Service Reference Book

MASTER TECHNICIANS SERVICE CONFERENCE

SESSION NO. 161

TOTAL-CONTACT BRAKE SERVICE TIPS

PREPARED BY CHRYSLER CORPORATION

PLYMOUTH • DODGE • CHRYSLER • IMPERIAL

Thought Starter

We hear a great deal about engines and "Go Power". A few years back there weren't more than a handful of souped-up sports car models that would get up and go from zero to sixty in less than ten seconds. Today, many of our production models can beat that kind of acceleration performance.

It takes roughly three hundred horsepower under the hood of a car weighing about two tons to turn in that kind of acceleration. This dazzling performance, used with a bit of common sense on modern super-highways, provides an extra margin of safety for passing and *avoiding* danger.

No doubt about it, GO POWER is mighty dramatic and it comes in for a lot of publicity. It certainly steals the show from brakes and "WHOA POWER". Here's a comparison worth thinking about.

We expect our brakes to bring a car to a complete, safe stop, from sixty miles an hour, in less than half the time it takes to accelerate up to sixty! The *deceleration power* packed into about two hundred square inches of brake lining is far greater than the acceleration power produced by 350 or more cubic inches of engine.

When you service a car equipped with total-contact brakes, you're working with two or three times more power potential than you are when you work on an engine. For safety's sake, that margin of brake power is mighty important.

Just as top engine performance depends on expert attention to many details, top-notch brake service depends on meticulous attention to many important little details. Customers who bring their cars back to you for expert brake service have passed up dozens of cut-rate shoe-changing shops because they have confidence in you, your special tools and facilities and the approved service materials you use. Cater to that customer confidence!

When the work you turn out measures up to the fussiest customer's expectations, you'll keep them coming back to you for all their service needs. Equally important, you'll keep them satisfied with the cars your dealership sells. Every time you turn out a job you can be proud of, you've helped set up a customer for a repeat new-car sale.

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INTRODUCTION

This session deals with the diagnosis and correction of *unusual total-contact brake* problems. This Reference Book supplements service information contained in your service manuals and bulletins. It is based on the most recent practical experiences of some of the best brake service technicians in the business and several new service parts developed by Chrysler engineers.

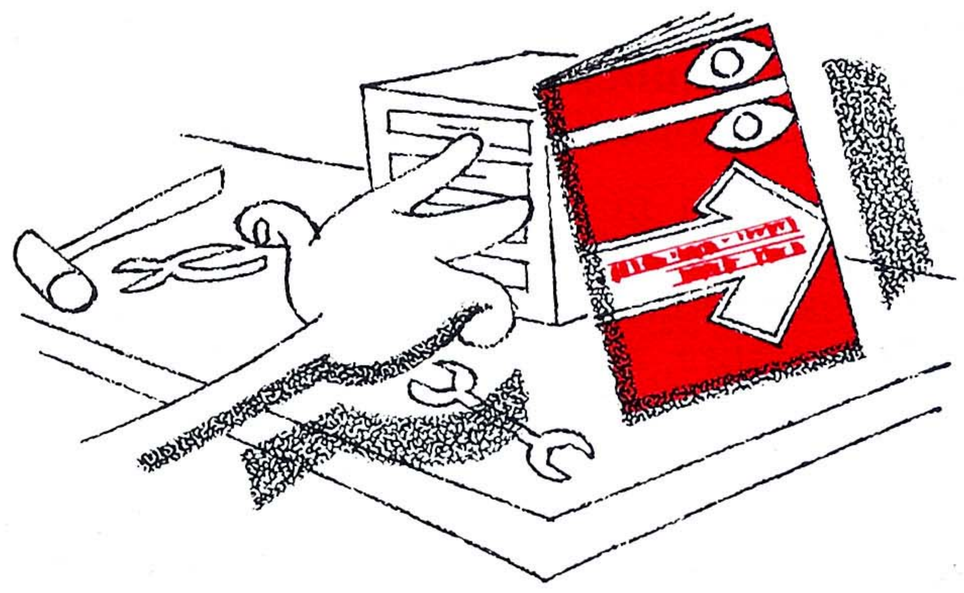
Have you ever had a comeback on a master cylinder replacement that failed to correct a "loss of pedal" complaint? This has happened to more than one brake technician. If you have, there's a good chance that the condition was actually *mechanical* rather than hydraulic. Improper brake shoe return can produce a condition that's easily mistaken for master cylinder trouble. You'll find the diagnosis and correction tips on this condition mighty useful on your next brake job.

A pulsating pedal is another condition that might stump you unless you know what to look for. The practical service tips on this condition will help you locate and correct the cause of this unusual complaint.

If any of your customers do a lot of sustained high-speed driving, you won't want to miss the information on the new water seal for twelve-inch brakes. This new seal will take care of an unusual brake condition that's aggravated by high-speed driving on wet pavement. Then, there's a new brake pedal return spring and a longer master cylinder push rod that will improve pedal return and pedal height on recent, or past model cars.

To round out the story, you'll find complete information on the new mechanical stop light switch.

There's a lot of up-to-the-minute information in these easy-to-read pages. Read them over now so that you'll know where to find these valuable brake service tips when you need them. Keep your copy of this Reference Book handy . . . it will save you time and help you avoid comebacks on your next brake job.



INCONSISTENT BRAKE PEDAL HEIGHT

A condition where brake pedal height and brake pedal travel is not the same on every brake application is very annoying, to say the least. This condition has all the earmarks of trouble in the hydraulic part of the brake system. The fact that pedal travel is normal part of the time, and abnormal at other times, might lead you to suspect fluid leakage past the master cylinder piston. However, don't jump to the conclusion that the master cylinder is at fault. This condition might well be caused by *inconsistent brake shoe return.*

Here's how that can happen. If a shoe is adjusted when it is hung up, the adjusting cam may be backed off too much in an attempt to get rid of shoe drag. This results in a false shoe adjustment and extra pedal travel each time the shoe *does fully return.* Pedal height and travel will be normal each time the misadjusted shoe hangs up and *fails to fully return.*

To avoid comebacks, always check fluid level, bleed the system to eliminate all air, and test for shoe hang-up.

FLUID LEVEL

The first step on any brake job is to make sure the brake fluid in the master cylinder is up to the proper level. If the level is extremely low, there is probably air in the system and it must be bled. If the level is not low enough to permit air to enter the system, add enough Chrysler-approved brake fluid to restore the level to the proper point.

After correcting fluid level, road-test the brakes to determine whether or not the difficulty has been corrected. If the pedal is the least bit spongy, careful bleeding to remove every trace of trapped air is imperative.

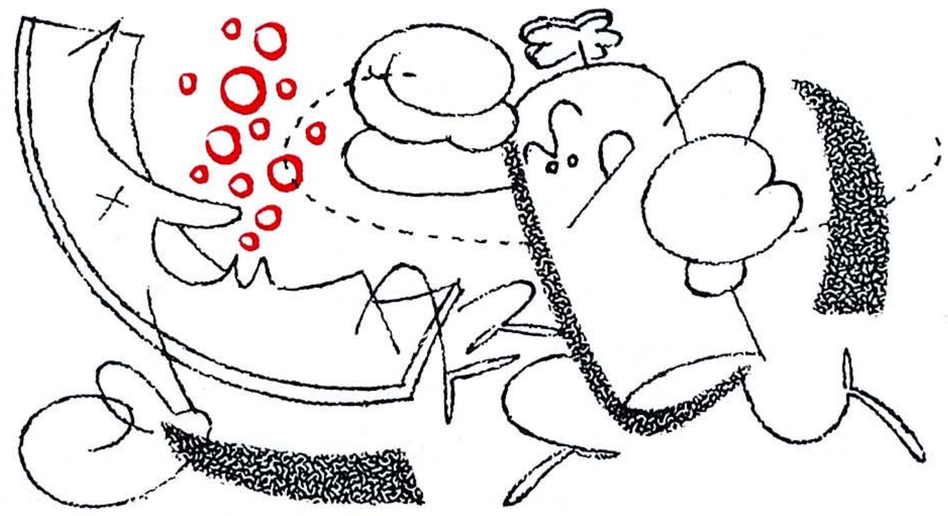
BLEEDING THE HYDRAULIC SYSTEM

It is impossible to overemphasize the importance of correct brake system bleeding. It is extremely difficult to get all air out of the system unless a pressure-type bleeder tank is used. Brakes can be bled without this equipment but the operation takes more time, two men, and requires extreme care to produce a satisfactory bleeding job every time.

Air can form in the lines during a bleeding operation. Bleeding the system by pumping the brake pedal usually fails to provide sufficient pressure, and the proper flow of fluid, to bleed all the air from every line. Also, failure to close the bleeder valve when the pedal is released, sometimes permits air to be drawn into the system through the partially opened valve as the pedal returns to its at-rest position. Air will cause spongy pedal action.

A recommended procedure to overcome this possibility is to always use Brake Bleeder Tank C-3496 and Adapter C-3494A, or their equivalent, whenever bleeding the hydraulic system. A bleed tank will always give the right amount of bleed pressure and the proper steady flow of brake fluid through all the lines to force out all air bubbles.

NOTE: Detailed bleeding and brake shoe adjustment instructions are covered in the Reference Book for Session No. 153. You will find it worthwhile to review and use this information on every brake job.



CAUTION: Whenever a brake shoe drags heavily after the adjusting cam has been backed off an amount equal to one-half inch of wrench travel (measured at the edge of the dust shield), test for brake shoe drag.

TEST FOR BRAKE SHOE HANG-UP

Position the car over the hoist. Apply the brakes several times, before lifting the car. Rotate each wheel forward and backward to test for brake drag.

Figure 1—Use pressure tank to bleed brakes

Figure 2—Test for brake drag

If there is any evidence of brake drag, it might be due to a shoe hanging up. Tap the tire of that wheel several times with a rubber mallet, parallel to the spindle or axle shaft, just enough to jar the brake shoes. It is not necessary to strike the tire a heavy blow, several light taps of the mallet will do the trick. *Do not strike the dust shield.*

