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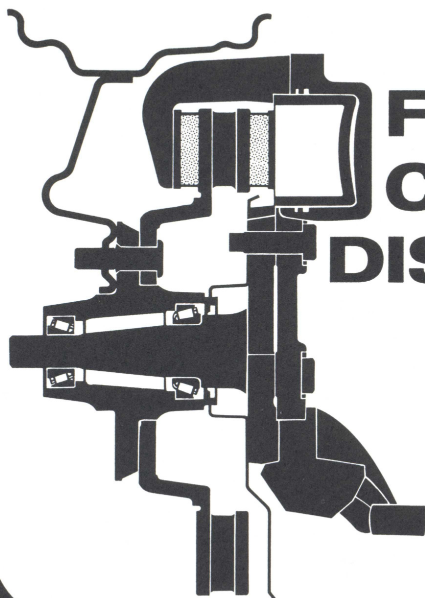

FLOATING CALIPER DISC BRAKES

PLYMOUTH
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IMPERIAL
DODGE TRUCK

CHRYSLER
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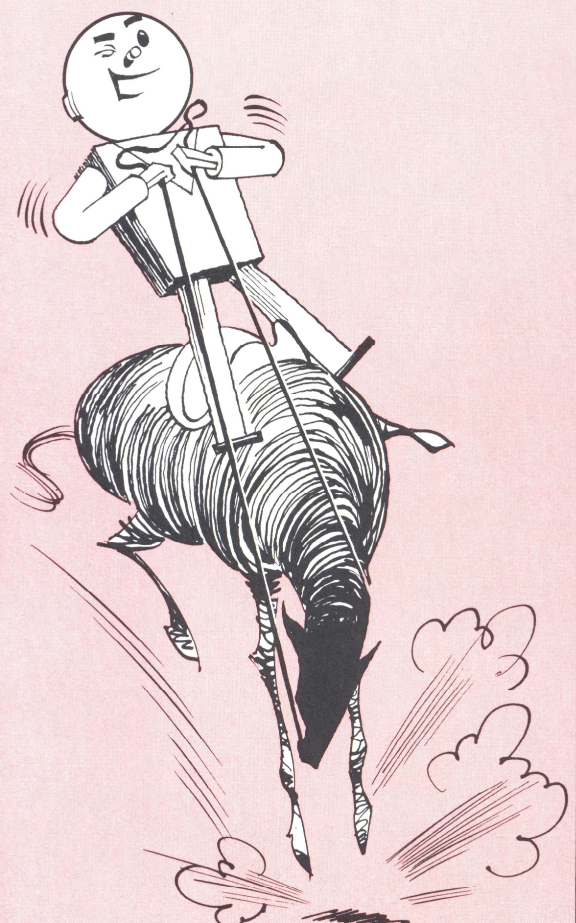

A WORD ABOUT BRAKE POWER

Few people realize that today's automobiles have far more "WHOA POWER" than "GO POWER". We hear a lot about horsepower but not too much about brake-power. For example, a three-hundred-horsepower engine isn't unusual these days. That's a lot of power but it has to take a back seat to the brake-power built into that same automobile.

For purposes of illustration, it's reasonable to assume that a car with a three-hundred-horsepower engine will accelerate from 0 to 60 miles an hour in about 10 seconds. That means it will also take about three-hundred horsepower to bring that same car to a complete stop from 60 miles an hour in 10 seconds. But stopping in 10 seconds isn't fast enough! Under some conditions we may want to stop in 5 seconds . . . or less. In other words, the brake-power requirement is at least twice the car's horsepower or 600, plus. That's a lot of brake-power!

Our drum-type brakes provide all of the brake-power required to stop the car safely under all normal driving conditions. However, disc brakes have operating characteristics that make them attractive to many drivers. This book will introduce you to the newest addition to our family of fine brakes . . . the floating caliper disc brake.

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THE FLOATING CALIPER BRAKE DESIGN

The new single-piston, floating caliper, disc brake is quite different from the four-piston, fixed caliper brakes you have worked on in the past. For instance, how one large piston manages to do the work of the four smaller pistons used on other disc brakes deserves an explanation.

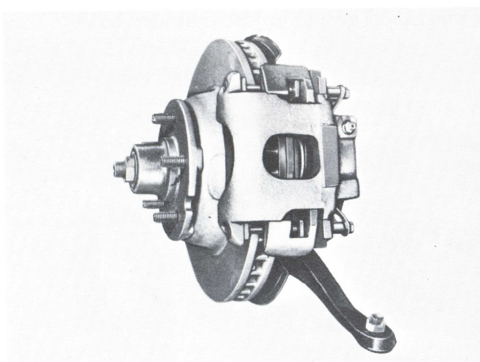

Fig. 1—Floating caliper disc brake

ACTION AND REACTION

In the four-piston disc brakes you are familiar with, the caliper is fixed. To produce equal braking force against both sides of the brake disc, two pistons push each of the two shoes against the opposite sides of the disc. The new single-piston brake utilizes the basic principle that "for every action there is an equal and opposite reaction" to produce equal braking force on both sides of the disc.

