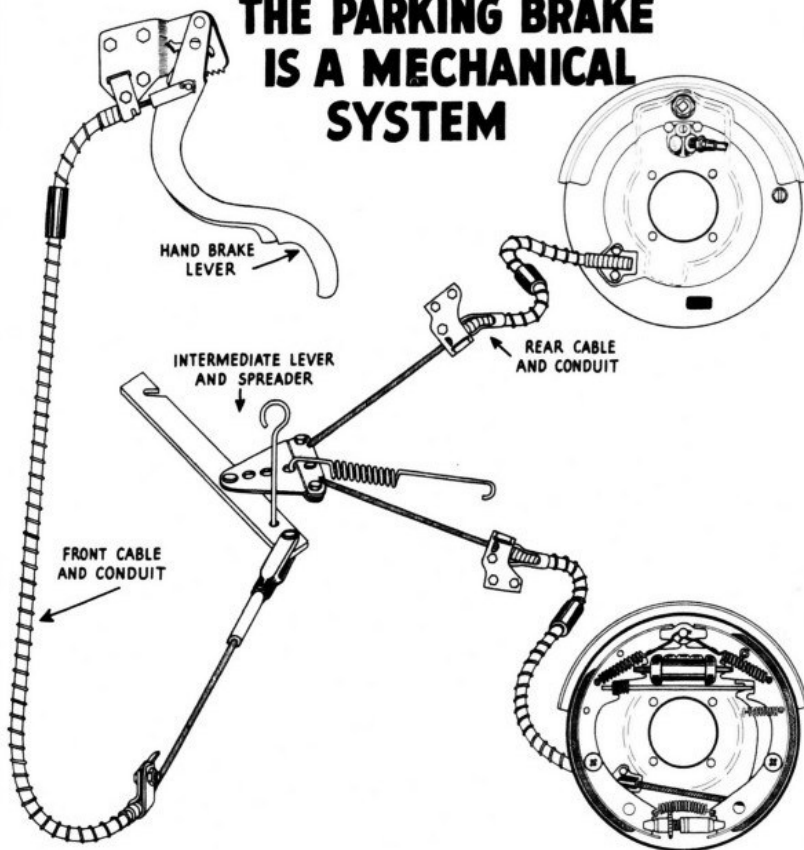
Brake fluid is important because conventional and synthetic fluids **are not compatible!** Conventional brake fluid is amber colored and the container



Typical single-circuit hydraulic system, 1942 Pontiac shown. Note the brake light switch on the master cylinder, also the 3 brake hoses are clearly shown, one for each front wheel and the third at the rear axle.

tively basic, the "service" brakes which operate from the foot pedal, and the hand operated parking brake. The service brakes are hydraulically actuated drum-type brakes at each of the 4 wheels. The parking brake is cable operated and only engages the rear

THE PARKING BRAKE IS A MECHANICAL SYSTEM



The hand brake multiplies force by the use of 3 levers, first at the handle under the dash, second at the intermediate lever and finally by the transfer levers within each rear brake assembly.

should be labeled D.O.T.-3 approved, otherwise find another brand that is labeled accordingly. You should buy it in the small 12oz size because it is hygroscopic; it attracts moisture, which causes rust and corrosion inside the brake system.

Synthetic brake fluid is labeled D.O.T.-5 approved and has a purple color. The big advantage to using synthetic fluid is the fact that it does not attract moisture, but to make the switch, you must completely rebuild the entire hydraulic system and replace every piece of rubber in it! If not, you risk having the brakes fail because traces of conventional fluid remain to contaminate the synthetic fluid. If you are planning to completely rebuild your brake system, you may want to seriously consider using synthetic D.O.T.-5 brake fluid. Be certain to label the master cylinder clearly with a tag indicating that synthetic fluid is installed in the system.