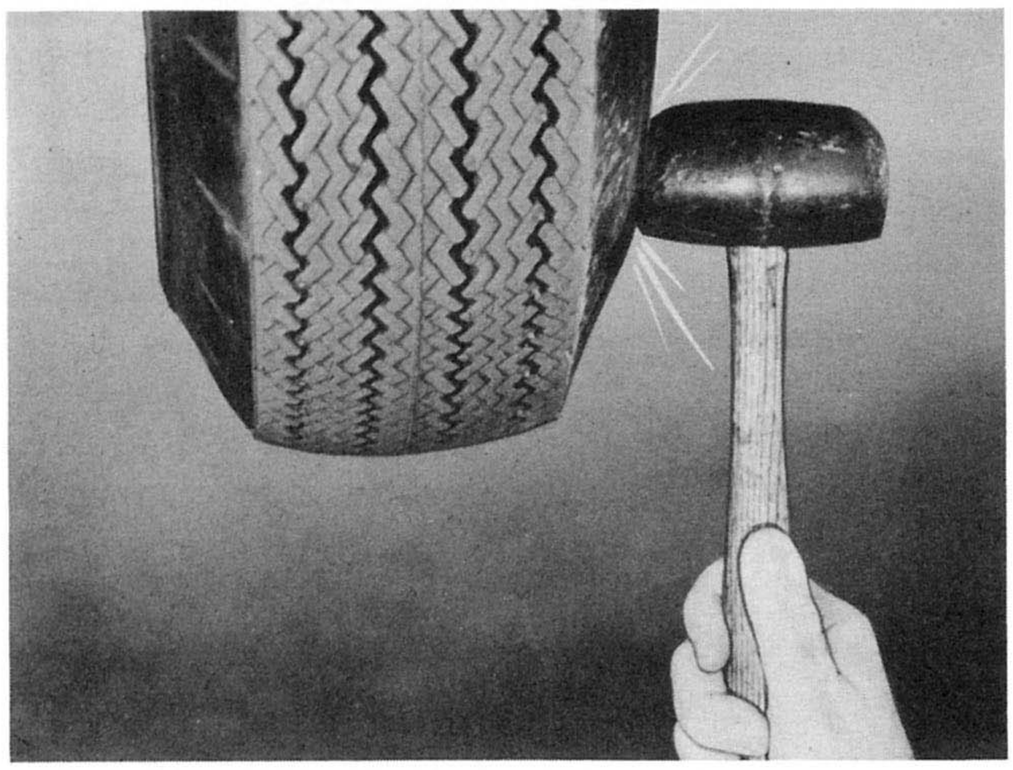
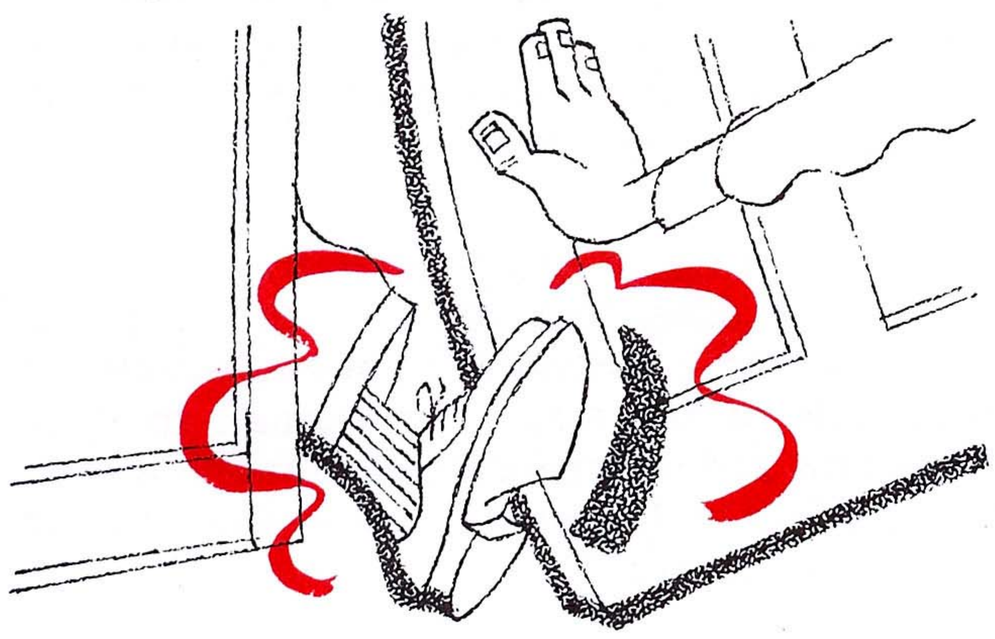


Figure 3—Use rubber mallet to release shoes



Again, test for brake drag. If the wheel now turns freely, it would indicate that the brake drag was due to the shoes hanging up on the raised shoe platforms on the dust shield. They had not returned to the fully released position, when the brake pedal was released. The drums must be removed to locate and correct this condition.

REMOVE DRUMS

Back off the brake shoe adjusting cams to provide maximum lining to drum clearance and remove the wheels and drums. When removing the rear drums, be sure to use an approved drum puller, such as C-845.

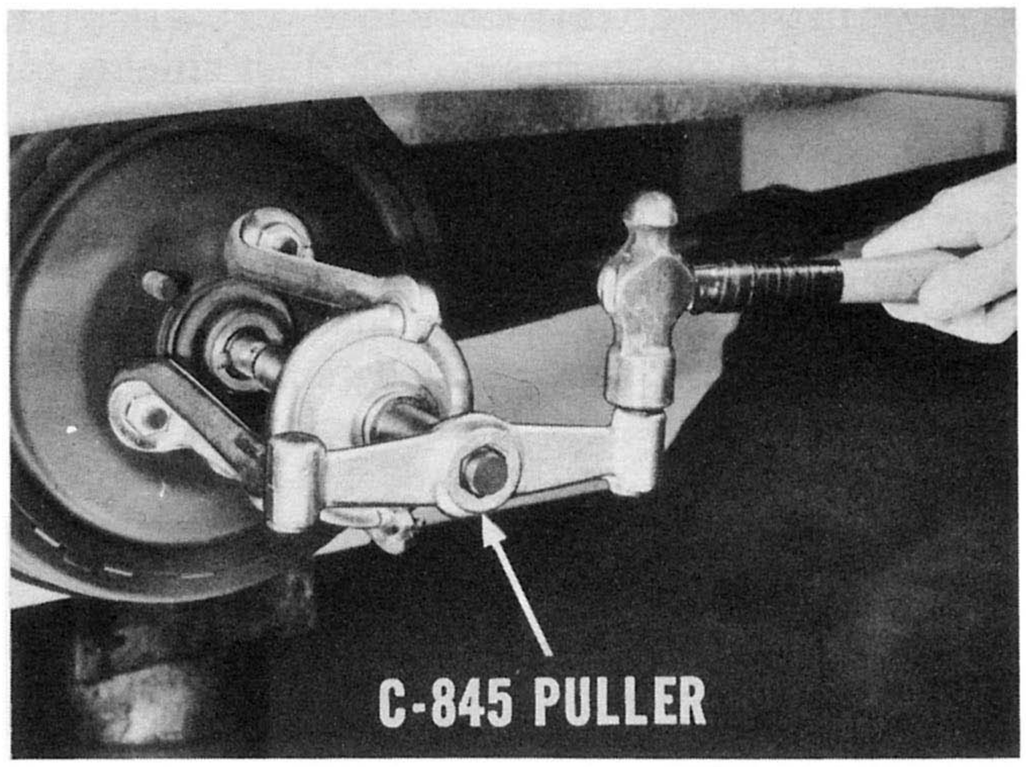


Figure 4—Use puller C-845 to remove rear drum

Do not use a knock-out-type puller, since its use may damage the axle shaft thrust block or rear wheel bearings.

Handle brake drums with care! Avoid dropping or bumping them against hard objects. Rough handling can damage drums or cause drum distortion.

REMOVE BRAKE SHOES

Next, disconnect the brake shoe return springs, using Remover C-3462, and remove the shoe retainers, springs and rods. Then, remove the shoes by sliding them from between the support plates.

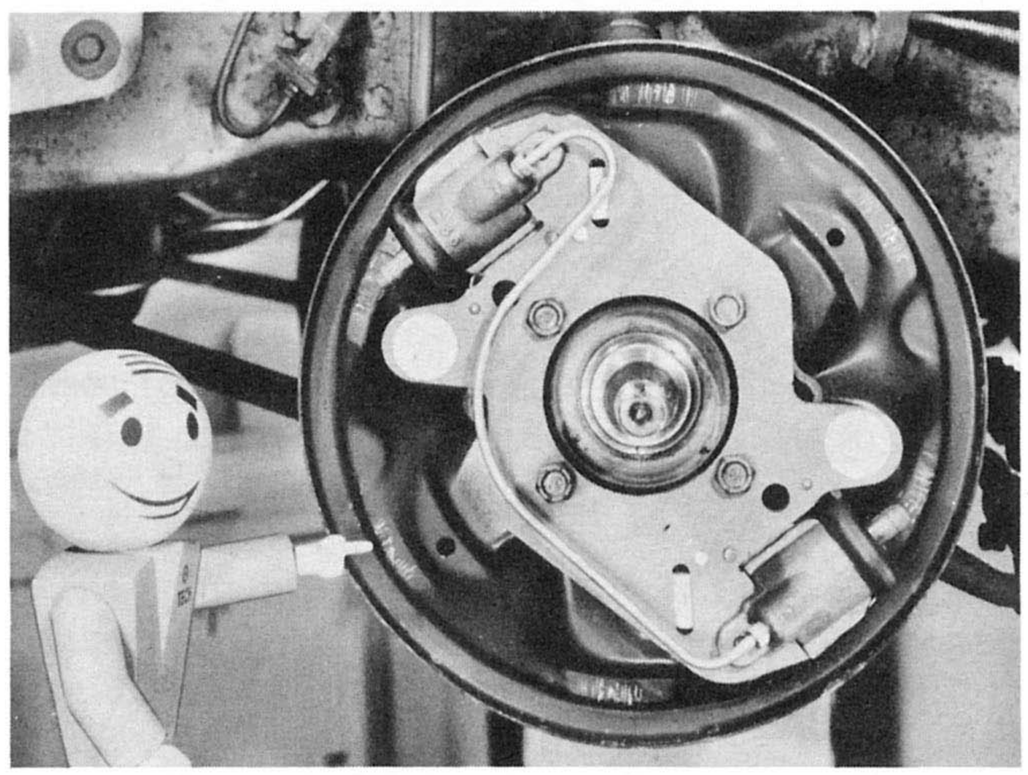


Figure 5—Scuffed brake shoe platforms

Cleanliness, including grease-free hands, is a must on all brake work.

Remove the dust and dirt from the supports and dust shields by wiping with a cloth, then,

use compressed air to blow out all dirt. Examine the platforms on the dust shields for gouges, burrs or build-up of paint which would cause the shoes to hang up. If there is a build-up of paint on the platforms, it can be removed by scraping. However, use care to avoid gouging the platform metal. If the platforms are scuffed or gouged, smooth off the rough spots with fine emery cloth.

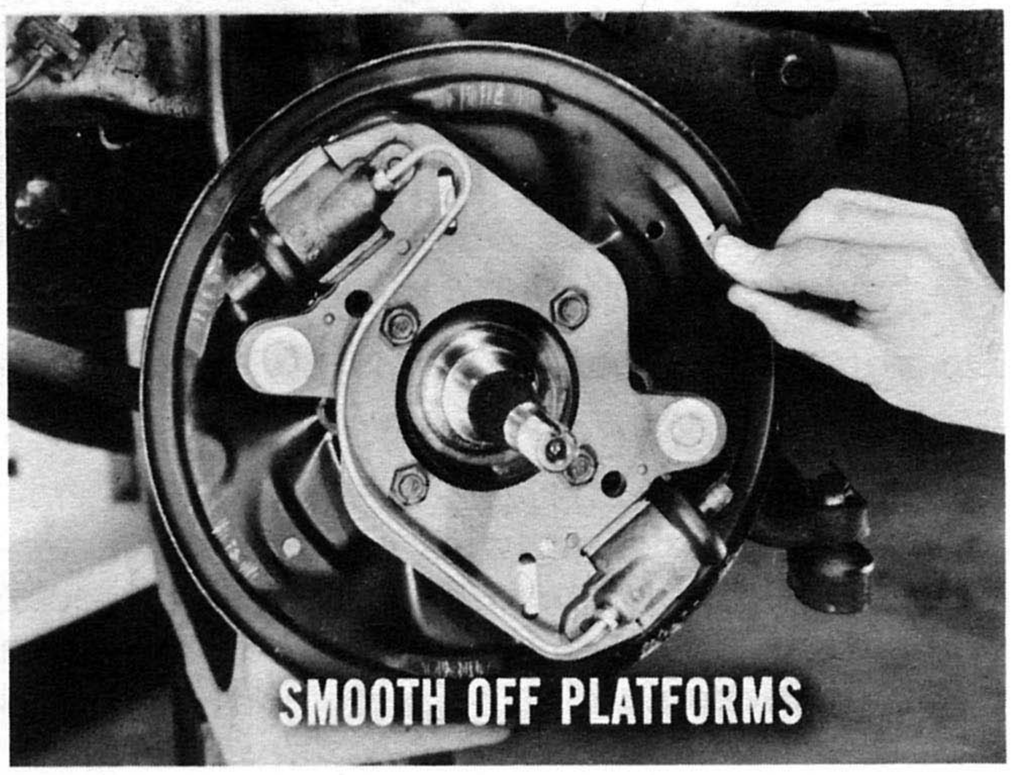


Figure 6—Smooth off platforms with emery cloth

INSPECT SHOES, LOOPS AND LININGS

Look the shoes over to be sure they are approved shoes. Approved shoes can be identified by the letters D P C D stamped on the web of the shoe. Don't take a chance on questionable shoes, replace them with approved shoes and linings.

