SERVICE REFERENCE BOOK

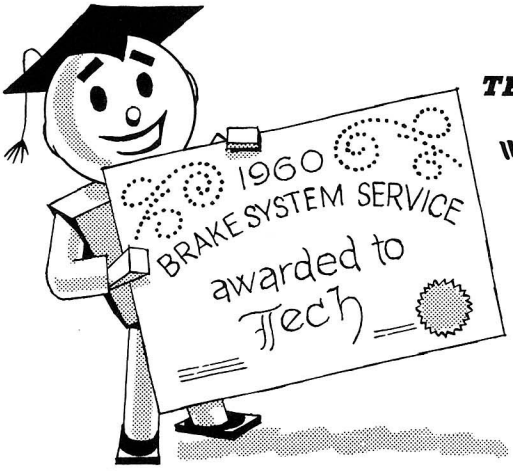
of the MASTER TECHNICIANS SERVICE CONFERENCE

session no. 153

BRAKE SYSTEM SERVICE

PREPARED BY CHRYSLER CORPORATION

Dodge • Plymouth-De Soto-Valiant • Chrysler and Imperial Divisions



TECH SEZ:

"It's smart to be up-to-date on brake facts"

Today's automobile, operating at higher speeds on our modern, crowded freeways and turnpikes, must be equipped with brakes capable of bringing the car to a stop quickly and safely.

We have brakes that will deliver that kind of performance—if they are adjusted properly. Seeing that they are adjusted properly is where we fit into the picture—it's our job.

This reference book outlines the new adjusting procedures applicable to our total-contact brakes, explains the new improved parking brake release mechanism, and covers a revised method of adjusting the parking brake cable.

Here's how this information is arranged for your reading:

INTRODUCTION

General

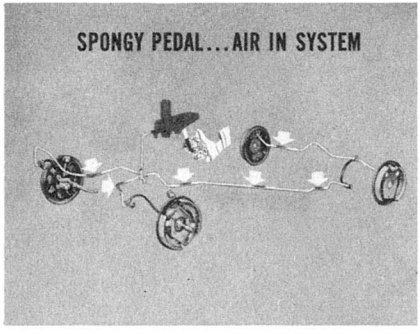
The trend in modern car design has resulted in the sheet metal almost entirely enclosing the wheels and brakes. Consequently, the air stream is not able to do as good a job of air-cooling the brake drums. The use of smaller wheels, the practice of driving cars at the higher freeway and turnpike speeds, coupled with the need for faster, safer braking, are all conditions which are responsible for more heat being generated in the brakes than ever before. Too much heat, as every brake technician is aware, greatly reduces brake efficiency and shortens lining life.

It is vitally important, therefore, that the technician be able to adjust brakes properly so they will operate at peak efficiency.

Two more or less everyday operations, which many technicians have taken for granted through the past years, are bleeding the

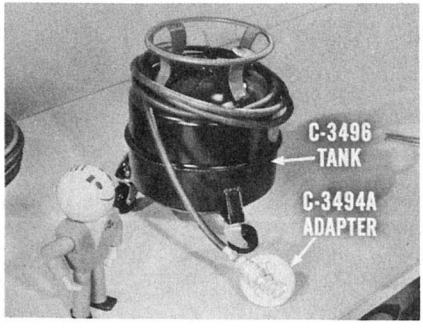
hydraulic system and adjusting the brake shoes. While these are generally thought of as relatively minor operations, there are certain steps which can be overlooked, and thereby make the job unsatisfactory.

A spongy pedal is generally due to an accumulation of small air bubbles in the hydraulic system.



These bubbles become trapped in the lines, connections and wheel cylinders and tend to cushion the pedal action. Then the brake pedal will not have the firm pedal feel necessary for good brake operation.

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 while the pedal is applying pressure, sometimes permits air to be drawn into the system through the partially opened valve as the pedal returns to its at-rest position.



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 bleeder 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.

Another common cause of air in the hydraulic system is the practice of using questionable brands of brake fluid which tend to decompose and form bubbles in the lines when the brakes become excessively hot. Once these bubbles form, they can be expelled only by bleeding the system.

Loose hose or line connections, and worn wheel cylinder cups are other possible conditions that would permit air to enter the lines.

BLEEDING THE HYDRAULIC SYSTEM

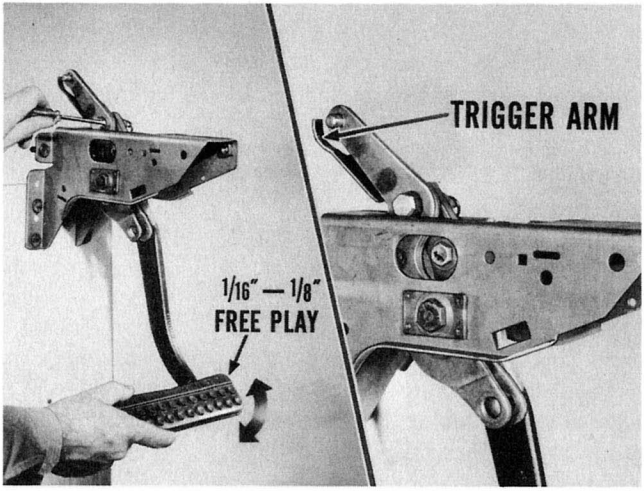
Preliminary Operations

Cleaning. Before proceeding with the bleeding operation, certain precautions must be taken before opening the system to prevent the entrance of foreign matter, particularly dirt. For example, carefully clean off the master cylinder cover before removing it, so no dirt will get into the master cylinder. If the car is equipped with power brakes, wipe off the *underside* of the power cylinder.

NOTE: If the master cylinder is removed for repairs or replacement, it is not necessary to bleed the entire hydraulic system. Since the cylinder is located above the level of the balance of the system, the lines will not drain when disconnected at the master cylinder. Before connecting the line to the cylinder, however, it is good practice to see that the fluid level is at the top of the line. If it is not, pour in sufficient new fluid to expel any air from the line.