Since conventional brake fluid does attract moisture, and due to limited use, our car's do not often require brake system service, it would be a good idea to bleed out fluid every 4 or 5 years and install fresh fluid. Naturally, if you perform any hydraulic system repair work, you would need to bleed out the air when your work was finished. In either case, bleeding our single-circuit brakes should be done beginning with the wheel closest to the master cylinder

and following along to the one furthest away. The proper order would be: left front, right front, left rear and finally, right rear. It is a good idea to fit a piece of clear plastic hose over the bleed screw and use a cup to catch the old fluid. In this manner, you can tell from the lack of bubbles when the air has been purged from the hydraulic system. Pay attention to the amount of fluid flow at each wheel. You should get an equal amount of fluid at each wheel, each time you open the bleed screw. If not, it is likely that the rubber brake hose to that wheel is bad. They can appear to be in perfect condition and still not allow fluid to flow on the inside. Suspect a bad brake hose if you find that one wheel wants to "drag" when the brake pedal is released.

Assuming that the master cylinder fluid level was OK, I would suggest performing operational tests next. First, with the car sitting still, is the pedal firm when you step on it, or is it spongy? The two likely causes for a spongy pedal are air in the hydraulic system, or brake shoes badly in need of adjustment. As you maintain full pressure on the pedal, does it slowly sink towards the floor? If so, this indicates an internal or external fluid leak somewhere in the system. Carefully examine the entire brake system for fluid leaks, including removing the brake drums to inspect each wheel cylinder. If there is no evidence of an external leak, it has to be internal and the master cylinder will need to be rebuilt or replaced. Internal leakage is past the piston seal in the master cylinder and the fluid merely returns to the fluid reservoir.

How close to the floor does the pedal fall when you step on it? If it is 2 inches or less away from the floorboard, then it is probably time to adjust the brakes. Apply the parking brake; will it hold the car under slight acceleration in Drive or first gear? If not, this is another indication the brakes need adjustment.

Now road test your car on a quiet street or country lane and apply the brakes. When stopping normally, you may find that your brake pedal does not travel within 2 inches of the floorboard. Does your car stop smoothly while continuing to travel straight ahead, or do the brakes grab and/or pull to one side? Assuming it stops smoothly without trying to yank the steering wheel out of your hands, make a severe stop from 30-35mph to determine how the brakes behave under panic-stop conditions. Does it still stop without trying to change lanes or skidding just one or two of the tires? If so, your brakes are in

pretty good condition. If your car did not stop straight and true, you need to remove all of the brake drums and perform a visual inspection.

Brake shoes – a cautionary note. There are still many cars out there with asbestos brake shoes, wear a paper mask and be careful when removing the brake drum to keep the dust at a minimum. Perform a quick visual inspection for obvious fluid leaks, then clean each brake assembly and drum with aerosol brake cleaner before attempting any further service work! I use a pan lined with newspaper to catch the residue, then immediately dispose of the papers into a tightly sealed plastic bag.

Using the appropriate shop manual for reference, compare each of your brake assemblies with the diagram in the manual, you are looking for any springs or fasteners that are damaged or missing.

Look for any signs of brake fluid leakage from the wheel cylinder, and lift up on the rubber boots at each end to see if fluid drips out.