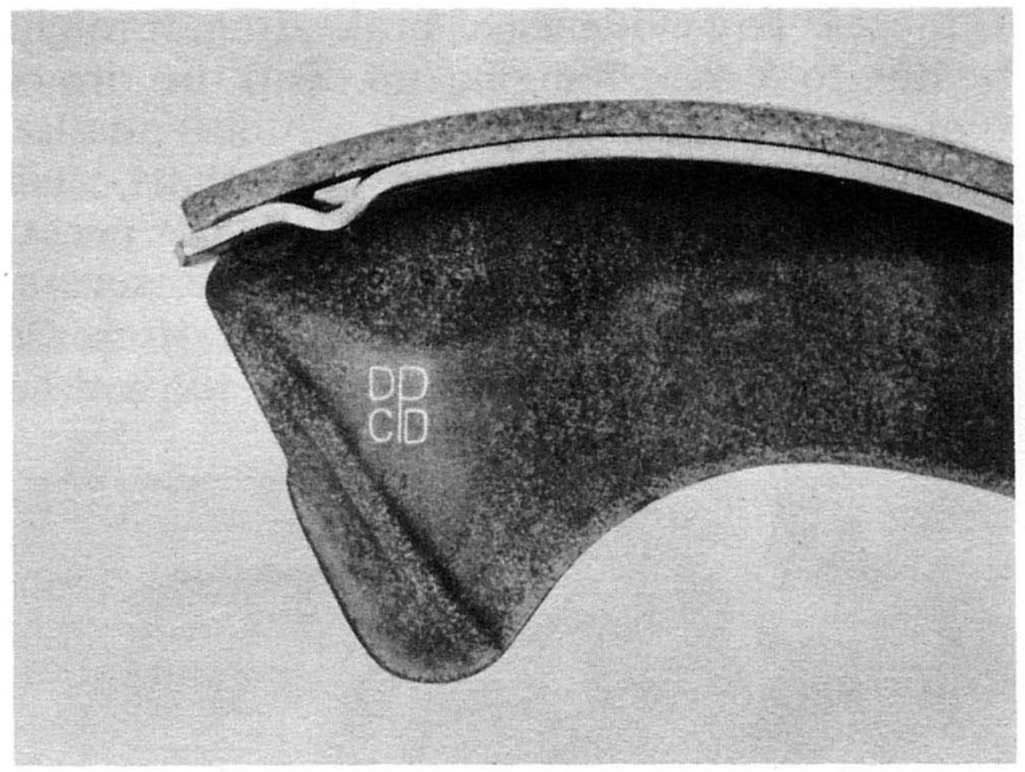


Figure 7—Chrysler-approved brake shoe

Examine the lining wear pattern. An uneven wear pattern often means the shoe is twisted. This can cause a shoe to bind at the platforms or support plate. If the shoes are twisted, they should be discarded and new ones installed.

Examine the contact loops for burrs or sharp edges. Look for shiny spots on the shoe web caused by rubbing against the support plate. *There must be clearance between the support plates and the shoe web.*

Remove all rough edges or burrs with a fine file. Dress down the edges of the loops and the shoe for a distance of about a half-inch each side of the loop—just enough to insure a smooth sliding surface. If too much metal is removed, it will result in poor shoe contact, and brake noise.

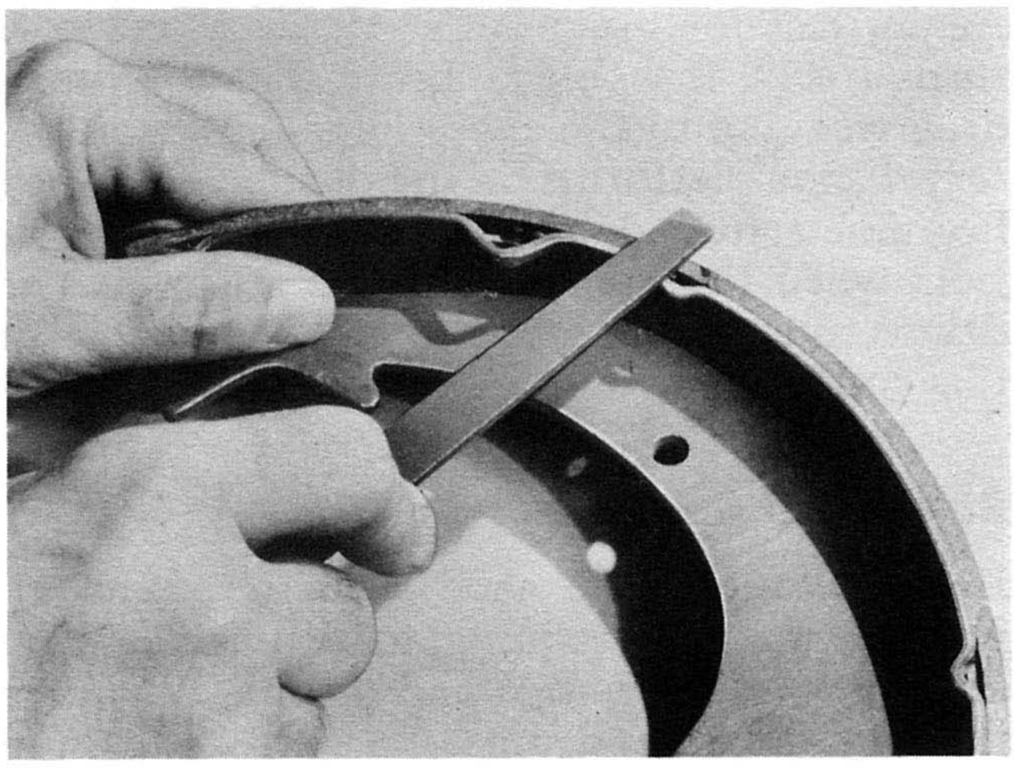
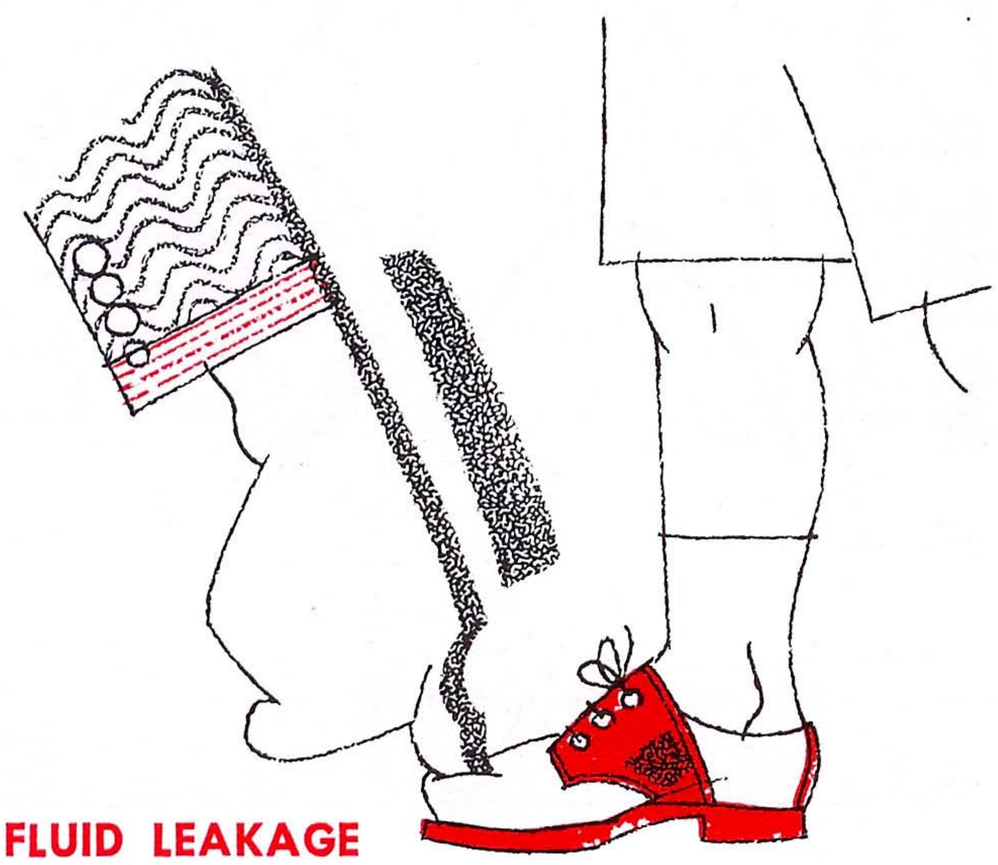


Figure 8—Remove rough edges from shoe loops

A condition to look for on both new or relined shoes is lining overhang on the dust shield side of the shoe. If there is evidence of this, dress down the lining with a file and make sure all edges are smooth.

SHOE AND DRUM RADIUS

A good point to bear in mind before installing new or rebonded shoes is to place the shoes in their respective drums and measure the toe and heel clearance with a feeler gauge. This clearance should measure .004″ to .005″. The factory-approved bonded shoes are cam-ground to provide that clearance.



FLUID LEAKAGE

Before installing the brake shoes, roll back the boots on the wheel cylinders and inspect them for evidence of fluid leakage.