Power Brake Precautions

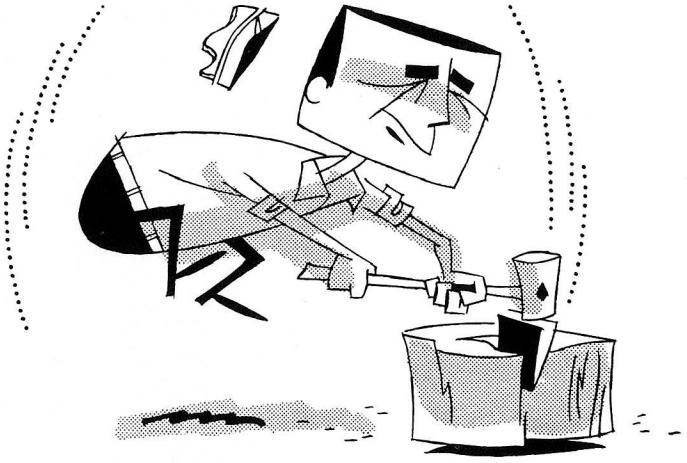
If the car is equipped with power brakes, the brake pedal free play and power lever trigger arm adjustment should be examined first.



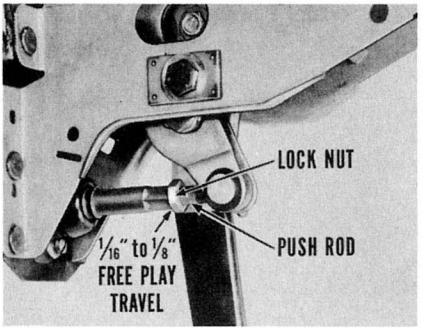
Pedal Free Play Adjustment—On The Car. Pedal free play of not less than one-sixteenth inch or more than one-eighth inch is necessary to prevent the possibility of brake drag due to the pedal not fully returning to the at-rest position, and to prevent linkage noises. Trigger arm adjustment and pedal free play determine how far the pedal will travel before the master cylinder piston applies pressure on the brake fluid.

Pedal free play adjustment is made with the engine *not* running, so *no vacuum* is applied on the cylinder. Depress the brake pedal several times to relieve all vacuum. Then insert a wedging tool, such as a screwdriver, between the trigger pivot and the *rear* side of the hole in the power lever, forcing the power lever and brake pedal apart.

> **CAUTION:** If the power pedal and brake pedal are not wedged apart, a *false* pedal free play setting will be measured at the end of the brake pedal.



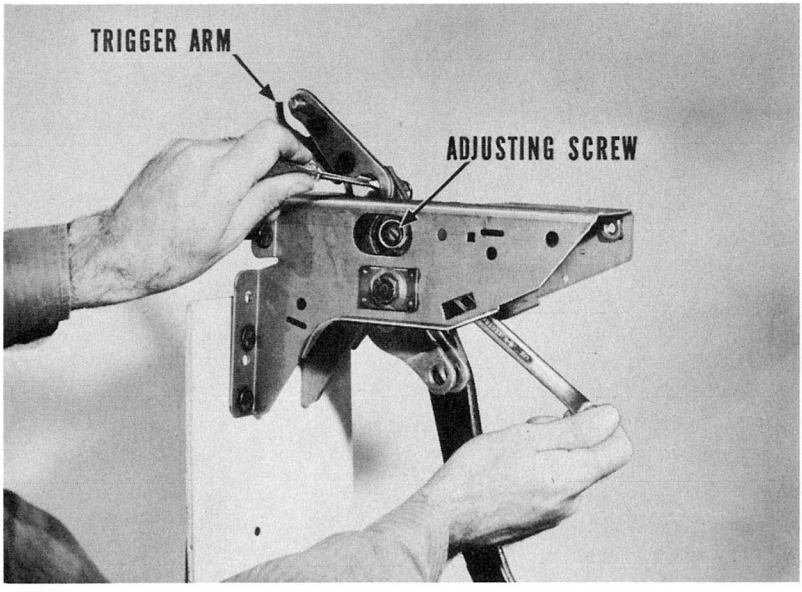
With the linkage in this position, push lightly on the brake pedal. This movement will give a true free play measurement between the master cylinder piston and push rod. This should be from one-sixteenth to one-eighth inch. If the pedal free play varies from this measurement, the pedal push rod should be lengthened or shortened until the desired dimension is obtained.



To do this, first loosen the lock nut, then turn the push rod. When the correct free play is obtained, tighten the lock nut.

Trigger Arm Adjustment—On The Car. After the pedal free play adjustment, test the performance of the power cylinder. Proper operation is controlled by the trigger adjusting screw which is accessible through an opening in the left side of the pedal mounting bracket. If the trigger arm is not properly adjusted, the brakes will be applied too rapidly or there will be a time delay due to too much pedal travel. Either of these performance conditions could be incorrectly diagnosed as being due to a faulty power cylinder or contaminated linings, whereas the trigger arm adjustment is at fault.

The approximate midpoint adjustment of the trigger arm is when the arrow on the head of the adjusting screw is pointed straight up. It is permissible to adjust the screw as much as 90 degrees either side of the straight-up position. Do not adjust the screw beyond this range.



If the pedal return is too slow, it can be speeded up by slight rotation of the adjusting screw in a clockwise direction.

If it is necessary to eliminate a time delay in the brake application, the adjusting screw should be rotated slightly in a counterclockwise direction.

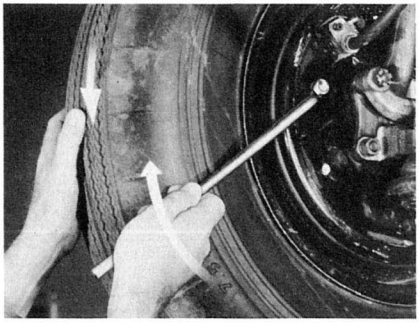
If the power cylinder chatters, it is frequently due to air bubbles in the hydraulic system and bleeding the lines will generally correct it. However, if the chatter persists after the bleeding operation, turning the screw slightly in a clockwise direction will eliminate the condition.