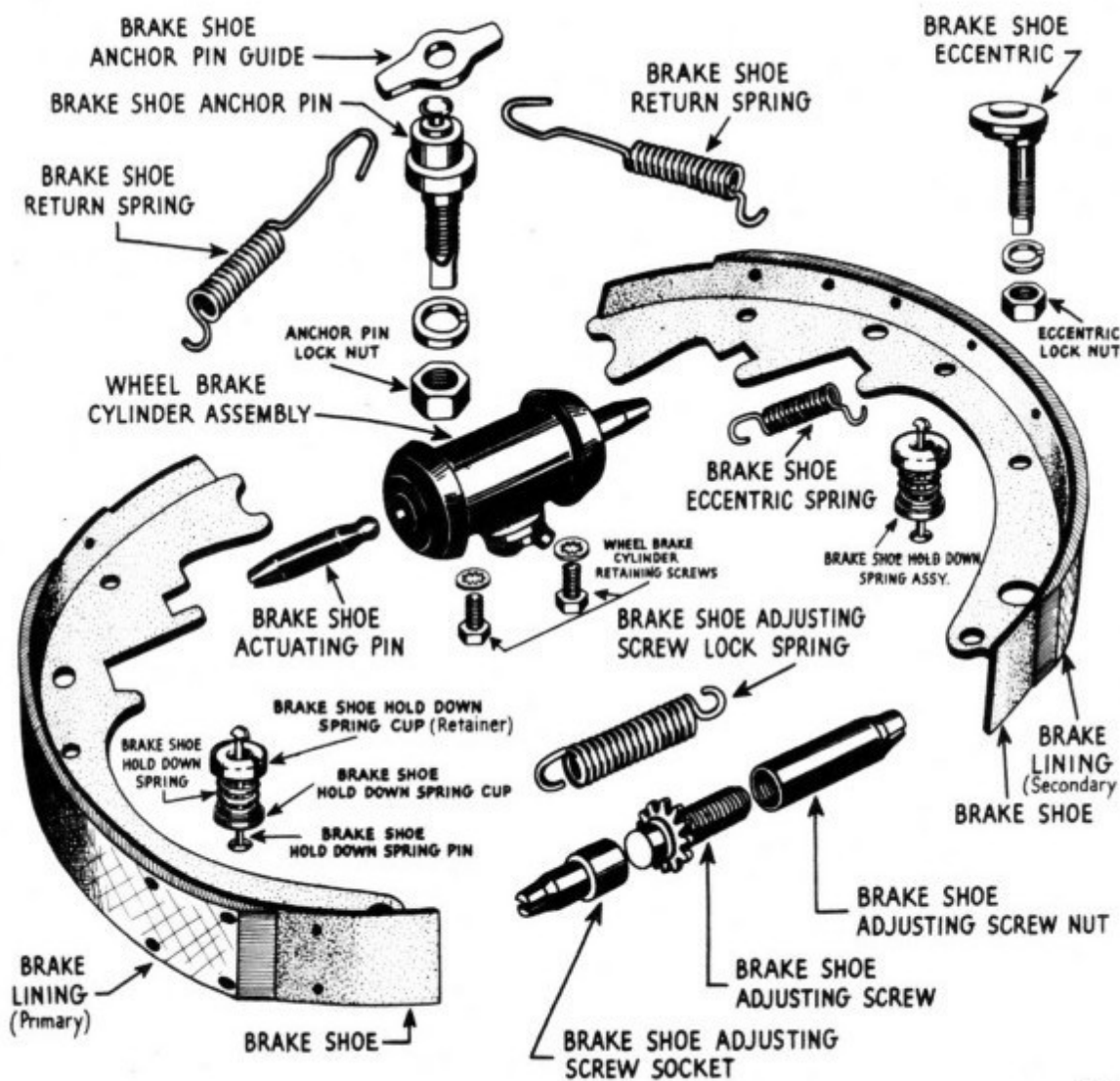
Look for any contamination on the brake shoes from wheel bearing grease or gear oil due to a defective seal. Inspect the amount of lining left on the brake shoes, and also the condition of each brake drum.

Finally, check to be sure that the primary and secondary brake shoes are correct at each wheel. The primary shoes have visibly shorter lining and are mounted toward the front of the car. The secondary shoes have longer lining and always mount toward the

back of the car. Look closely to be sure that you don't have pairs of primary and/or secondary shoes mounted on the same wheel.