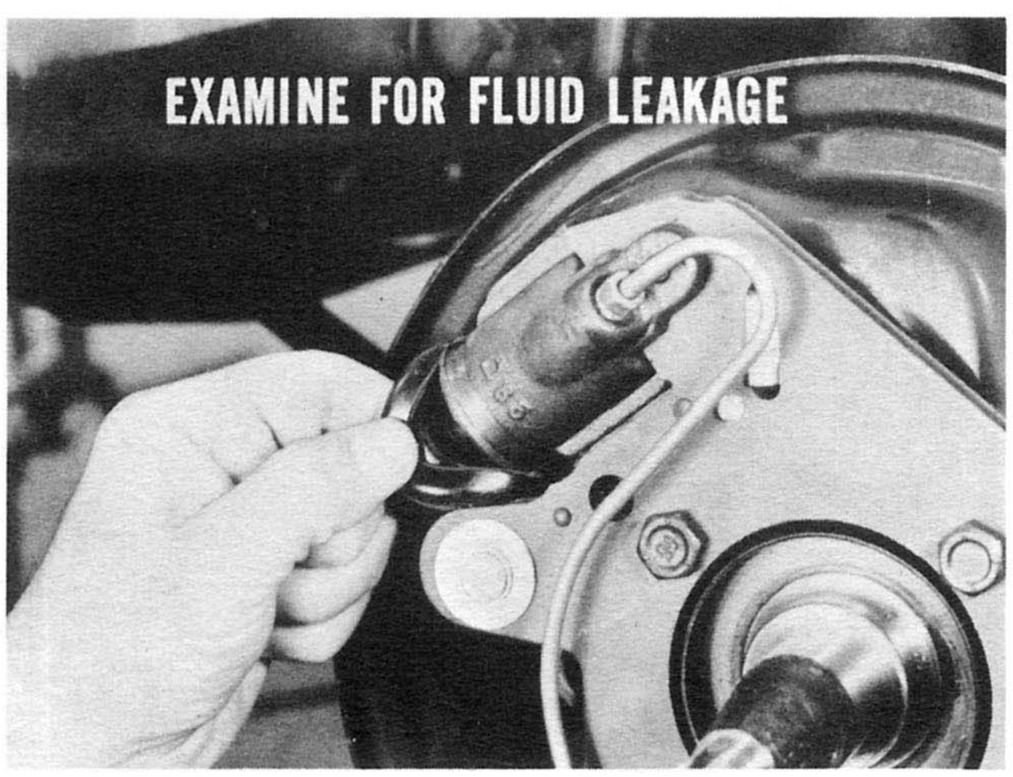


Figure 9—Inspect for wheel cylinder fluid leakage

WHEEL CYLINDERS

If there is fluid in the boots, the pistons, the cups, or the wheel cylinder bores are worn. The wheel cylinder should be reconditioned. Be sure to use approved parts.

If, while examining the wheel cylinders for fluid leakage, it is noted that the boots are the early type with the lip, it is recommended that the later type without the lip be installed. The new type boot does an excellent job of keeping out water and dirt.

RETURN SPRING LINKS

The return spring links should be inspected to be sure they are free in the supports and that the end opposite the adjusting cam is in position around the rivet rather than around the dimple in the support plate.

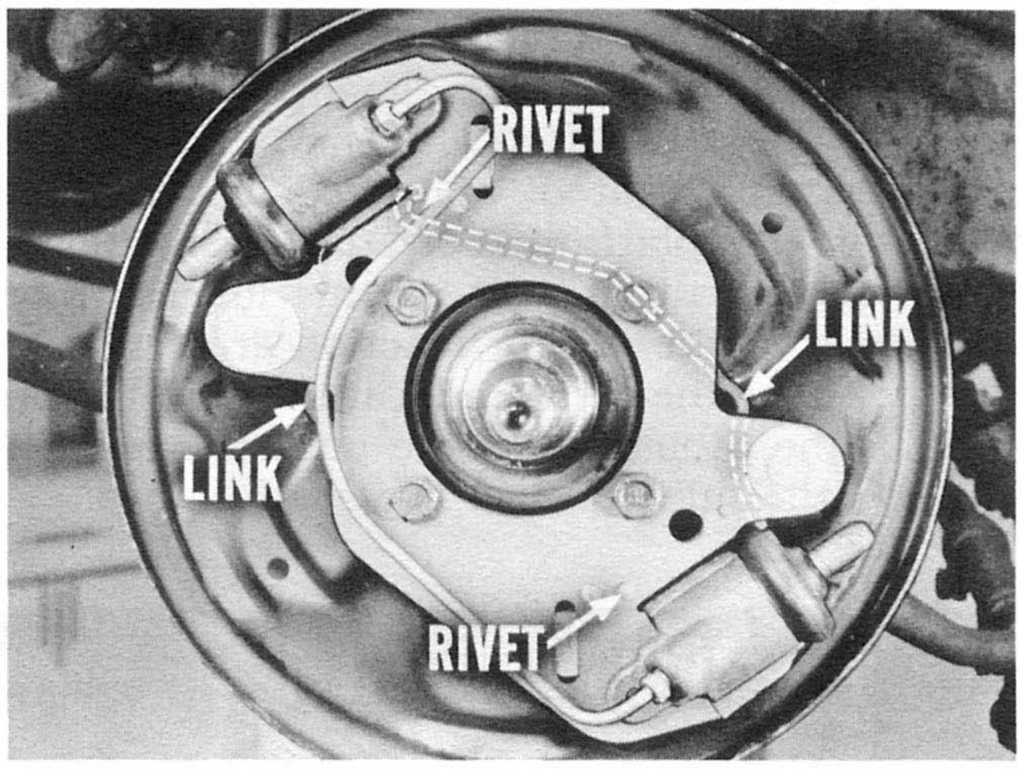


Figure 10—Inspect position of spring link

ADJUSTING CAMS

Also, test the adjusting cams to be sure they do not turn too freely. Cams that turn too freely will not maintain proper shoe adjustment. If the customer has reported any difficulty in maintaining a satisfactory brake adjustment, test cam movement with a torque wrench. A torque of at least seven foot-pounds should be required to turn the cams.

Loose cams can be tightened by *removing the support plate assembly* and peening the stud end of the cam.

Care should be taken to avoid bending the support plates during the peening operation.

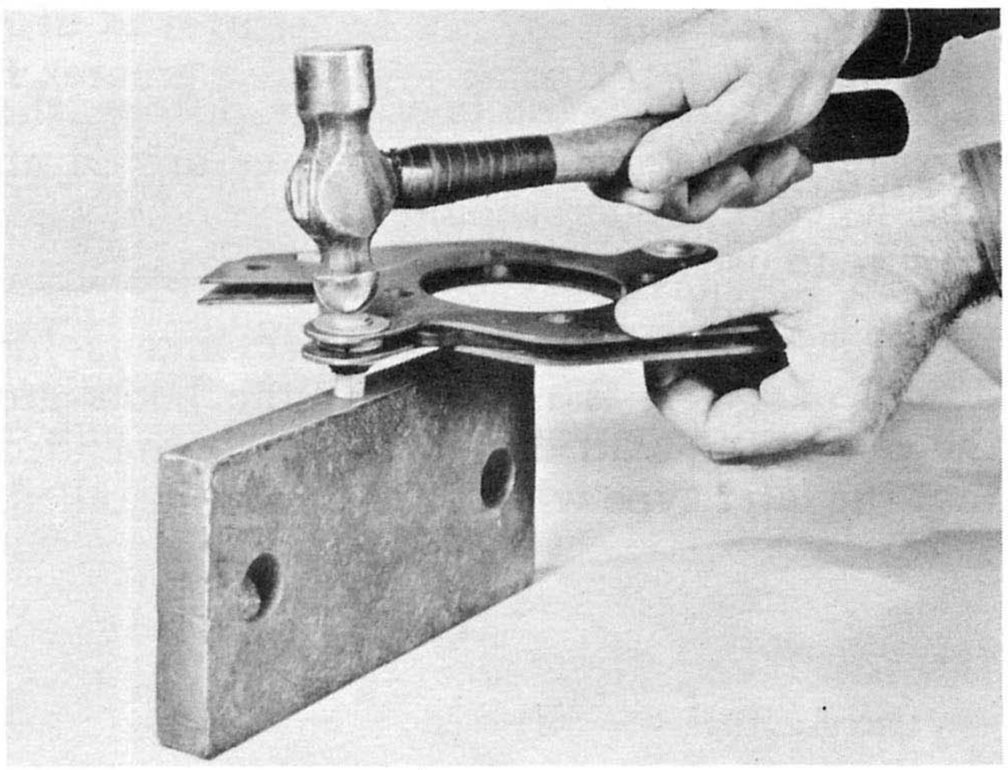


Figure 11—Peening stud end of cam

Place the hex end of the adjusting cam on a solid surface and peen the stud end of the cam. Torque-test to make sure a *minimum* of seven foot-pounds is required to turn them.

LUBRICATE

Apply a thin coat of approved lubricant on each of the platforms on the dust shields. Also, apply a thin coat of this lubricant on the shoes at the anchor reaction area ends, at the holes for the guide rods, at the cam fingers and in the shoe slots in the push rods. Avoid getting the lubricant on the shoe linings.

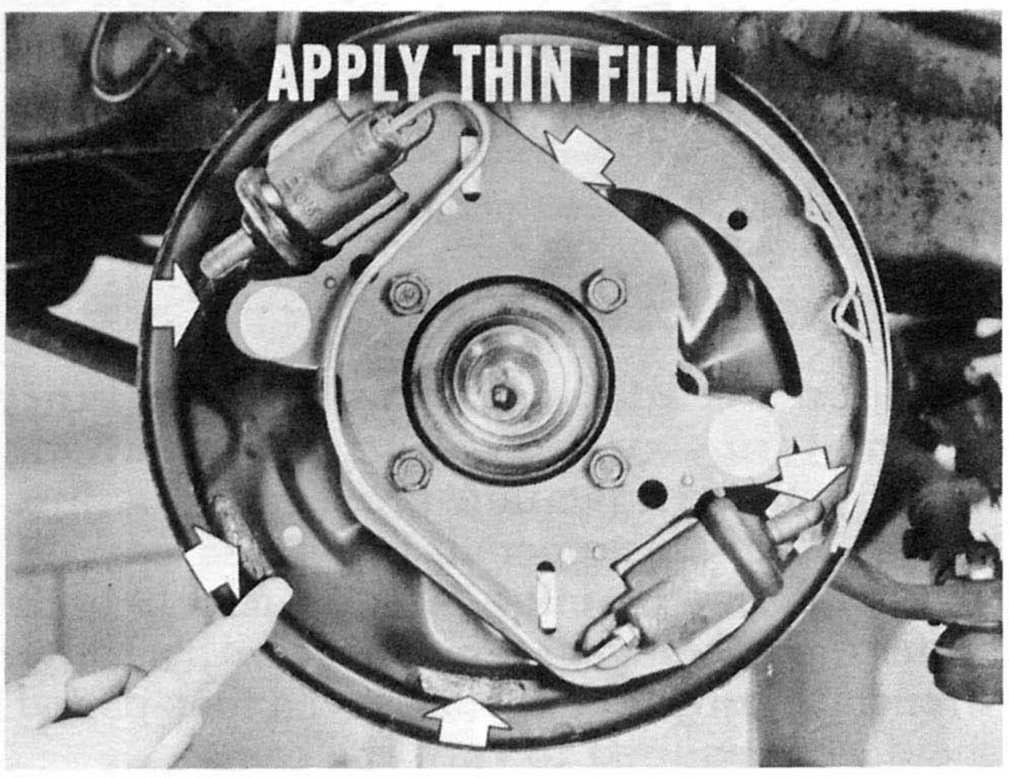
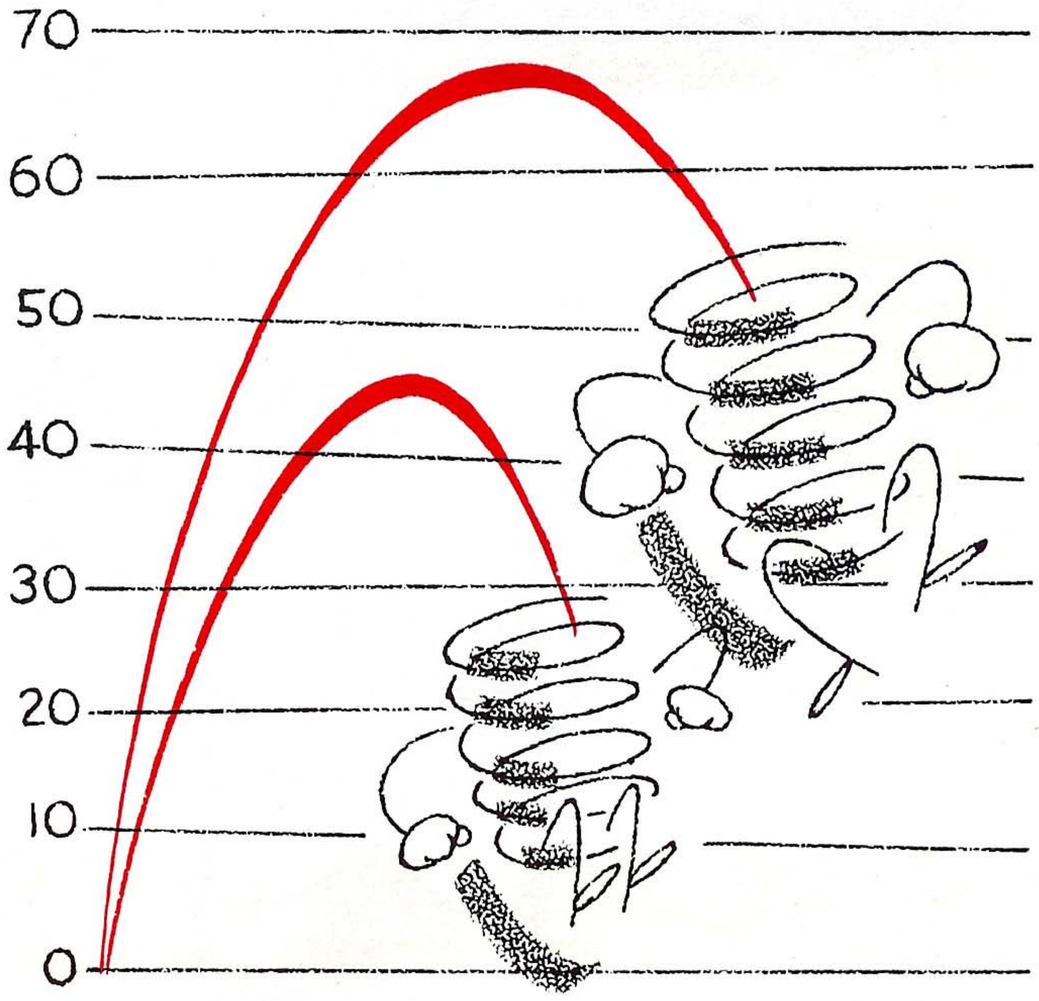