If the above trigger adjustments do not produce satisfactory results, the pedal linkage should be removed from the car and the trigger arm arc examined and corrected as outlined in the Service Manual.

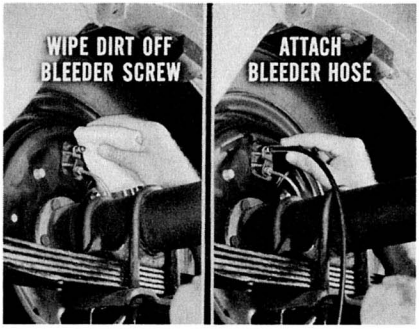
Bleeding Operation

Remove the master cylinder cover and install the Adapter C-3494A in its place. Then, connect the hose from Bleeder Tank C-3496 to the adapter fitting. Examine the tank to be sure it is full of Chrysler-approved brake fluid. Fill the tank if necessary. Then, pressurize the tank to 25 pounds.

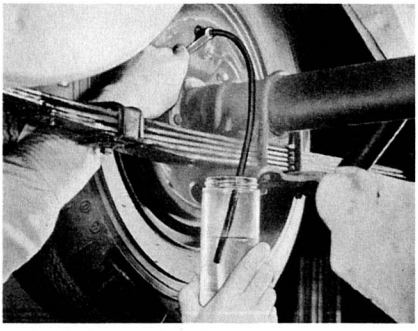
Next, raise the car off its wheels. Back off all the brake shoe adjusting cams to move the shoes to the *fully released* position. This shoe action will force the wheel cylinder pistons back and trap the air at the bleeder screw hole in the wheel cylinder. Trapping the air at this point will assure all the air being bled out with the fluid.



Then, wipe the bleeder screws clean of all dirt. Starting with the *right rear* wheel, attach the bleeder hose to the brake bleeder screw at that location. The reason for starting at this location is that the long lines to the rear cylinders generally contain about three times as much air as the short lines, and it is essential to remove these bubbles first to obtain a firm brake pedal.



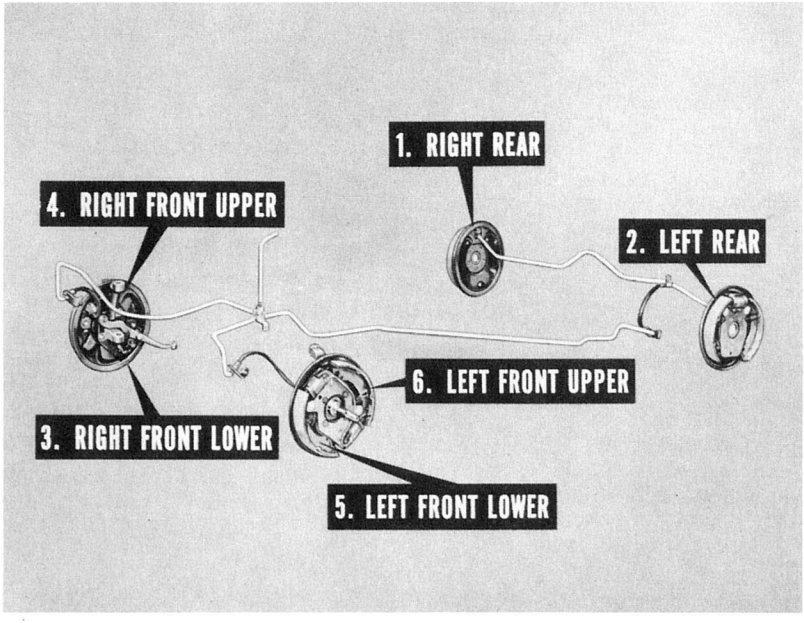
Immerse the free end of the bleeder hose in a glass jar containing brake fluid. Use a *clean* glass jar. Pour in enough Chrysler-approved brake fluid to be sure the opposite end of the bleeder hose will be covered by the fluid. This will enable you to detect any trace of contaminants, such as mineral oil or water, as the fluid is expelled.



Start the bleeding by turning the bleeder screw to open it. Allow the fluid to flow from the hose in a solid stream for a *full thirty*

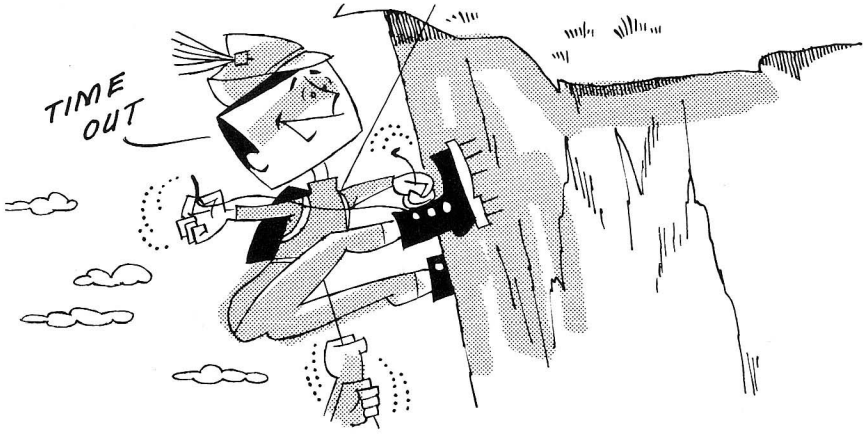
seconds before you close the screw. This is important, as it will assure that all air and impurities that might be contained in the lines are removed. Should you detect any trace of impurities in the fluid, the entire system should be flushed out and refilled.

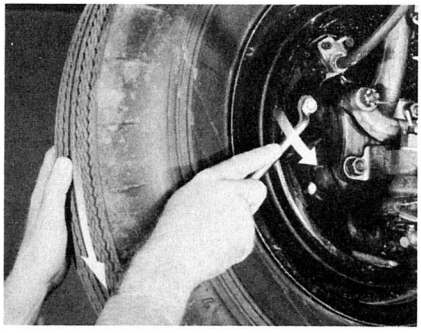
Repeat this operation at the left rear wheel cylinder, followed by the right front lower, right front upper, left front lower and left front upper wheel cylinders. Bleeding the lower cylinder first, forces all the air out of the connecting line.