I recommend that you read through the brake repair section of your shop manual before you begin your repairs. Especially note what adjustments are required and be sure that those adjustment points operate smoothly before you reassemble the brakes. Be very careful to keep new brake shoes clean, this

BENDIX DUO SERVO BRAKES



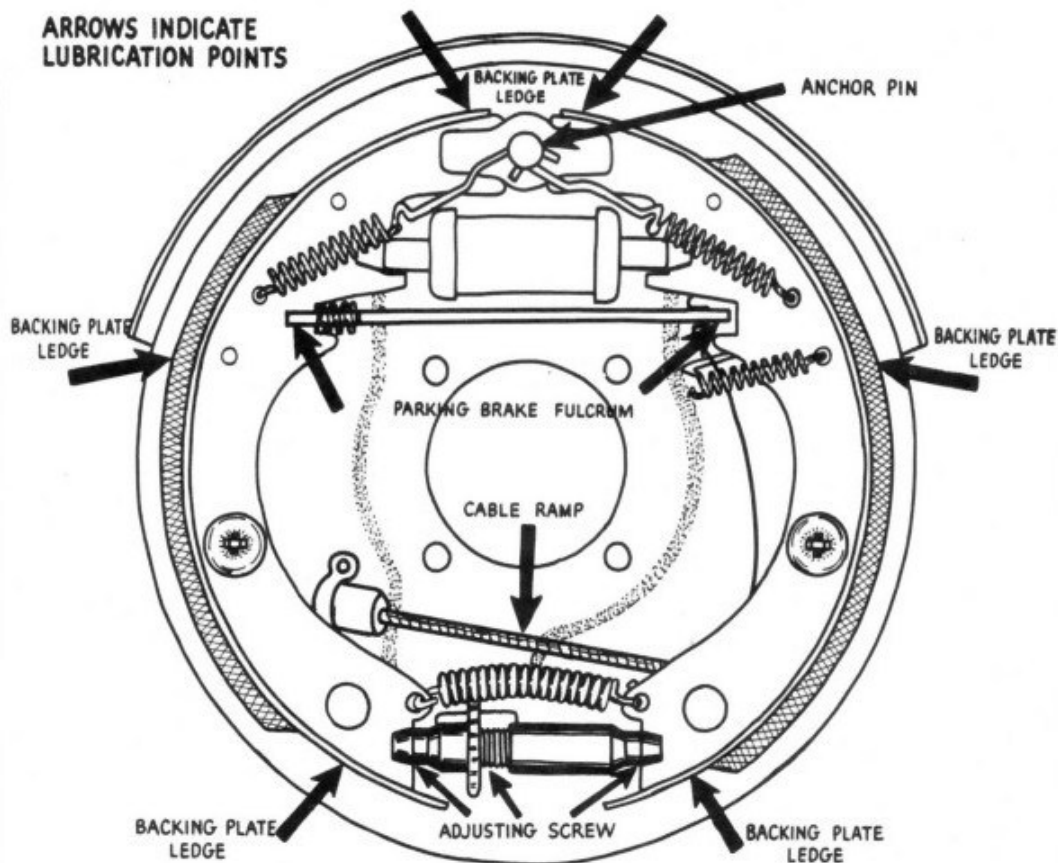
This exploded view dates from 1942. Note the brake shoe eccentric at the top right, this mounts through the backing plate and must rotate freely when the lock nut is loosened. Note also the spring that keeps the secondary brake shoe tight against the eccentric. The central anchor pin is also an eccentric adjustment necessary for proper shoe adjustment.

includes not handling them with dirty-greasy hands! Use grease sparingly on all of the lubrication points within the brake drum. You can buy special high temperature grease specifically to lube drum brakes, or you can use extreme pressure wheel bearing grease. Be sure your wheel bearing grease is labeled NLGI GC-LB, grease meeting this standard has a drop-point (melting point) of 450-500° F and should work just fine inside the brake drum. Don't forget to lubricate the parking brake cables.

The most important aspect of servicing your brakes is properly adjusting the brake shoes. I have included several diagrams that cover various model years, but you should really follow the directions in your shop manual. If you really want your car to stop like it should, it is essential that you properly adjust the brake shoes to the drums as outlined in your manual. This service typically needs to be done only once, when the brake shoes are replaced. Once all of the adjustments are performed correctly, you should only have to adjust the brakes to compensate for normal wear.