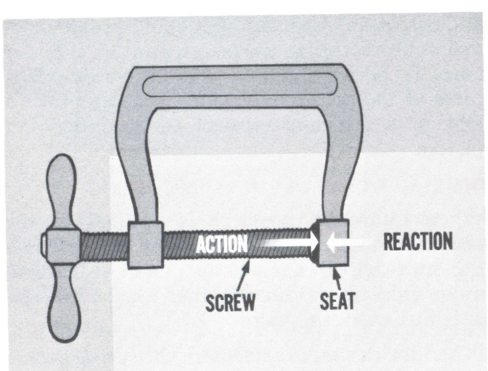

Fig. 2—C-clamp illustrates "action" and "reaction"

Let's use an ordinary "C" clamp to illustrate the principle involved in the floating caliper disc brake. When you tighten the screw of the clamp, the screw pushes against the seat . . . that is the "action" part of the principle. But, the seat pushes back or resists the push of the screw an equal and opposite amount so you don't need a screw in each end of a C-clamp.

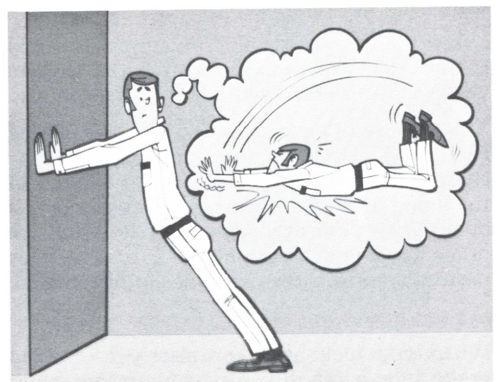

Fig. 3—The wall really does "push back"!

If you find it a bit difficult to visualize how something that doesn't move can exert a push, try putting your hands out in front of yourself and lean your weight against a wall. Now imagine what would happen if someone suddenly took the wall away so that it wasn't pushing back against your hands . . . an equal and opposite amount! Get the picture?

So—we can say that two of the small pistons, used in other disc brakes, do the acting and the other two simply provide the reacting force. In other words, the one large piston used with the floating caliper only has to do the work of the pistons on one side of the disc in a fixed caliper brake.

BUT ONE DOESN'T EQUAL TWO

Sooner or later you'll notice that the one big piston used with the new brake isn't equal in

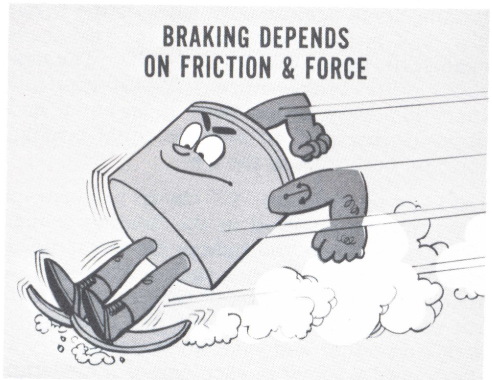

Fig. 4—Linings have a higher coefficient of friction

effective area to two of the smaller pistons used in our other disc brakes. So we better explain "how come" before you get a chance to ask.

The amount of braking done depends on lining friction as well as the force pushing the lining against the disc. The coefficient of friction of the lining used with the single-piston brakes is about fifty percent higher than it is for the lining used with our other disc brakes. This more than offsets the difference in piston area.

THE ADAPTER SUPPORTS THE CALIPER

When you look at a completely assembled brake it is a bit difficult to figure out what moves . . . what stands still . . . and exactly how the floating caliper brake works. So, let's take a brake apart and get acquinted with the major working parts.