Figure 12—Lubricate shoe contact points

Install the shoes by sliding them into position between the plates of the support. Be sure the ends of the push rods engage the toe end of the shoe properly.

NEW RETURN SPRINGS

A new, heavier-load brake shoe return spring, Part Number 2266881, is available in service for installation on 12-inch-diameter front and rear brakes. The wire diameter is slightly larger than on the former spring. These new springs require a pull of 55-65 pounds on the toe end of the shoe to start the shoe moving. This compares with a 45- to 55-pound pull on the old springs. The new springs are painted a bright red for easy identification. The old springs were dark red.



INSTALL SHOES

Install the new return springs, first engaging the spring in the return spring link.

Figure 13—Use return spring installing tool C-3462

Then, connect the opposite end to the spring loop in the shoe. Use Installing Tool C-3462, to avoid overstretching the spring loops. When the new, heavier springs are installed on one brake, they should be installed on the opposite side, also.

Test the return springs by attaching a spring scale to the toe of the shoe.

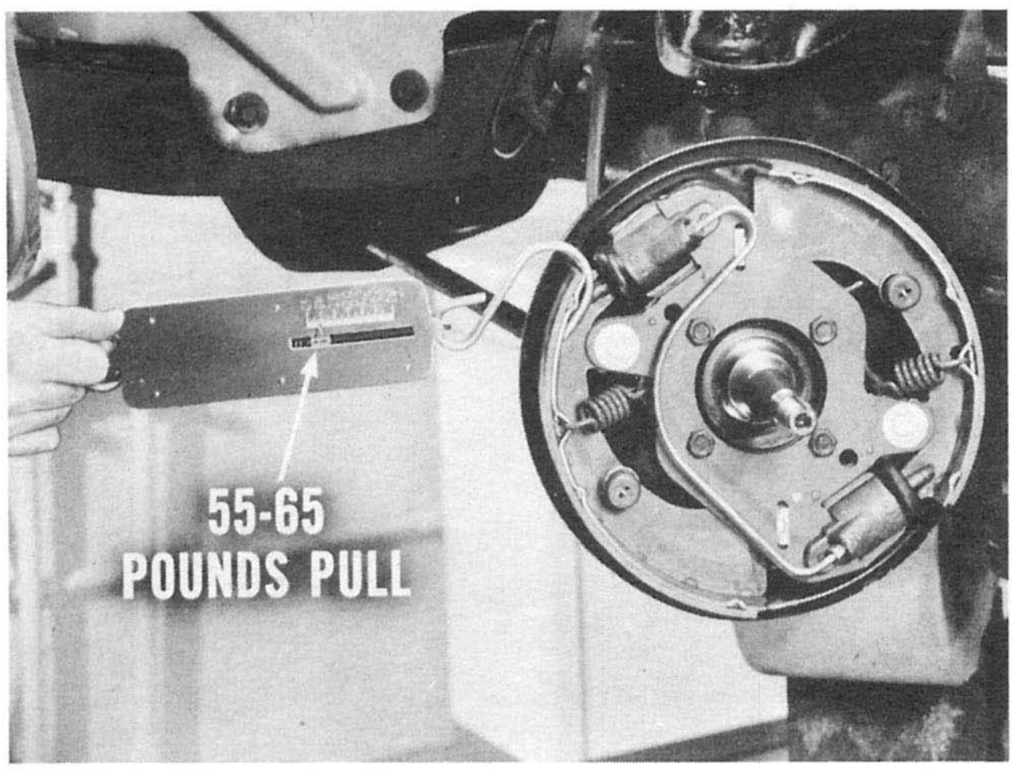


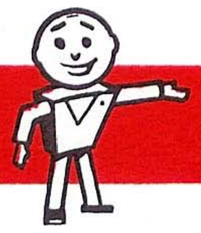
Figure 14—Test shoe return spring tension

The scale should read 55-65 pounds at the instant the toe of the shoe moves. If greater effort is required to move the shoe, examine the shoe for any condition that might interfere with free movement, and make the necessary corrections.

Install the brake shoe guide rods, springs and retainers. Be sure the positioning lip of the guide rod is positioned properly in the spring retainer. Back off the adjusting cams to facilitate the installation of the brake drums. Examine the push rods to be sure they are properly engaged on the web of the shoe. Then, install the drums and wheels. Tighten the wheel studs evenly and to exactly sixty-five foot-pounds. Adjust the front wheel bearings to specifications.

TEST BRAKES

Apply the brakes once or twice to be sure the push rods are fully engaged in the shoes. Then, adjust the brakes, making sure that only a very slight, uniform brake drag remains at each brake. Road-test the car to be sure the brake shoes are no longer hanging up.



BRAKE PEDAL RETURN SPRING

Current model cars equipped with total-contact brakes, without power brakes, are now provided with a 1/8-inch longer master cylinder push rod, a new pedal return spring and a spring retainer.

The new longer push rod increases the brake pedal height approximately one inch. The return spring and retainer insures quick, positive pedal return.

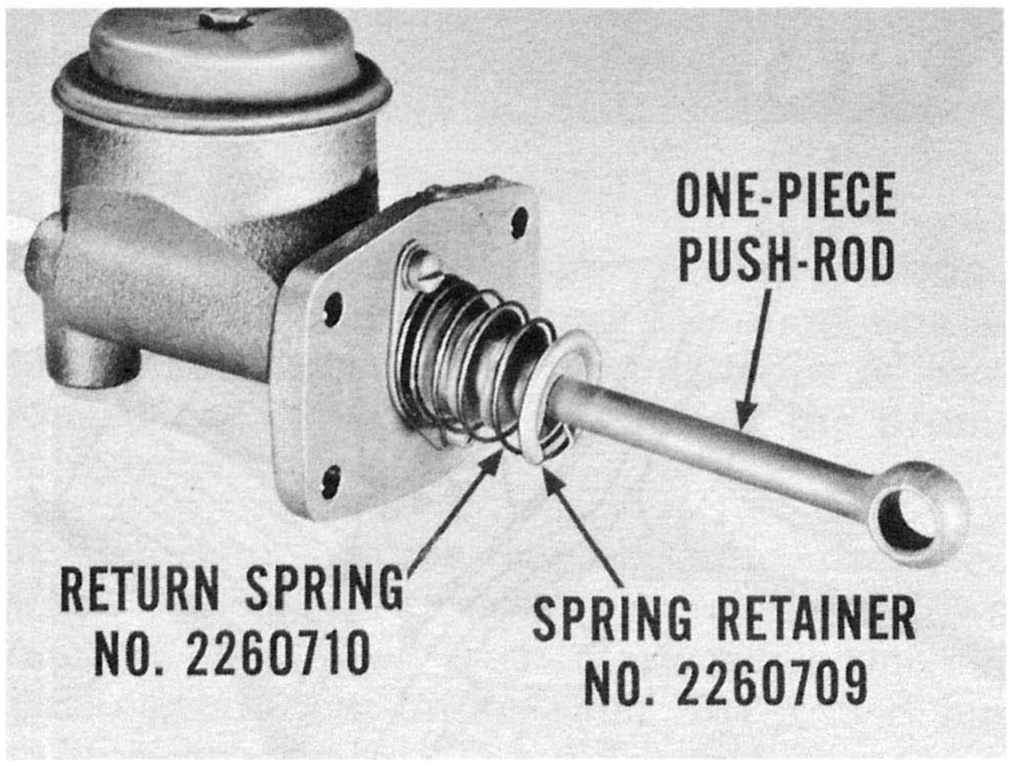


Figure 15—New pedal return spring

Brake pedal return spring, Part Number 2260710 and retainer, Part Number 2260709, can be installed on all earlier models equipped with a one-piece push rod. The return spring is a coil spring and is assembled over the push rod and boot. The retainer is slotted and engages in the boot groove in the push rod to hold the spring under tension.

To install the spring and retainer, disconnect the push rod at the pedal. Then, install the spring over the push rod and boot with the large-diameter end of the spring resting against the master cylinder. Compress the boot and spring, and install the retainer in the groove in the rod. Then, let the boot and spring expand back into place. Finally, connect the rod to the pedal and be sure to tighten the push rod bolt nut.