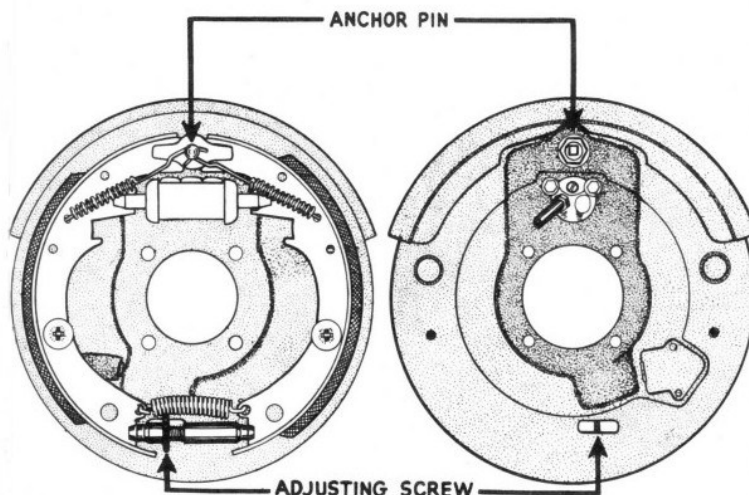
I have spoken with several of our members with pre-1935 cars and they have told me these cars also respond well to proper adjustment of the brake system. It is also essential that mechanical brake systems be properly lubricated, levers and/or cables that stick or drag will certainly have a detrimental effect on the braking action you get when you step on the pedal or pull the brake handle. Properly adjusting the entire system when shoes are replaced is critical to the life and performance of the brake system whether you have hydraulic or mechanical brakes.

Trust me, you will not believe the difference it will make in the way your car stops!

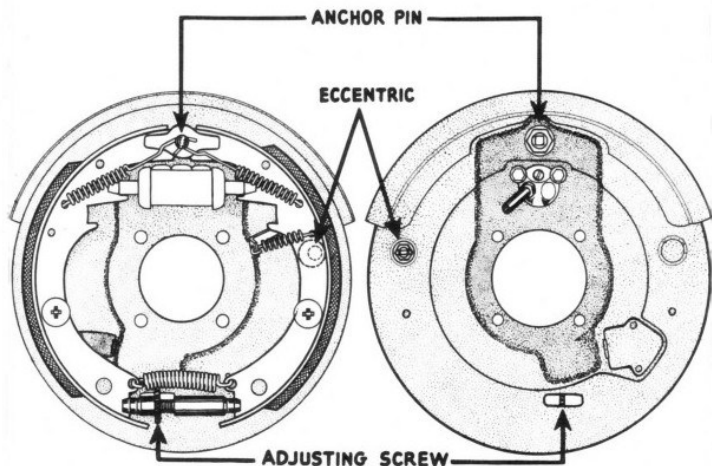


This diagram identifies the lubrication points inside the rear brake assembly, the front brake will be the same except for the parking brake lever and cable. This diagram also happens to show the best view of the primary and secondary brake shoes. You can clearly see the difference in the length of the lining, in this case the primary is on the left and the secondary on the right. This is a small detail that really matters!