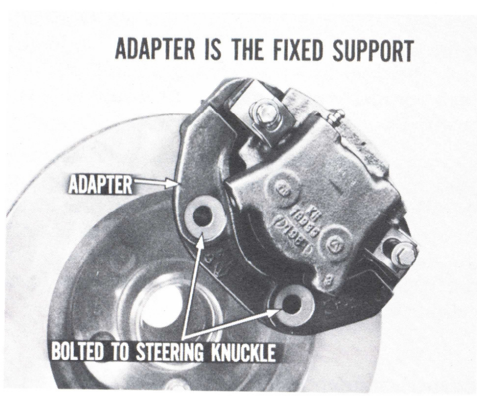

Fig. 5—The adapter supports the floating caliper

The adapter is the backbone or support for the floating caliper. It's bolted directly to the steering knuckle so it takes all of the braking loads. Functionally, it does the same thing for a disc brake that the support plate does for a drum-type brake. The adapter is a stationary member and the disc is the rotating member. Notice that the disc is much thicker than the ones used with our other disc brakes. A positive method of retaining the shoes makes it safe to machine the discs. But more about that later.

THE SINGLE-PISTON CALIPER

The caliper is a one-piece casting having a single cylinder bore on the inboard side of the brake. A square-cut rubber piston seal fits into a machined groove in the cylinder bore.

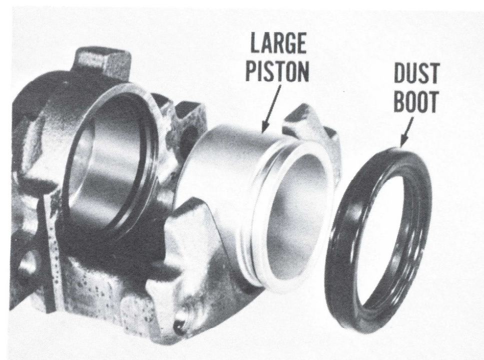

Fig. 6—The piston is nickel and chrome plated

The large, single, piston is nickel and chrome plated to provide very good resistance to wear and corrosion. A rubber dust boot provides corrosion protection to the piston and the cylinder bore. To better understand the functional features of the piston, seal, and boot, let's take a look at a sectional view of the cylinder and piston.

THE SEAL WORKS LIKE A RETURN SPRING

When hydraulic pressure is applied to the piston, it moves outward. Since the seal is a pressure-tight fit against the piston, it tends to move with the piston. In other words, it bends outward with the piston.

When the brakes are released, the spring action of the distorted seal pulls the piston back into its bore. This relieves the pressure on the brake

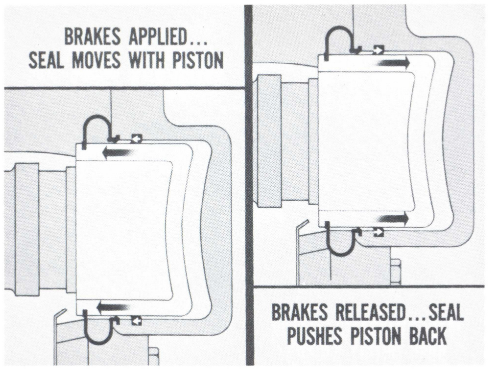

Fig. 7—The piston seal bends and moves with the piston

shoes and establishes running clearance between the shoes and the disc.

THE DUST BOOT DOES DOUBLE DUTY

The dust boot forms an airtight seal at both the piston and the cylinder. A lip rides on the piston and this keeps the boot seated in its groove inside the cylinder. The other lip of the boot fits tightly into a groove machined in the piston.

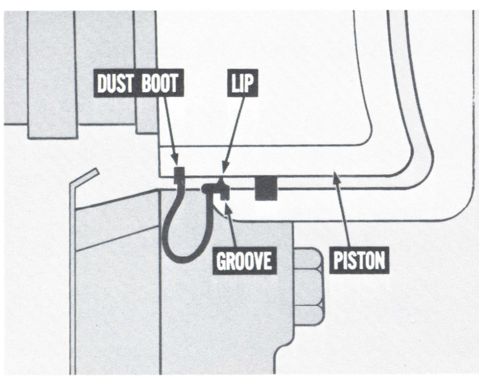

Fig. 8—The dust boot forms an airtight seal

It is extremely important to make sure the dust boots are in good condition and sealing effectively. Moisture is as much an enemy of the hydraulic brake system as dust and dirt.

That's because the excellent, high-boiling-point brake fluid required for a modern brake system has a tremendous thirst for water. Exposing this fluid to moisture-laden air will result in serious contamination of the fluid and eventual corrosion of metallic parts. That's why you must never leave a brake fluid container open and exposed to the moisture-laden air.

A PAIR OF SHOES FOR THE CALIPER

The two brake shoes fit into the caliper. The inboard shoe rests against the piston. The outboard shoe simply bottoms against the machined surface in the outboard side of the caliper. It's easier to see the relationship of the shoes to the caliper before the brake is completely assembled.