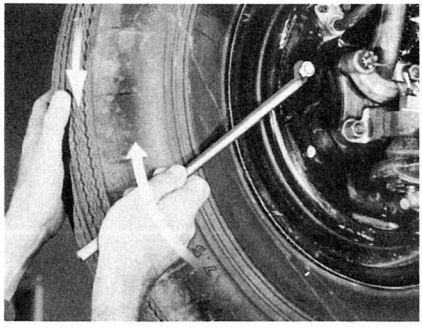
After the bleeding operation of all four wheels has been completed, remove the hose and adapter from the master cylinder. Be sure the brake fluid is at the proper level in the cylinder; add fluid if necessary. Install the master cylinder cover, but be careful not to tighten the cover screw to more than 20 inch-pounds. Over-tightening may collapse the cover, forming a depression in which water could collect, which could eventually leak into the master cylinder through the screw hole.

ADJUSTING BRAKE SHOES



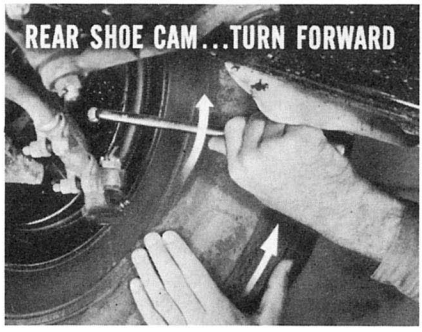


Starting at the right front wheel, turn the adjusting cam on the front shoe in the direction of the front wheel rotation when the car is moving *forward,* and rotate the wheel slowly. Turn the cam until the shoe lining is solidly against the drum, and the wheel is locked.



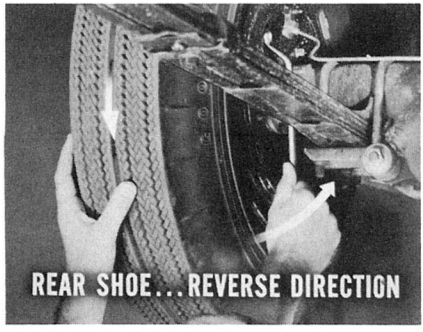
Then, back off the cam until only a *very slight drag* is felt, as you turn the wheel in forward direction.

This *same procedure* is followed on the rear shoe. *Turn the rear shoe cam in the direction of forward wheel rotation,* then back it off to get a slight drag as the wheel is turned.



When this brake is properly adjusted, repeat the operation on the other front wheel. Before leaving the front wheels, again turn them in the direction of forward wheel rotation and be sure there is only a slight drag. Readjust the cams, if necessary.

When adjusting the rear wheel brakes, *the front shoes only* are adjusted by turning the cams in the direction of forward wheel rotation, then backing them off to get a slight drag. However, the cams on the *rear* shoes should be turned in the direction the wheel turns when the car is moving in *reverse* direction. The reason for this is that the rear shoe is self-energizing when applied while the wheel is turning in a *reverse* direction, but not in forward direction with this type brake. You always turn the brake shoe cams in the direction of self-energization.



Before you lower the car to the floor, apply the brake pedal *lightly,* once or twice, to test the action and to properly center the shoes.

Then, rotate each wheel again to be sure there is only a slight drag noticeable. If necessary, readjust the cams as required to obtain a uniform light drag.

Finally, examine the fluid level in the master cylinder to be sure it is up to the proper level. Add fluid if necessary, and use only Chrysler-approved brake fluid.

DIAGNOSIS OF BRAKING CONDITIONS

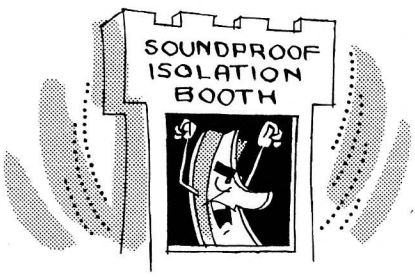
General

By correctly diagnosing a braking condition, considerable waste of time and expense can be avoided. Trial and error methods of correcting brake troubles are costly, and can result in serious consequences. Frequently, questionable foreign parts such as silencers, spacers, washers, webbing and other parts which are not approved, are installed in brake mechanisms. Avoid the use of any parts which are not approved. Follow only prescribed procedures and use only Chrysler-approved parts when making repairs.

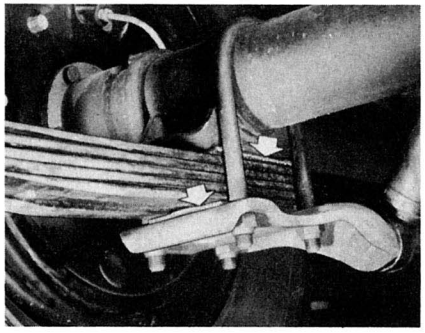
Rear Brake Howl

There have been reports of a howl from the rear brakes, especially on Plymouth and Dodge Suburbans, when applying brakes at speeds of twenty miles per hour or less, and generally on light pedal application. The owner usually reports the noise as a bell-like sound.

Perform the normal service operations such as adjusting shoes, being sure that the shoe return springs are of correct tension, that drum surfaces are even, and that brake drum damper springs are in place. If the condition is not corrected, install a set of rear spring insulators, Part No. 1731797 upper, and Part No. 1731798 lower, such as were used on some 1959 models.



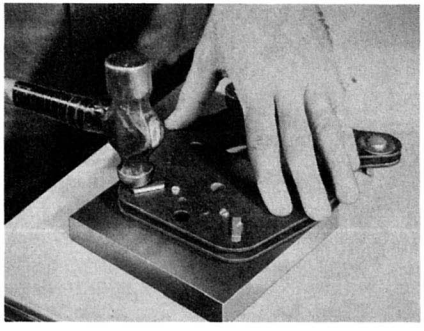
After the insulators are in place, the spring "U" bolt nuts should be tightened to the recommended 70 foot-pounds torque. This correction will generally eliminate the noise.