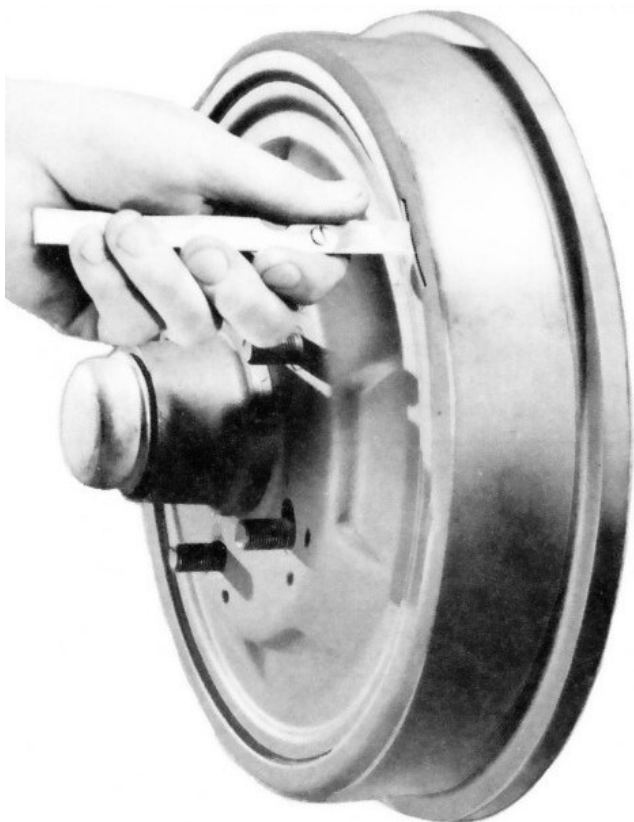
THERE ARE ONLY TWO BRAKE ADJUSTMENTS AT THE WHEEL ON 1939-40 AND 41 PONTIACS



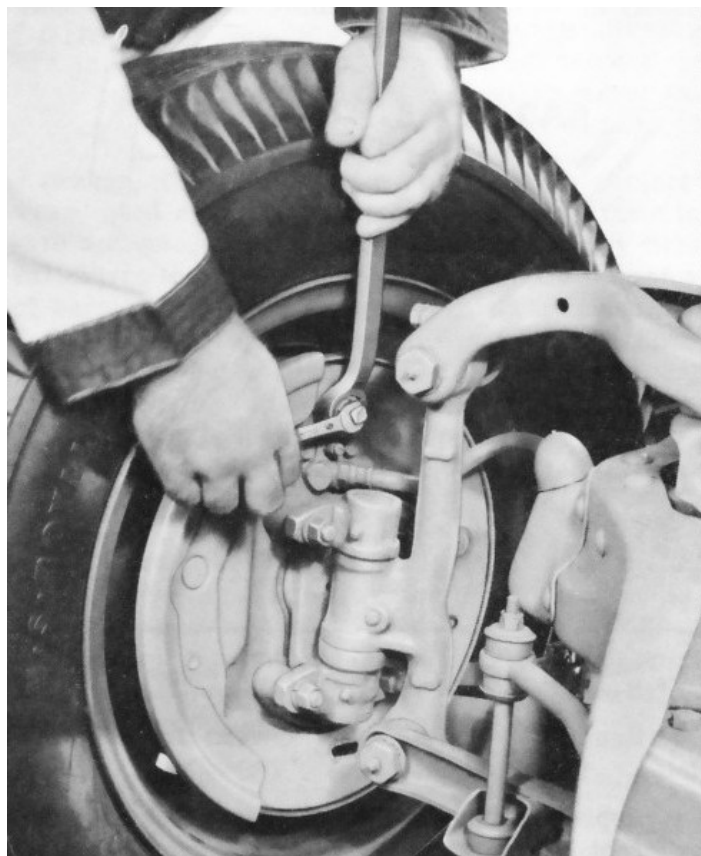
THERE ARE ***THREE*** BRAKE ADJUSTMENTS AT THE WHEEL ON 1935-36-37-38-42 PONTIACS