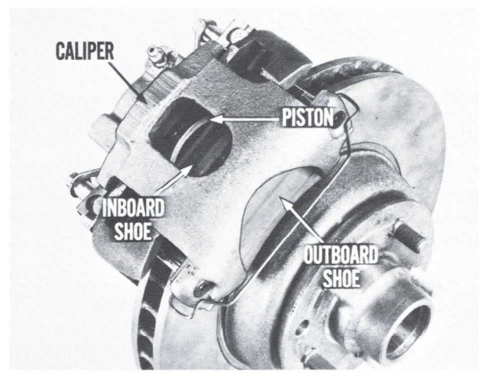

Fig. 9—The inboard shoe rests against the piston

THE GUIDE PINS DON'T MOVE

It is also difficult to visualize the relationship between the guide pins, the caliper and the adapter when the brake is assembled.

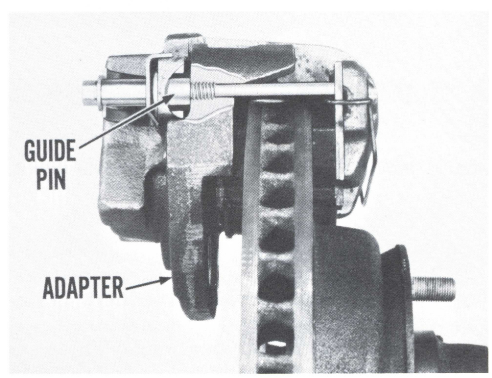

Fig. 10—The guide pins are threaded into the adapter

The accompanying illustration shows how the two steel guide pins are threaded into the adapter. That means they are fixed or non-moving parts. They help guide and position the floating caliper as it moves from side to side. The guide pins also pass through holes at either end of the two brake shoes. This provides positive retention of the shoes in the caliper.

POSITIONERS COMPENSATE FOR LINING WEAR

The guide pins slide through four rubber bushings in the caliper as well as the four retaining holes in the two brake shoes. The positioners at the inboard end of the guide pins hold the caliper outward, away from the disc, when the brakes are released. The positioners are not ordinary springs. They are adjustable spacers which actually bend and close up as the linings wear. They automatically compensate for lining wear. Since the positioners are compressed and gradually close up as the linings wear, they must be replaced when new shoes are installed or whenever the caliper is serviced. New rubber bushings for the guide pins must also be installed when the brakes are relined.

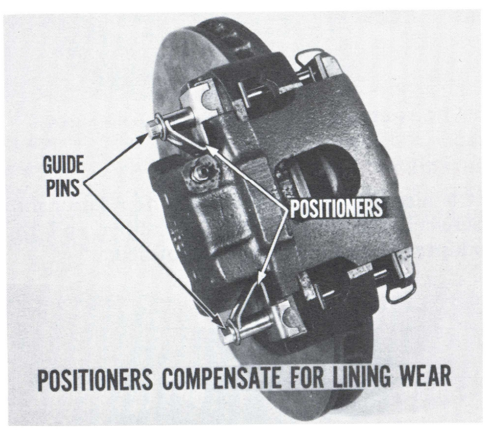

Fig. 11—The positioners actually bend as the lining wears

CALIPER ALIGNMENT AND BRAKING LOADS

The caliper is a precision, sliding fit in the adapter. At four points, mating, machined surfaces on both the caliper and the adapter maintain caliper alignment. These machined surfaces take all of the braking loads. There are no braking loads on the guide pins or the rubber bushings in the caliper.

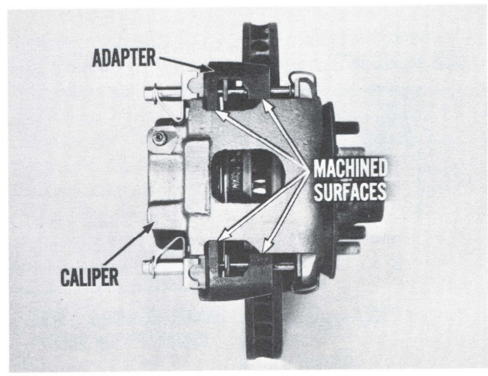

Fig. 12—Machined surfaces take the braking loads

DISC BRAKE LININGS ARE HARD AND TOUGH

The brake disc is clamped between the two shoes when the brakes are applied, the apply force is always equal on both sides and there is no disc distortion . . . even at high temperatures. Much higher brake application force is used with disc brakes but less lining area is required than with drum brakes to provide equal or greater braking effort.

Fig. 13—Disc brake linings tolerate higher temperatures

Very hard lining material is used with disc brakes in order to withstand the high compression force needed to produce good braking. These hard linings can stand much higher temperatures and are more resistant to brake fade.