In cases where the insulators do not correct the condition, remove the brake drum from the noisy brake and inspect the brake support assembly for loose anchors, a loose support, or excessive rear axle shaft end play.

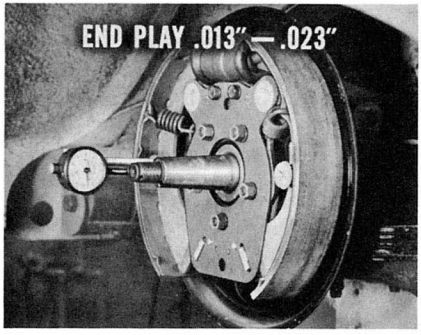
If the examination indicates the anchors in the support assembly are loose, the support should be removed and the anchors secured by either tack-welding each of them to the support plate in two places with an arc welder, or by peening the ends of the anchors.

CAUTION: If welding, use only the arc weld method. Avoid gas welding, as this will overheat and distort the parts.



If the anchors are to be peened, the support should be placed on a solid surface so you don't damage the support.

Loose support bolt nuts and spring "U" bolt nuts should be tightened to the proper torque specifications for the car being worked on.



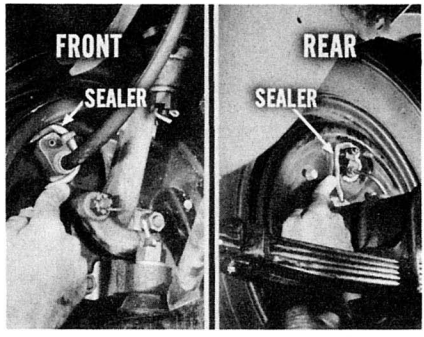
Excessive rear axle shaft end play will tend to make a brake howl more noticeable. Measure the end play. If it is greater than .023", install shims to bring end play within .013" to .018", working to the low limit.

Brake Dive

A condition of brake dive is one in which the car pulls or dives to one side or the other when the brakes are applied. It can be caused by a loose brake assembly on the steering knuckle or rear axle housing, improper shoe linings, or linings contaminated with brake fluid or grease. The correction of these conditions would be quite obvious. However, there are other conditions, not directly related to the brakes, which can contribute to this condition and which should be carefully considered. Among these are loose or worn front suspension parts. Misalignment of the front suspension, particularly improper caster and camber settings, can also be contributing factors.

There is another possible cause of brake dive which is usually of a temporary nature, and experienced only under certain driving conditions. This is moisture from road spray getting into the brakes and dampening the linings. It is not possible to eliminate all moisture spray from the brakes because of the necessary running clearances of drums and dust shields. A few light brake applications from time to time, however, will usually generate enough heat to dry the linings and restore them to their usual efficient state.

If the condition is persistent, and an inspection indicates moisture is entering the brakes through openings between the wheel cylinders and dust shields, an application of sealing compound over the opening will help to prevent the condition.

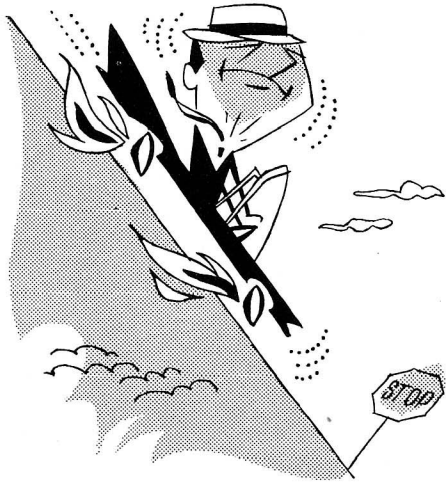


Loss of Pedal

Loss of pedal usually occurs when the brakes are hot after numerous hard pedal applications, either on level roads or in mountainous areas.

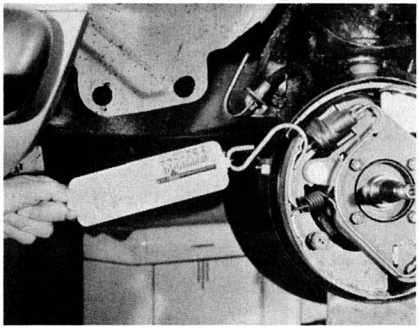
In most cases this may be due to nothing more than normal wear on the shoe linings, and a shoe adjustment should correct it.

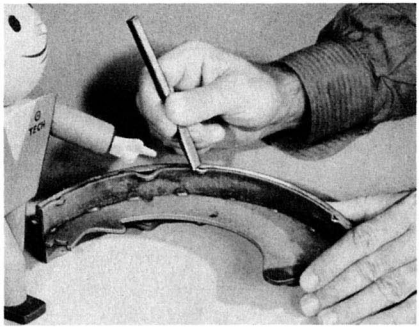
The use of questionable linings of the type that loses its friction qualities when subjected to severe braking heat conditions is frequently a cause of loss of pedal. This condition can be greatly minimized by installing Chrysler-approved shoe and lining sets.



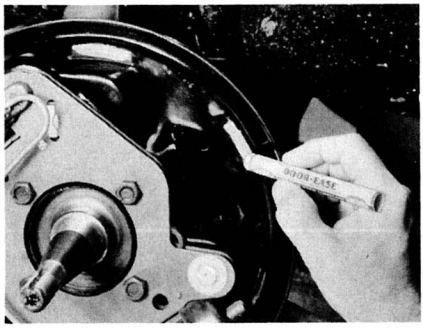
Still another possible cause of this condition is heat generated due to shoes dragging. This could be due to weak shoe return springs preventing shoes from returning to their fully released positions, or a build-up of burrs or paint on the brake dust shield shoe platforms due to rough edges on the brake shoe loops.

The desired tension of shoe return springs to start the shoes in motion, is 45 to 55 pounds. You can measure this spring tension by attaching a spring scale to the toe of the shoe and pulling it away from the wheel cylinder. If a tension of less than 45 pounds is required to start the shoe in motion, the spring should be replaced.