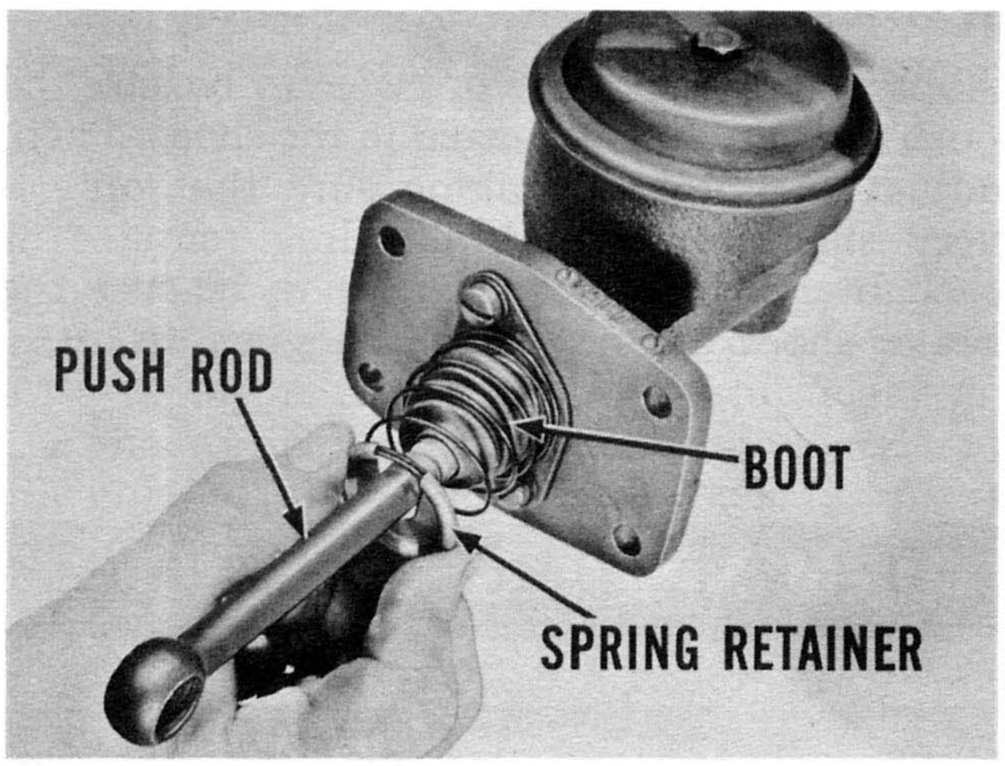


Figure 16—Installing new pedal return spring and retainer

CAUTION: No unauthorized pedal pull-back springs should be installed because excessive spring tension may pull the push rod from the master cylinder piston.

NEW MASTER CYLINDER REPAIR PACKAGE

A new Master Cylinder Repair Package, Part Number 2240245, which includes the new, longer push rod and piston assembly, boot, check valve, check valve seat, primary cup and secondary cup, is available for service on all past models using the one-piece push rod.

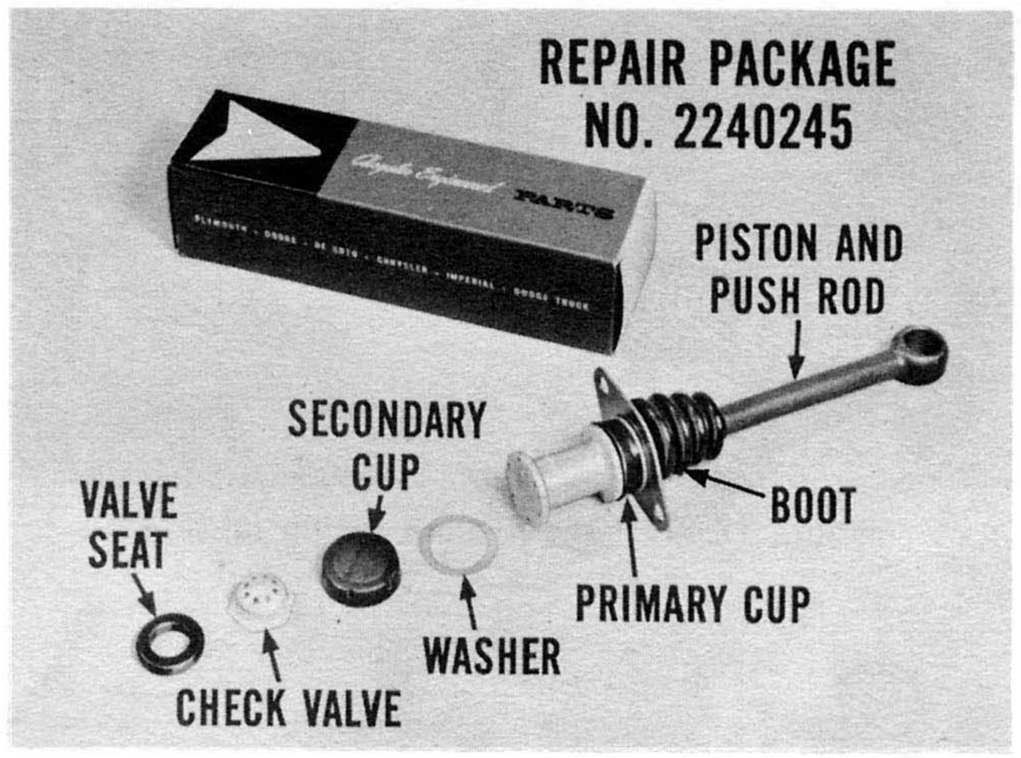


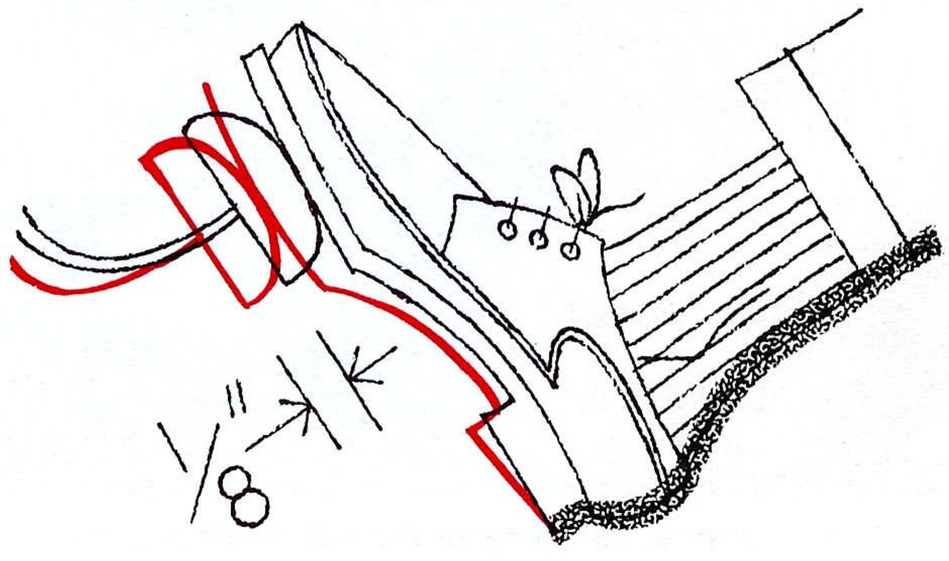
Figure 17—New master cylinder repair package

The installation of the new repair package will give the owners of the earlier models the benefit of more pedal reserve.

PEDAL FREE PLAY

The brake pedal on cars equipped with power brakes should have $\frac{1}{16}$- to $\frac{1}{8}$-inch free play. This free play is necessary to prevent the possibility of brake drag due to the master cylinder piston not returning to the fully released position.

NOTE: The procedure for adjusting the pedal free play and also the trigger arm, if necessary, is outlined in the Reference Book of MTSC Session No. 153.



PULSATING BRAKE PEDAL

If you receive a report of a slight movement of the brake pedal when the car is being brought to a stop, it is a condition commonly referred to as a "pulsating pedal". In most cases, it will be found that pedal pulsation is caused by out-of-round brake drums.

The following suggestions will prove helpful in correcting this condition. Raise the car about three feet off the floor. Then, while a helper is applying the brake pedal *lightly by hand,* turn each wheel slowly by hand.

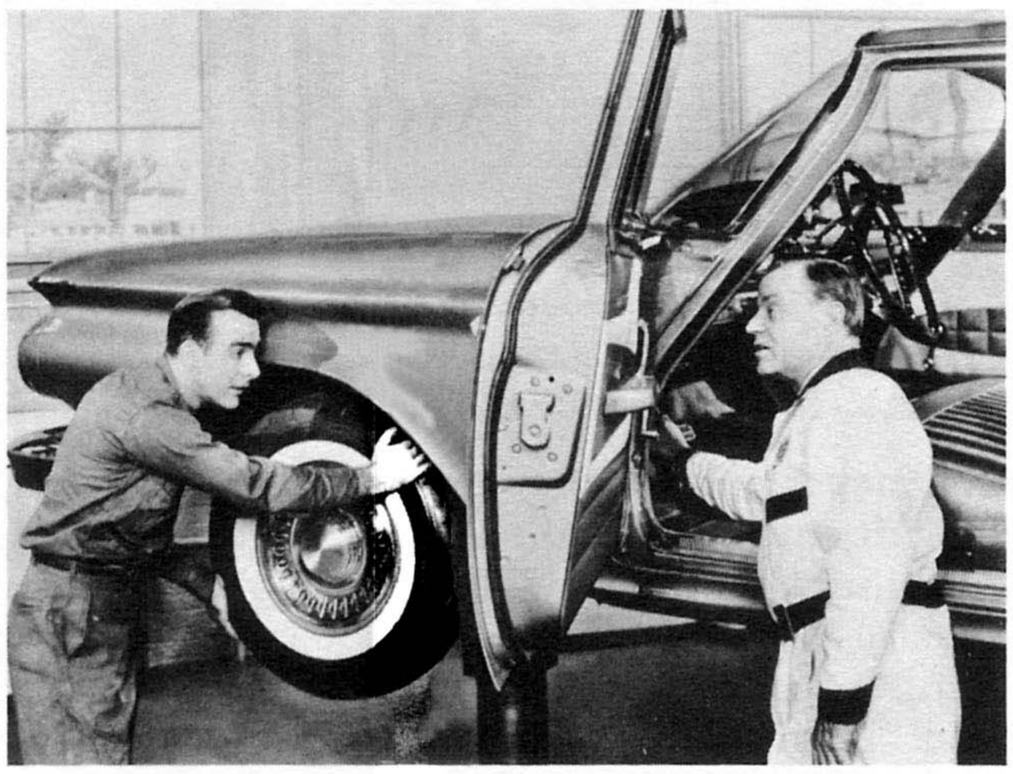


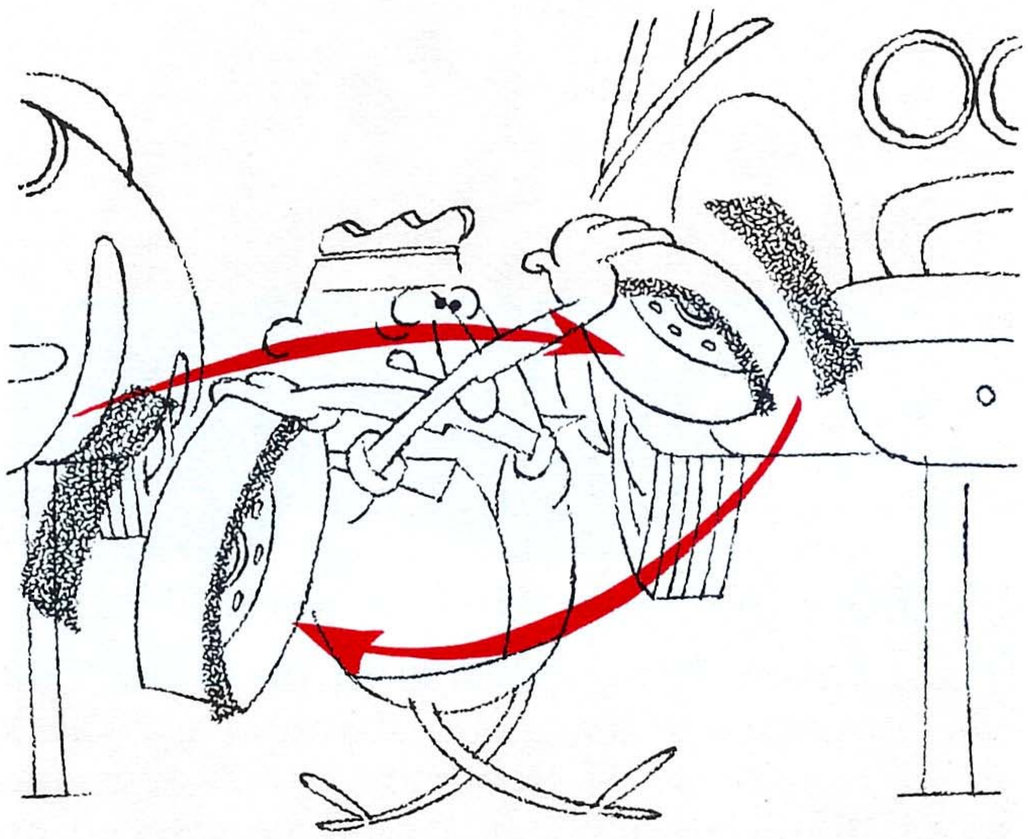
Figure 18—Testing for out-of-round brake drum

The wheel that drags, then frees up, is generally the wheel with the out-of-round drum. Since the condition could apply to more than one drum, it is good practice to test all four brakes.