AND THEY'RE THICKER, TOO

In addition to being harder, disc brake lining is much thicker to provide good lining life. As these thicker linings wear, the large disc brake pistons move outward quite a way as they automatically compensate for lining wear. That's why more fluid capacity is needed in the reservoir of the master cylinder used with disc brakes. As a matter of fact, the master cylinder used with floating caliper disc brakes is not the same as the one used with other disc brakes. So let's take a look at the master cylinder and the rest of the hydraulic system used with these new disc brakes.

THE MASTER CYLINDER AND HYDRAULIC SYSTEM

The master cylinder used with the new floating caliper disc brakes is not exactly like or interchangeable with any of our other master cylinders. But let's review exactly how a dual hydraulic brake system works so you'll understand the differences.

ONE BORE AND TWO PISTONS

All of our tandem master cylinders have two separate brake fluid reservoirs. However, they have a single cylinder bore and two separate pistons which operate in tandem. Of course, all disc brake master cylinders have deeper reservoirs and more fluid capacity.

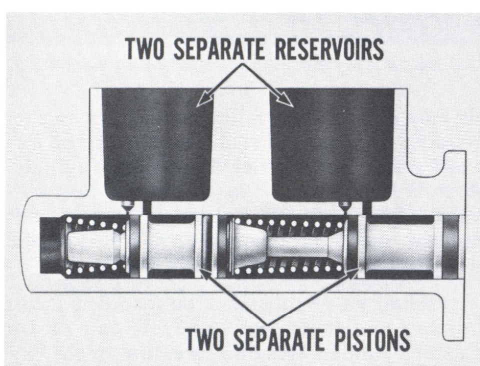

Fig. 14—Disc brake master cylinder

It's a lot easier to keep things straight if we call the rearward piston the *primary* piston because it is actuated directly by the brake pedal push rod. Besides, the primary piston supplies pressure to the front brakes where most of the braking is done on all but very light brake applications.

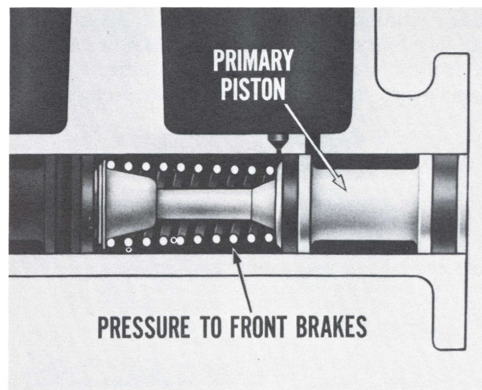

Fig. 15—The brake pedal actuates the primary piston

The piston at the forward end of the master cylinder is the secondary piston and it supplies pressure to the rear brakes. In normal operation, hydraulic pressure from the primary piston operates the secondary piston. In other words, there is a hydraulic link between the two separate sections of the dual hydraulic system and the same pressure is supplied to the front and rear brakes by the master cylinder in normal operation.

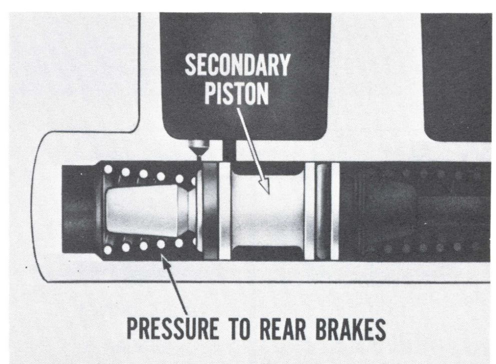

Fig. 16—Hydraulic pressure actuates the secondary piston

WHEN THE BRAKES ARE APPLIED

Here is what happens when the brakes are applied. The somewhat stiffer primary piston spring pushes the secondary piston forward, compressing the weaker secondary spring slightly. The secondary compensating port is closed off and pressure starts to build up in the forward chamber. At the same time, the primary compensating port has also been closed off. The correct amount of fluid is now trapped in front of each piston and pressure is developed in the primary and secondary chambers.