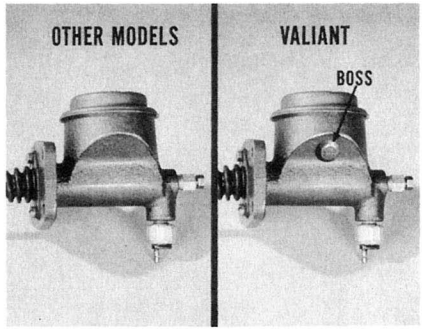


If there is a build-up of burrs or paint on the platforms, due to sharp edges on the loops of the shoes, a scraper or file should be used to smooth down the loops and platforms. This should be done carefully to avoid removing too much metal—take off just enough to smooth out the surface.

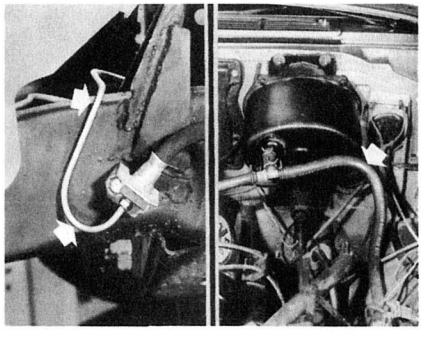


When installing the shoes, apply a light film of approved lubricant, such as MoPar or Chryco Door Ease on the platforms. This will free up the movement of the shoes on the platforms.

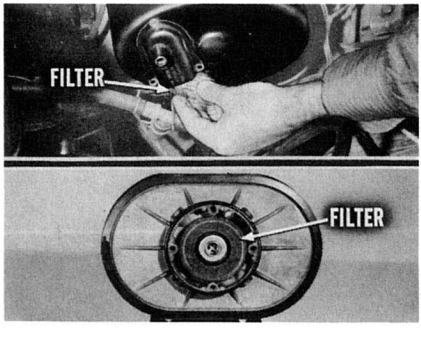
If, by mistake, a Valiant one-inch master cylinder is installed on other models, it will cause excessive pedal travel. The bore of the Valiant master cylinder is smaller than the others. The Valiant cylinder can be identified by the small boss cast in the right side of the unit.



Loss of pedal when the brakes are *not* hot could be caused by collapsed brake hoses or kinked lines, which restrict the flow of fluid to one or both wheel cylinders.



On cars equipped with power brakes, it is possible the condition may be the result of damaged power cylinder vacuum hoses or a plugged filter in the power cylinder. Damaged parts should be replaced and the filter should be either cleaned or replaced.



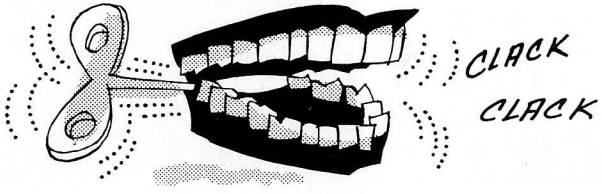
Brake Chatter

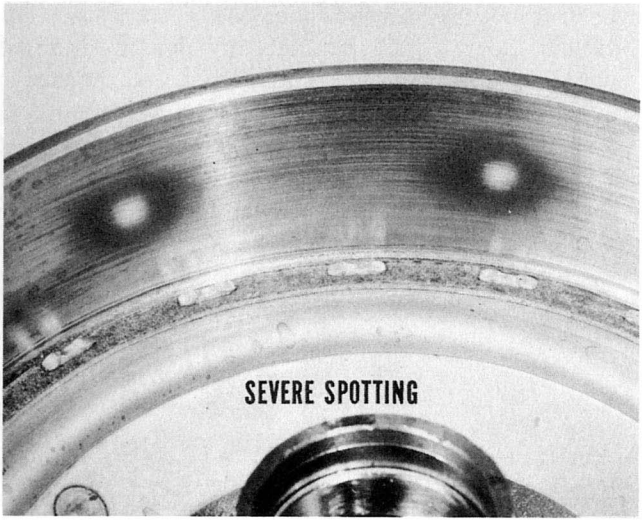
When diagnosing causes of brake chatter, look for a surface condition on the brake drum called "spotting".

This spotting condition is a local hardening of certain areas of the drum. It is described as either incipient (or first stage) spotting, or severe spotting.

The former is identified as a blue area in the contact surface and can sometimes be removed by rubbing with emery cloth. If this treatment does not remove the spotting, turning out the drums a few thousandths of an inch on a lathe will correct the condition.

The severe spotting is identified as quite a bright spot with a bluish area around it. The bluish area indicates that a metallurgical change or hardening has taken place in the metal.



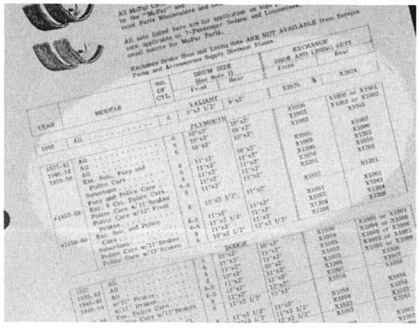


This type of spotting cannot be removed by turning on a drum lathe because the metal is too hard. Grinding is required. However, grinding should be limited to .030 inch on a side or .060 inch on the diameter. If the removal of more than this amount of metal is required, the drums should be replaced.

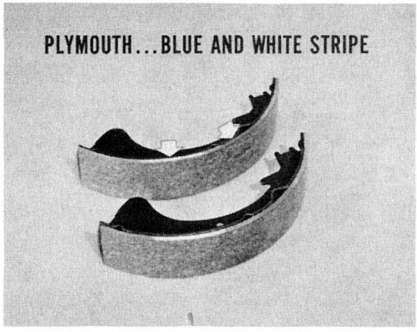
RELINING BRAKES

Chrysler-Approved Parts

When shoe adjustments are no longer effective, brakes should be relined, using only Chrysler-approved shoe and lining sets. Using these shoe and lining sets insures that the correct type of lining will be used for that car, and in addition, the shoes are pre-ground, so they fit the contour of the drums properly.