CAUSES OF OUT-OF-ROUND DRUMS

There are a number of causes for out-of-round drums. Probably the most common one is abuse, such as successive panic stops or prolonged use of the brakes, causing the drums to overheat.

In addition, drums can become distorted when wheels and tires are interchanged from one car to another, particularly when one car has eleven-inch brakes and the other has twelve-inch brakes. The difference in contour of the two sizes of wheels and drums is sufficient to cause the drums to distort when the wheel bolts are tightened.



A common cause of distortion is uneven tightening, or *over*tightening of wheel bolts. When wheel bolts are tightened, they should be just snugged up the first time around. The final tightening should be equal, and to a torque of sixty-five foot-pounds on cars with total-contact brakes. If this practice is followed, there should be no cause for distortion from improper wheel bolt tightening.

Another cause, frequently overlooked, is rough handling of brake drums. Drums, because of their shape can be very easily distorted by dropping or bumping them against hard objects. When handling drums, set them down squarely and easily.

Driving the rear axle shaft key too far into the hub can distort the brake drum. When properly installed, the outer end of the key should be just flush with the outer edge of the hub.

GAUGING BRAKE DRUMS

Even though only one drum may be found to be dragging, it is good practice to also remove the wheel and drum from the opposite side because any corrections made on one brake should apply equally to the other one.

The drums and shoes and shoe supports should be carefully wiped off and cleaned with compressed air. Cleanliness is a *must*.

Figure 19—Measure drum with gauge C-3492

Place Drum Gauge C-3492 in the drum that was suspected of being out-of-round and check it for roundness. If the drum is out-of-round more than .004 inch, it should be refaced on a grinder to insure proper shoe contact.

Only enough material should be removed to true up the drum. Not more than thirty-thousandths of an inch of metal should be removed from the drum radius, or sixty-thousandths of an inch on the diameter. Drums that will not true at this dimension should be discarded. Do not exceed these dimensions as this will reduce the drum thickness to the extent that more severe out-of-round conditions may be experienced on frequent, fast, hard stops.

Since grinding leaves a fairly smooth surface, it is good practice to rough up the surface with sixty- or eighty-grit sandpaper, to assist lining break-in.

If a grinder is not available, a lathe can be used, providing there is no evidence of drum spotting. The cutter should be set for the finest feed setting. If drum spotting is evident, the cutter on the lathe will bounce, whereas the grinder will do a more satisfactory job of cleaning up the drum surface.

Figure 20—Rough up drum surface

BREAK-IN PRECAUTIONS

Whenever new or rebonded shoes are installed, new drums are installed or drums are refaced, full lining contact will not be obtained for several brake applications. There is a strong temptation to take the car out on a road test and "burn 'em in". This practice can't do any real good and it may do a lot of harm. Severe braking, particularly from high speeds, can produce extreme heat concentration on the lining areas that contact the drum first. This in turn can distort drums, create lining problems and erratic brake action.

It isn't necessary to "baby" a good brake job. It doesn't take many normal stops to establish total lining contact with the drum. Just play it safe. Avoid panic stops when you road-test a car with new linings and advise the customer to do the same for at least the first dozen stops or so.

As a final precaution before delivering the car to the customer, inspect all hoses, lines and connections for leaks. Hoses that show signs of porosity should be replaced. Connections that show signs of leaks should be tightened. If threads on connections are worn or damaged, replace the lines.

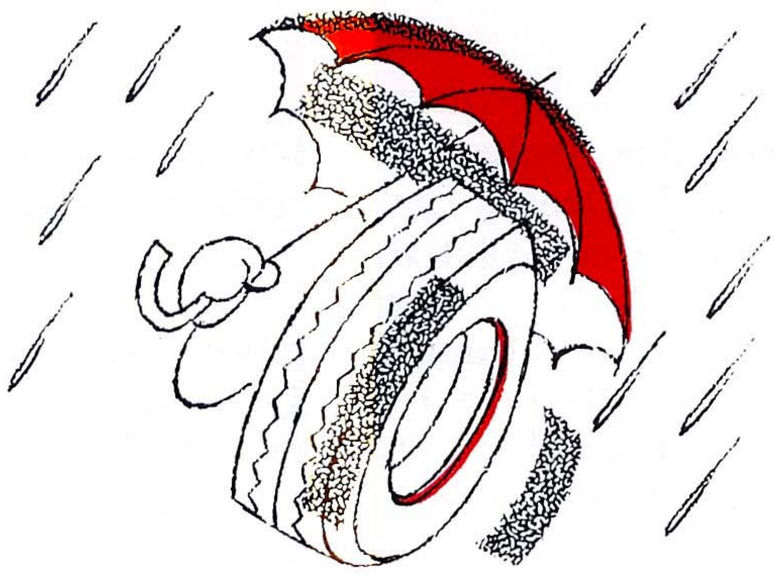
FRONT BRAKE DRUM SEAL

High-speed driving on wet turnpikes produces some unusual brake conditions. In the first place, driving under these conditions creates a constant fog of swirling moisture. Each front wheel tends to throw an excessive amount of moisture at the opposite front brake drum. What's more, turnpike driving usually means many miles traveled between stops.

Extreme moisture plus infrequent braking invite excessive accumulation inside the front brakes. This unusual combination greatly increases the possibility of brake grab.

Figure 21—12-inch front brake drum seal Part No. 2260875

A new Front Brake Drum Seal, Part Number 2260875, has been released for twelve-inch drums. This new, coated sheet-metal seal can be installed on the outer perimeter of the drum and serves to deflect road splash from entering the brakes at the junction of the dust shield and brake drum.



To install the seals, remove both front wheels. Then, roll the damper springs from the spring recess in the drums. Carefully clean out the recesses to remove any foreign matter which might prevent the seal from seating evenly. The seal is shaped to fit the contour of the drum and *must seat* in the drum recess.

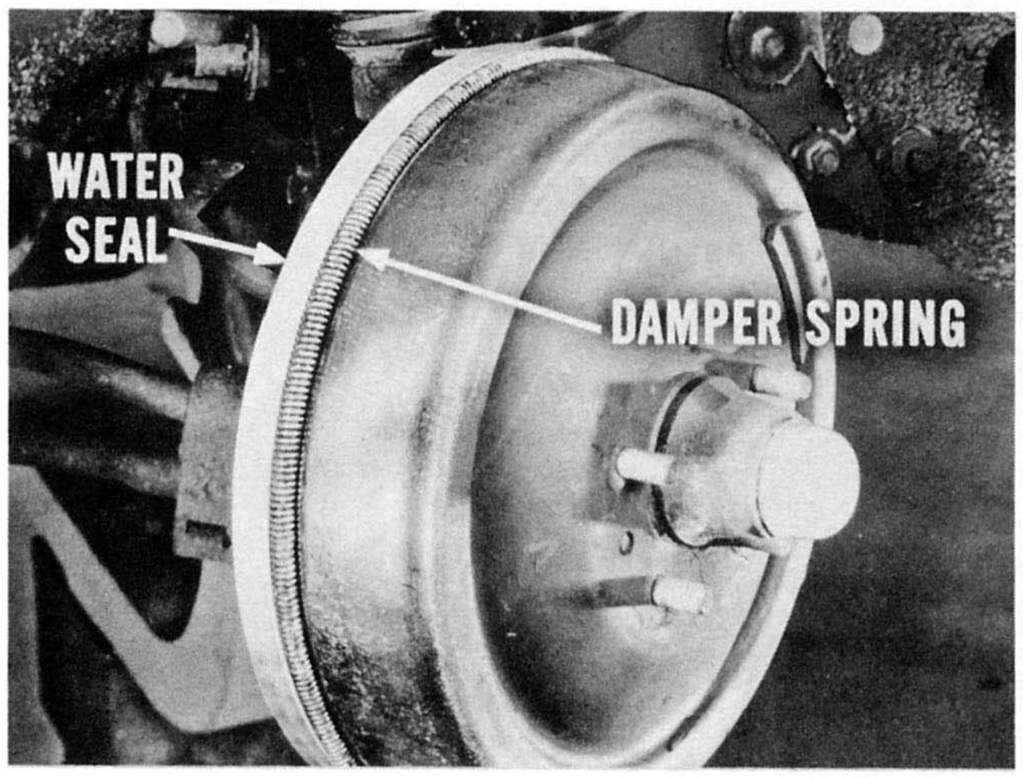


Figure 22—Installing brake drum seal

Position the seal in the brake drum spring recess. Next, roll the spring into position over the seal. Be sure that both the seal and spring are properly located and seated.

Rotate the drum to make certain there is no interference between the dust shield and the seal that might cause rubbing.

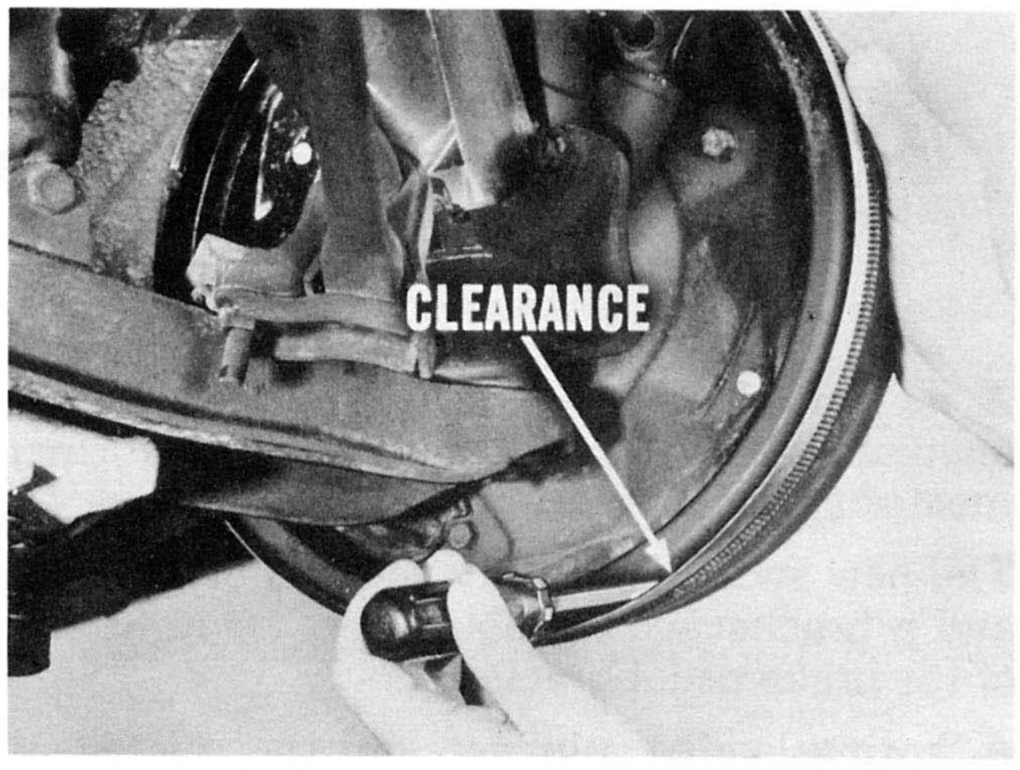


Figure 23—Check clearance between seal and drum

LOSS OF POWER ASSIST

An occasional report may be received from a customer that there seems to be a lack of assist from the power brake cylinder when cold. This condition may be caused by kinked or collapsed vacuum hoses or a sticking vacuum check valve.