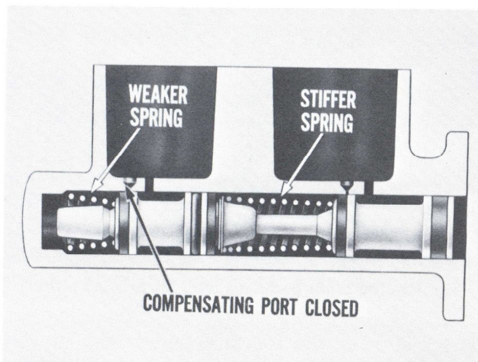

Fig. 17—Equal pressure in secondary and primary systems

THE MASTER CYLINDER IS SPECIAL

The master cylinder for the single-piston disc brake system has a longer stroke and greater capacity than most of our other master cylinders. What's more, the division of fluid capacity between the primary and the secondary

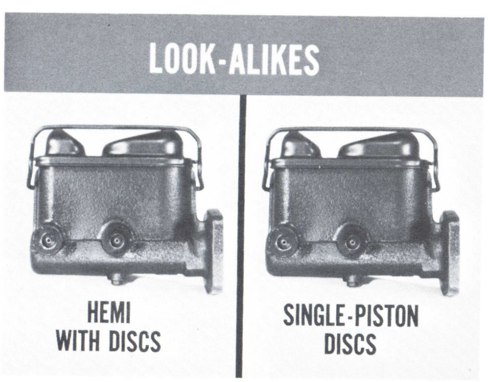

Fig. 18—These master cylinders must not be interchanged

systems provides more reserve capacity for the front disc brakes than is needed for other brake systems.

The master cylinder for a Coronet, Charger, Belvedere or Satellite, equipped with a Hemi-engine and disc brakes, looks exactly like the master cylinder used with floating caliper disc brakes. These master cylinders must not be interchanged. As a matter of fact, neither the pistons nor the master cylinder assemblies should be interchanged, so don't mix up the complete assemblies or the separate parts.

NO RESIDUAL VALVE FOR THE DISCS, PLEASE

All master cylinders for drum-type brakes have residual valves in both the primary and the secondary outlets. These valves maintain a small amount of hydraulic pressure in the wheel cylinders. The residual pressure keeps the piston cup lips expanded so they press against the cylinder wall to form a good seal. This keeps air from being sucked past the wheel cylinder cups when the brakes are released.

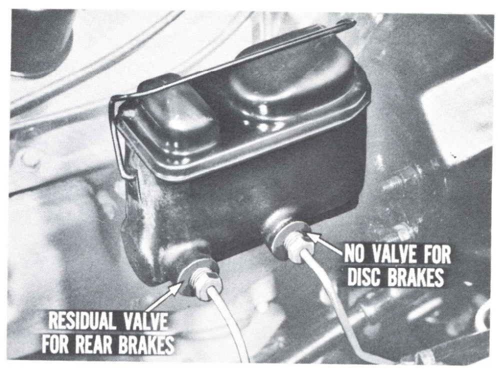

Fig. 19—No residual valve in the primary system

On cars equipped with disc brakes, the master cylinder must have a residual valve in the forward or secondary outlet of the master cylinder to maintain pressure in the rear wheel cylinders. This pressure is never great enough to prevent the brake shoe return springs from retracting the shoes so there is no brake drag.

A residual valve must not be installed in the primary outlet at the rearward end of the master cylinder. Residual pressure in the primary brake lines would make the disc brake shoes drag and wear out prematurely. That's because the pistons are large and there are no shoe return springs with disc brakes.

DUAL-PURPOSE BRAKE WARNING LIGHT

Next in the brake hydraulic system is the brake warning light. In addition to warning the driver if pressure is lost in either the primary or secondary system, it reminds him to release the parking brake before he drives away. Let's review the way the warning light switch works.

The primary brake line from the master cylinder is connected to one end of the switch and a line supplying the front disc brake is connected at this same end. With the single-piston disc brakes, one outlet at this end of the switch is plugged . . . you'll see why a couple of paragraphs from now.

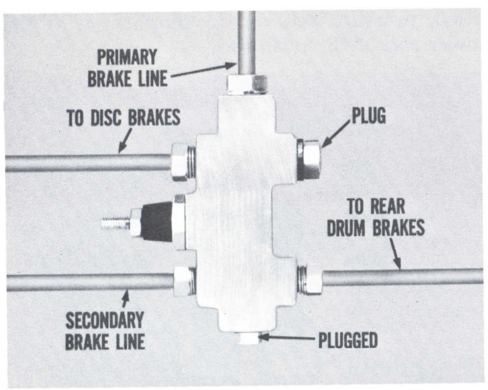

Fig. 20—Brake warning light switch connections

The line from the secondary outlet of the master cylinder is connected at the other end of the switch and a fourth line leads to the rear drum brakes. At this end of the switch, the end outlet is plugged on all applications.

INSIDE THE BRAKE WARNING LIGHT SWITCH

Inside the switch, a barbell-shaped double-headed piston, with an "O" ring seal at each end, separates the front brake hydraulic system from the rear brake system. Coil springs at either end of the piston keep the piston centered as long as the pressure is the same in both parts of the hydraulic system.