The use of approved shoe and lining sets protects owners against questionable parts, particularly shoes that are not properly heat-treated or with poor welding jobs. When installing replacement shoe and lining sets on Plymouth models, particularly, be sure the linings are identified with two-inch long, white and blue stripes on the edge of the lining. Above all, be sure the same type of lining is used on each side. This is important, regardless of the type of lining used on the shoes that were removed.



When installing shoe and lining sets on Imperial models, some owners prefer to have new assemblies used, rather than relined shoes.

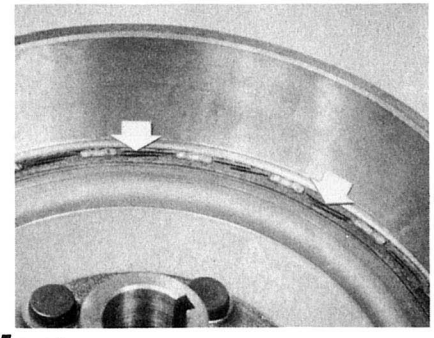
CAUTION: A very important point to remember is to avoid handling shoes and linings with oily or greasy hands that might contaminate the linings and spoil the job.

Inspect Brake Drums

Before installing the shoes on the dust shields, inspect the drums for roundness, using Gauge C-3492. A drum that is more than .004 inch out of round should be refaced. If removing more than .030 inch on one side, or .060 inch on the diameter is necessary to true up the drum, it should be replaced. If too much metal is removed from a drum it will tend to distort under load, particularly on hard brake applications, when high temperatures are developed.

It is also good practice to measure the clearance between the ends of the shoes and the drums with a feeler gauge to be sure there is at least .004- to .005-inch clearance. Hold the shoe at its center, and press it against the drum so both ends will be free.

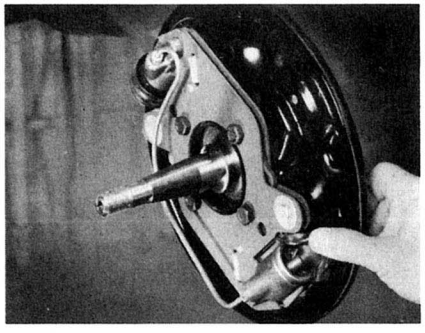
When examining brake drums, hairline cracks in the cast iron part of the drum near the back are not sufficient reason to discard the drum. The cast part is fused to the drum, and the cracks will have no effect on the life or efficiency of the drum.



Inspect Wheel Cylinders

Before installing the new or relined shoes on the dust shields, it is good practice to inspect the wheel cylinders to be sure they are not scored, do not have ridges in the bores, or contain worn parts that may leak fluid after the car is placed back in service.

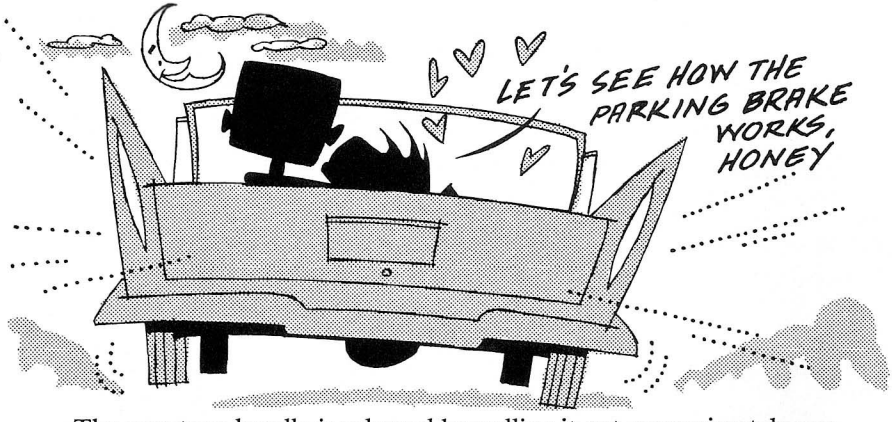
If a wheel cylinder should leak after new shoes are installed, the linings might be contaminated with brake fluid and require replacement. Always play it safe and examine the cylinders.



When installing the shoes, apply a light coating of approved lubricant, such as MoPar or Chryco Door Ease on the shoe platforms.

PARKING BRAKE

Late-production models, except Valiant, are equipped with a new parking brake release mechanism. This new unit is similar in operation to the former unit, and can be identified by a new release handle.



The new type handle is released by pulling it out approximately one inch and then pressing it down.

Cable Adjustment

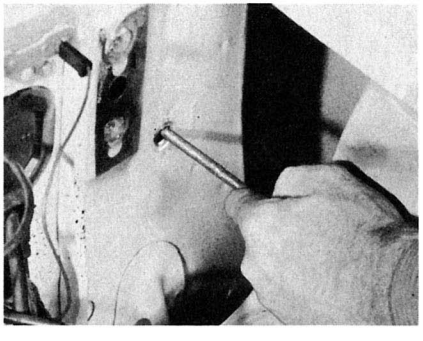
There is no difference in the adjustment procedure of the two types of mechanisms. However, it might be well to review the procedure to assist in correcting some reports of faulty cable operation.

If the pedal requires considerable foot pressure to apply, or a binding or crunchy feeling is observed when applying the brake pedal, the following possible causes should be explored.

First, it might be due to kinks or sharp bends in the cable. The cable should be routed with a wide sweeping curve free of bends. If the cable is kinked enough to be damaged it should be replaced.

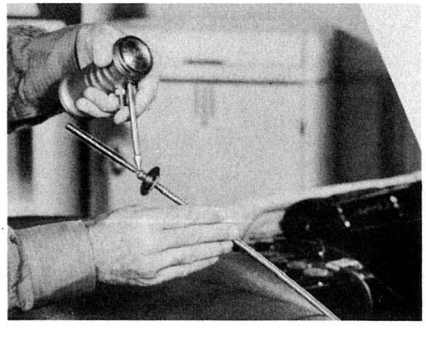
Another possibility is misalignment of the cable hole in the dash panel in respect to the position of the cable lever, which does not allow the cable to align properly with the lever.