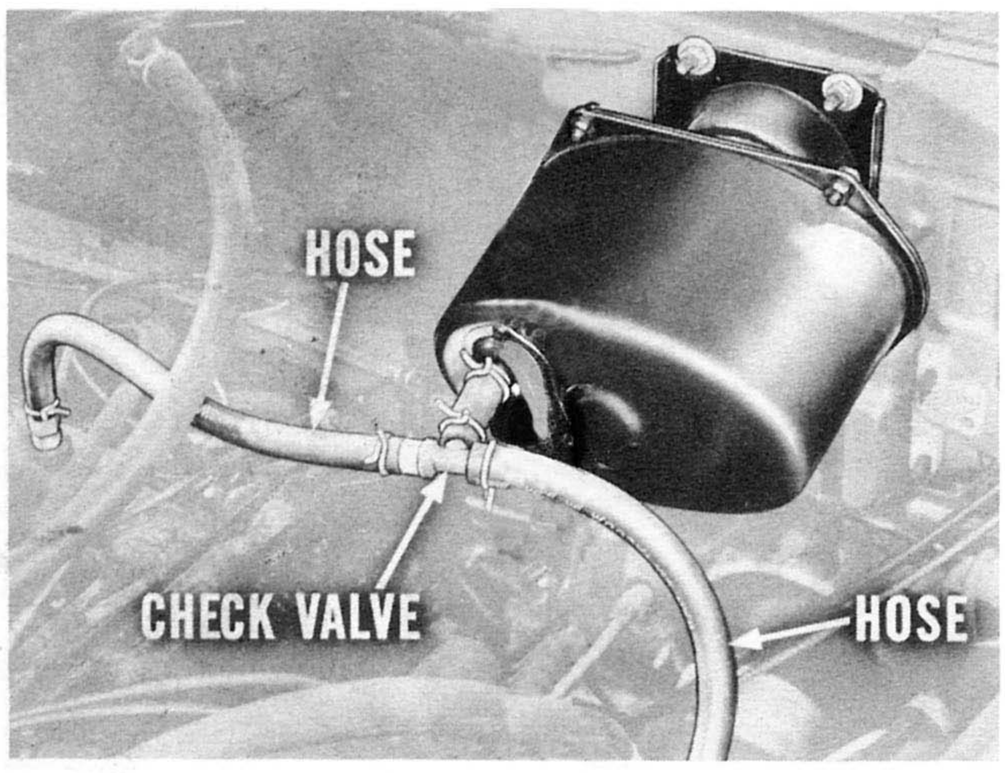


Figure 24—Examine vacuum hoses

If an inspection discloses sharp bends, kinks or a collapsed hose, install a new hose.

If the hoses are found to be in satisfactory condition, install a new Vacuum Check Valve Assembly, Part Number 1944089. The new, improved check valve is red and white for purposes of identification.

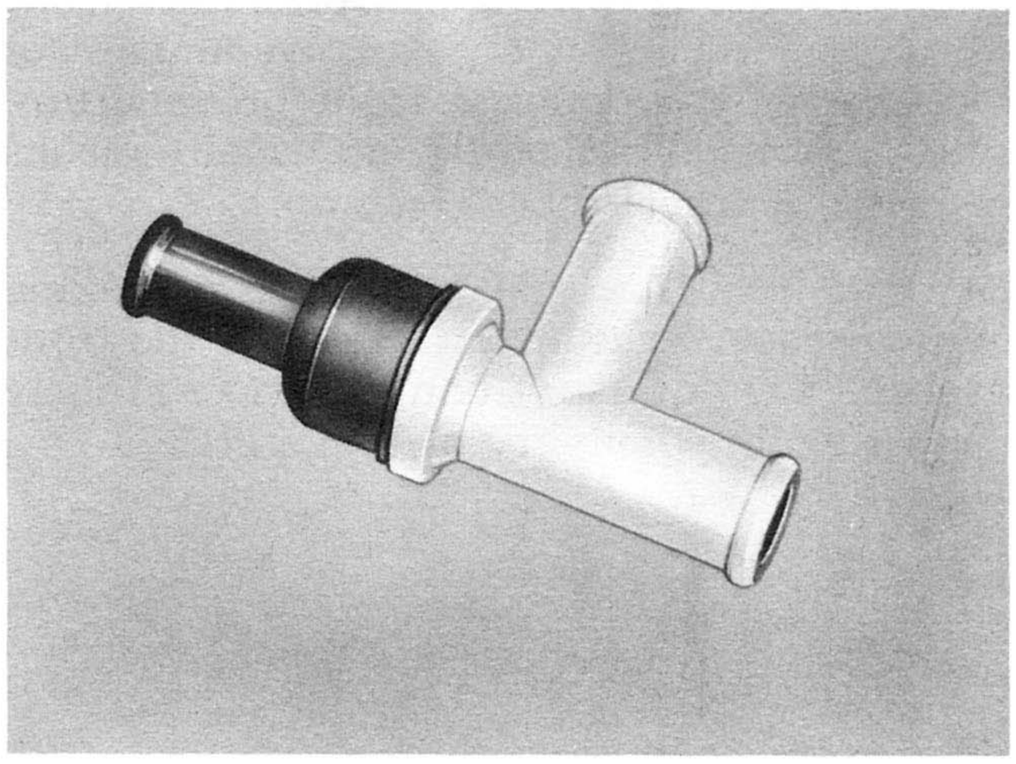


Figure 25—New check valve

The new valve is coated internally to prevent it from sticking when cold.

When installing the new valve, the manifold vacuum hose must be connected to the small fitting at the *red* end of the valve.

Road-test the car for power assist. If the lack of assist still exists, inspect and adjust the trigger arm, *only if necessary*. This procedure is outlined in the Reference Book, Session No. 153.

MECHANICAL STOP LIGHT SWITCH

A new mechanical stop light switch is now being used on all models in place of the former master cylinder hydraulic switch.

The new switch assembly consists of a switch and a bracket which mounts on the right side of the brake pedal bracket.

A spring-loaded plunger on the switch is positioned against the brake pedal lever. When the brakes are applied, the forward movement of the pedal releases the plunger and the stop light circuit is completed.

The switch bracket mounting hole in the pedal bracket is slotted so that the switch can be mounted forward or rearward. It is held in position by the attaching screw which threads into the tapped hole in the switch bracket.

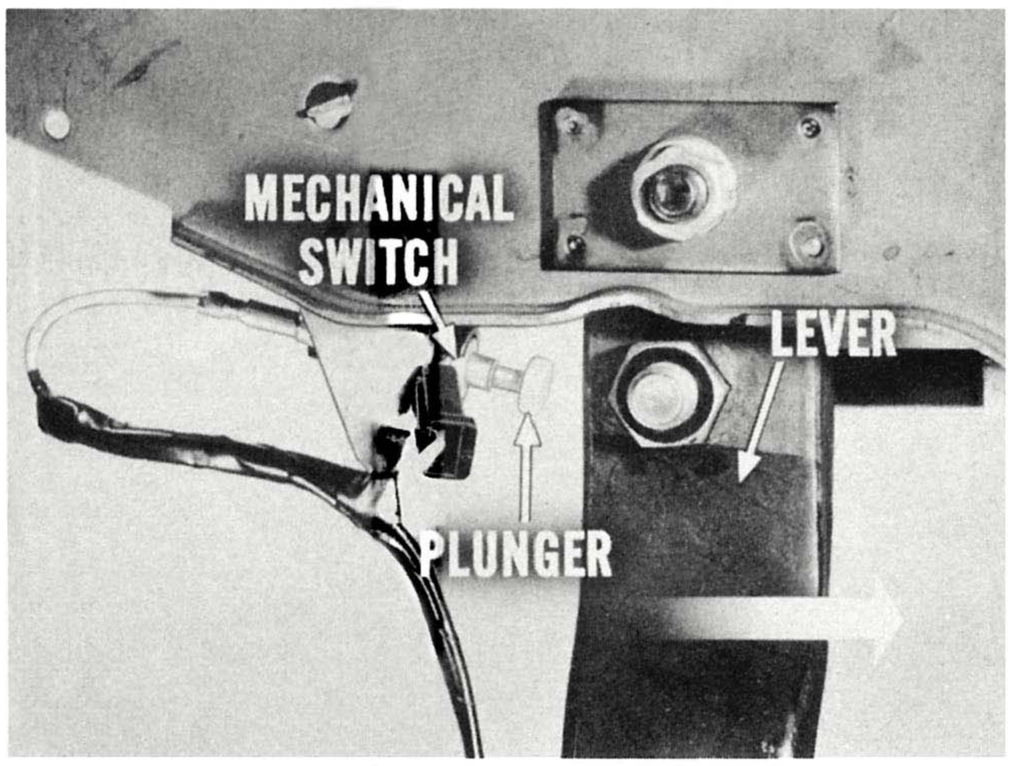


Figure 26—Mechanical stop light switch

Three switches have been released for service. Although the switches are similar in appearance, plunger travel and bracket design are different for each switch. Here's the switch application information you'll need to select the right switch for each car model.

PLYMOUTH, DODGE and CHRYSLER MODELS—without power brakes, use Part No. 2257769.

PLYMOUTH, DODGE, CHRYSLER and IMPERIAL MODELS—with power brakes, use Part No. 2257770.

ALL VALIANT AND LANCER MODELS —use Part Number 2257768.

Switches are mounted rearward on all models *except Lancer and Valiant with power brakes.* On Lancer and Valiant models with power brakes, the switch must be mounted forward.

Summary

Of all the safety features on a modern automobile, the one that is most important is the brake system. Most motorists realize this and when they experience brake troubles, they want a brake expert to handle the job. This is particularly true of those "hard to figure out" brake problems.

You ARE the expert. Use your knowledge of the product and the brake service suggestions in this Reference Book to diagnose and correct brake difficulties.

You Master Technicians are not only "service experts" . . . you are "customer keepers". The Master Technician's role in keeping customers extends beyond the service department, into the showroom and into the closing office.

When you keep a customer satisfied with your service department, you've done your part to set up a new-car sale for the sales department.

SERVICE REFERENCE BOOK · SERVICE REFERENCE BOOK

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