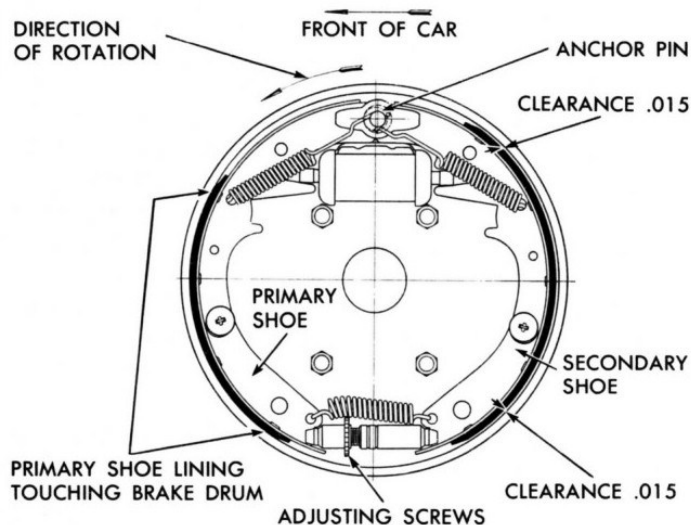
The anchor pin must be adjusted when brake shoes are replaced, if done correctly the first time, it seldom needs further adjustment. The eccentric and brake adjusting screw are both needed to adjust this type of brake to compensate for normal wear of the lining material.