If pressure is lost in one system, for example the front brakes, pressure in the rear brake system pushes the piston off-center. As soon as

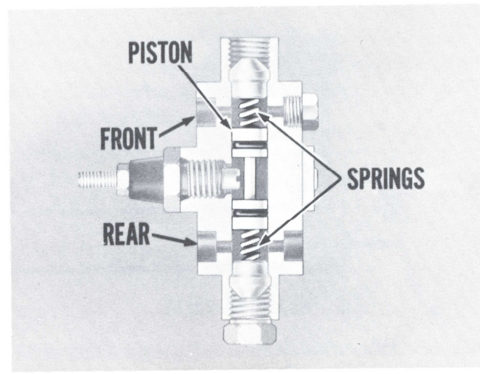

Fig. 21—Springs keep the piston centered

the piston moves far enough to touch the ground contact of the warning light switch, the warning light ground circuit is completed and the light comes on.

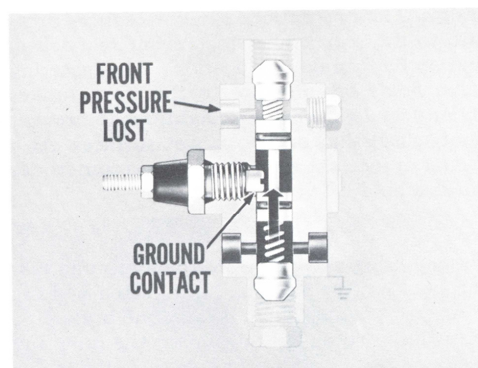

Fig. 22—Pressure moves the piston off center

The springs in the switch are quite stiff so that minor variations in pressure won't turn the warning light on. For example, residual pressure in the secondary system will not cause the light to come on even when the primary system pressure is released.

THE DISC BRAKE METERING VALVE

Although drum brakes and disc brakes have different characteristics, the floating caliper disc brakes are designed for excellent balance with the new rear drum brakes. However, on icy or extremely slippery road surfaces, it is desirable to reduce front-wheel braking. That's

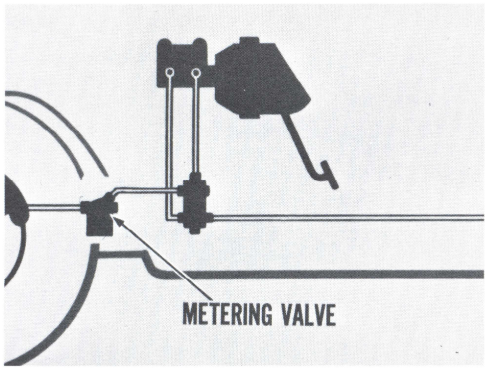

Fig. 23—Metering valve holds off pressure to disc brakes

where the metering valve comes in. It cuts off pressure to the front brakes in the range from about 10 psi to about 115 psi.

This should not be confused with the proportioning valve used with some of our other disc brakes. The proportioning valve *reduces* pressure to the *rear* brakes to prevent rear-wheel skid on *hard* brake applications. The metering valve *holds off* pressure to the *front* brakes under very *light braking* conditions to prevent front-wheel skid on icy or wet surfaces. As a matter of fact, the metering valve is sometimes called a hold-off valve.

ONE "IN" AND TWO "OUT"

The metering valve fits into the hydraulic system between the warning light switch and the front disc brakes. There is only one brake line from the warning light switch to the metering

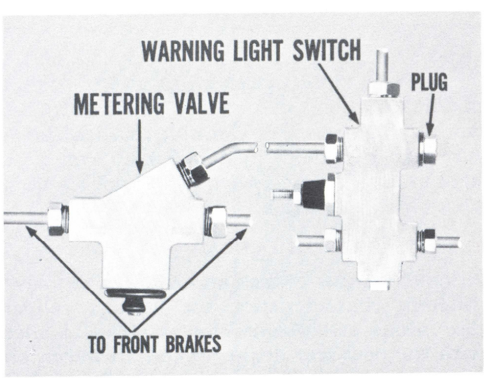

Fig. 24—Metering valve connections

valve. That's why one of the primary lines from the warning light switch is plugged on this installation. There are two lines leading from the metering valve . . . one line for each front brake caliper.

INSIDE THE METERING VALVE

The metering valve is serviced as an assembly so you won't have to be concerned with repairing it. However, if you know what's inside the valve you'll have a better understanding of some of the service precautions that apply. In the accompanying illustration, note that there is a check valve and a valve seat. The valve seat is mounted in a moveable valve plate. A spring holds the valve plate closed. The check valve at the upper end of the push rod is normally open to insure complete release of pressure to the disc brakes. As soon as the brakes are applied, pressure acts on the diaphragm at the lower end of the push rod.