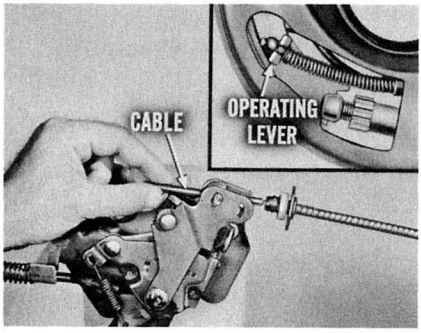
To correct this misalignment, it will be necessary to disconnect the cable at the bracket, and pull it and its seal from the panel. Then, elongate the hole in the panel by filing in the necessary direction until the alignment is satisfactory.



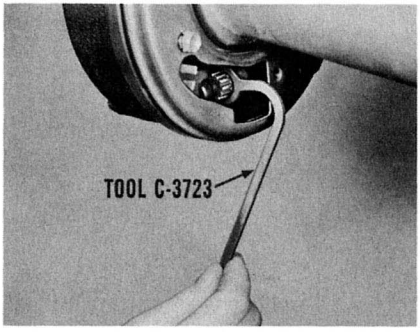
It is also possible the crunchy feeling might be caused by misalignment of the cable and lever, and the condition can be corrected by elongating the cable hole as just explained.

The binding or crunchy feeling might also be due to dryness at the upper end of the cable. If such is the case, lubricate the cable with SAE 30 engine oil, and let it work down.

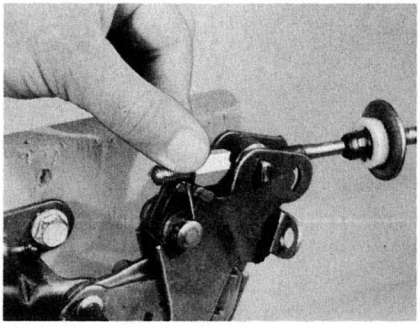




When installing the cable in the internal-expanding brake, pull it firmly from the top with a force of about five to nine pounds to take up the slack. Then, install the adjusting nut, but leave it loose enough so that the *brake operating lever is in the fully released position.*

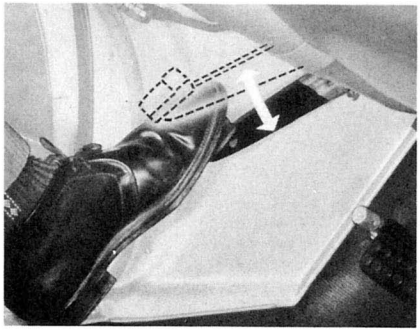


Next, expand the shoes outward against the drum until a slight drag is felt. Because of the limited access to the adjusting screw, use of Adjusting Tool C-3723 will make the job easier. Then, back off the adjustment one notch, or until the drum is free.



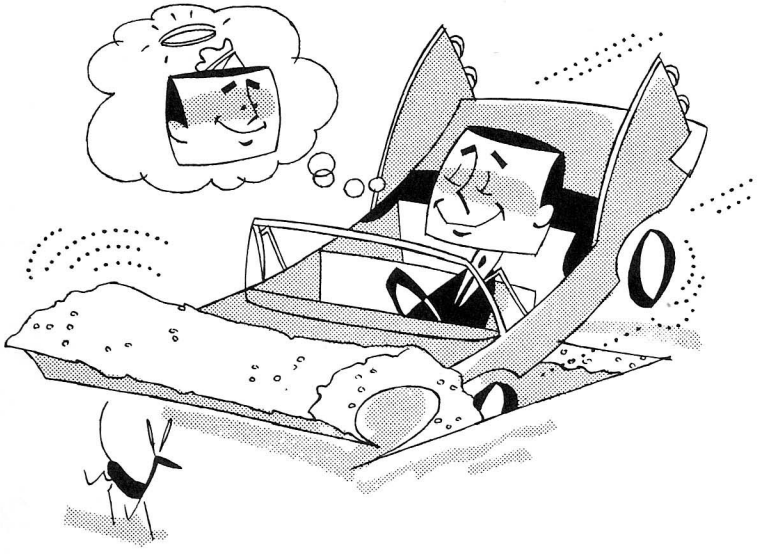
Next, turn up the cable adjusting nut *fingertight.* Apply the pedal three or four times to eliminate all slack from the cable. After that, again tighten the nut fingertight and finally, add three full turns with a wrench.

Complete the cable adjustment by testing the brake lever travel. This should be no more than three and one-half inches with nominal foot pressure. If five or six clicks are heard from the pedal as it is pressed, the adjustment is correct.



SUMMARY

The information contained in this Reference Book was compiled and arranged to cover, thoroughly, all phases of service and parking brake maintenance. Using the knowledge you gained here, coupled with the use of Chrysler-approved service replacement parts and brake fluid, should place you in high regard with your customers.



RECORD YOUR ANSWERS TO THESE QUESTIONS ON QUESTIONNAIRE NO. 153

An accumulation of small air bubbles in the hydraulic system is generally the cause of a spongy pedal.	RIGHT	1	WRONG
On cars equipped with power brakes, the pedal free play should be examined when the engine is running and vacuum is applied on the vacuum cylinder.	RIGHT	2	WRONG
Before bleeding brakes, always back off the adjusting cams to move the shoes to the fully released position.	RIGHT	3	WRONG
It is best to start bleeding at the front brakes, because the short lines contain more air bubbles.	RIGHT	4	WRONG
Brake fluid should flow from the hose in a solid stream for *three* seconds before you close the screw.	RIGHT	5	WRONG
Turn the cams on the rear shoes of the rear brakes in the direction of forward wheel rotation when adjusting brakes.	RIGHT	6	WRONG
Loose anchors in the support assembly are a frequent cause of rear brake howl.	RIGHT	7	WRONG
Severe spotting in the brake drums can be corrected by turning the drum in a lathe.	RIGHT	8	WRONG
Parking brake cable misalignment can be corrected by elongating the cable hole in the dash panel.	RIGHT	9	WRONG
When adjusting the parking brake cable, the brake operating lever should be in the fully released position.	RIGHT	10	WRONG

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