Checking shoe to drum clearance with a feeler gauge
on the 49-54 Pontiac

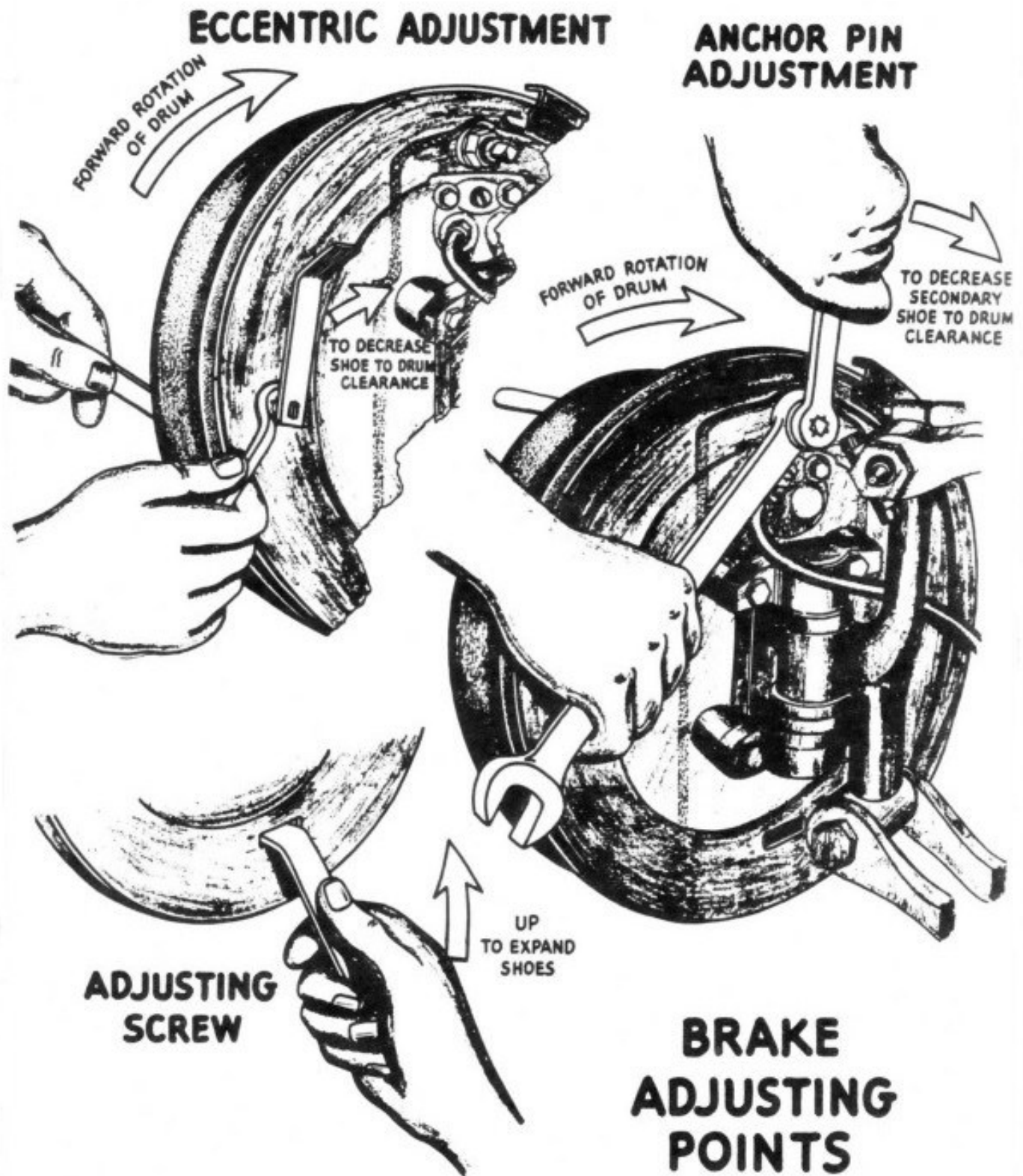


Anchor pin adjustment on the 49-54 Pontiac



LEFT FRONT BRAKE SHOWN

The diagram above shows the proper clearance for brake shoes on the 49-54 brake system. The primary shoe is supposed to contact the drum at both the top and bottom of the lining material. The secondary shoe should have .015 in. clearance top and bottom. The primary shoes can be adjusted as shown due to the normal rotation of the brake drums, it tends to push the primary shoe away. The secondary shoe must have clearance because drum rotation tends to pull this shoe into contact with the drum. This is what is known as "self-energizing" action and the mounting of the brake shoes is intended to enhance this effect.

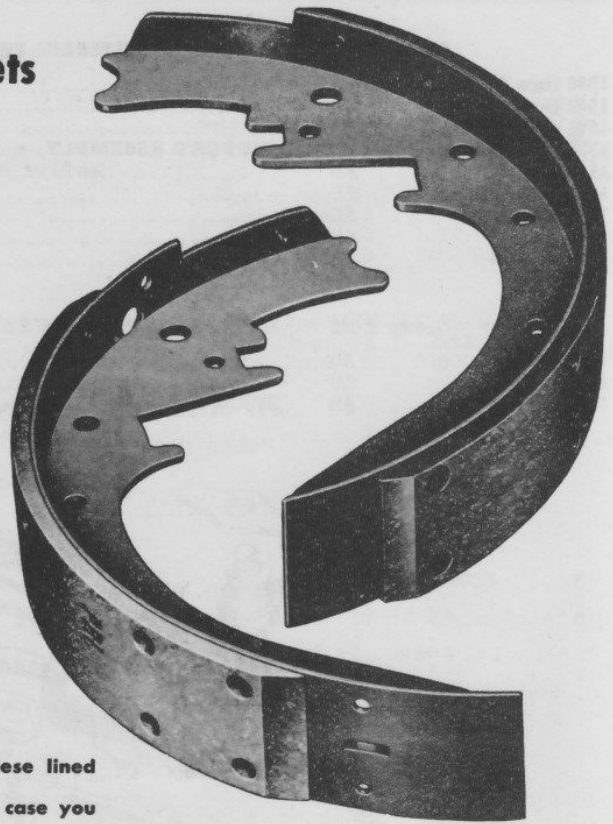


The diagram above shows the 3 adjustment point brake system and explains the effect of each of the individual adjustments. The anchor pin moves the secondary brake shoe closer or further away from the drum. The eccentric screw positions the primary shoe in a similar manner and the "star wheel" adjustment screw at the bottom of the brake assembly expands both shoes outward as necessary to the proper position. It is essential for smooth braking that the primary and secondary shoes simultaneously move into contact with the brake drum. Performing all of the adjustments necessary for your particular Pontiac will insure the minimum of lining wear due to full contact with the brake drum, and also that the maximum braking effort is generated. You will definitely notice a difference in the "feel" and amount of brake pedal travel if the brakes are properly adjusted.

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