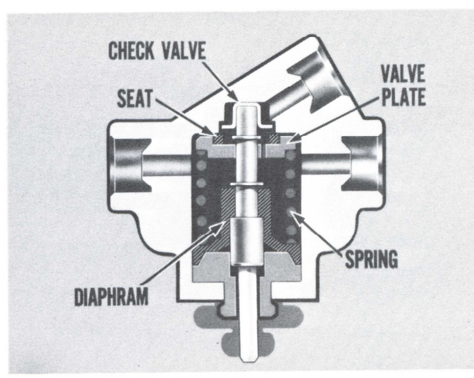

Fig. 25—Metering valve construction details

It only takes about 10 psi to move the diaphragm far enough to seat the check valve. This cuts off all pressure to the front brakes. As a result, the rear brakes do the braking when very light pedal pressure is applied. This insures good braking and steering control under slippery operating conditions because it reduces the likelihood of front-wheel skid.

When master cylinder pressure gets up to about 115 psi, the push on the check valve and valve plate overcomes the valve spring pressure and unseats the valve plate. From about 115 psi to 500 psi, the pressure difference between the primary and the secondary is gradu-

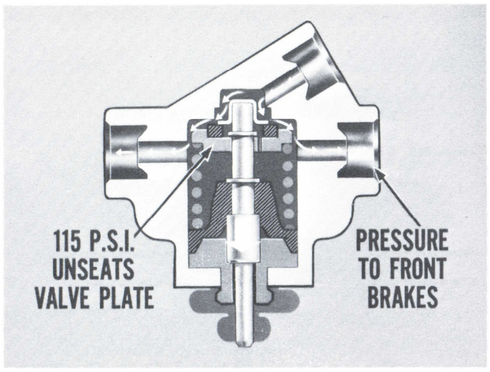

Fig. 26—Pressure opens the metering valve plate

ally reduced until, at about 500 psi, pressure to the front and rear brakes is the same.

REAR BRAKES AND PARKING BRAKES

All full-size 1969 models have new 11-inch, drum-type brakes front and rear. The front drums have deep ribs cast into the outer surface of the drum. The rear drums have shallow ribs and a wide flare cast into the surface of the drum. These ribs and flares increase the amount of surface exposed to the cooling air,

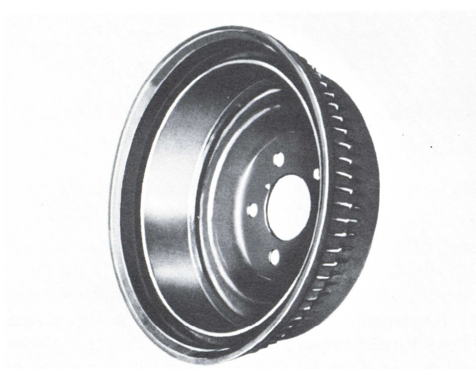
Fig. 27—Ribbed and flared rear brake drum

increasing the rate of heat dissipation. These new drums are used with new 15-inch ring-mounted wheels. Larger wheels promote better cooling and the ring mount feature minimizes drum distortion.

In other words, the standard production brakes on the full-size models will be bigger and better for 1969. But this is a disc brake story so we are primarily interested in the features of rear drum-type brakes and parking brakes used with floating caliper disc brakes.

PARKING BRAKE CABLE ASSEMBLY

New parking brake cable assemblies are used on all full-sized models. The new assemblies have stiffer return springs and both the type of cable lubricant used and the method of lubricating the cable have been improved. The new cable insures parking brake release and reduces the possibility of rear brake drag. The new parking brake cable assemblies can be used on previous models. However, if you replace one rear cable with one of the new cable assemblies you must also replace the other rear cable assembly. One new and one previous model assembly must not be used. The new cable assemblies can be identified by a *zinc-colored* spring on the left assembly and a *blue-colored* spring on the right assembly.

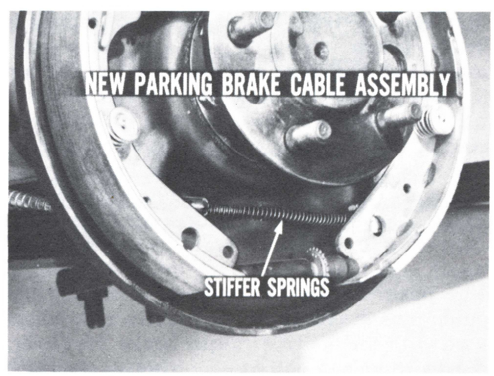

Fig. 28—New cable assembly insures parking brake release

DRUMS ARE BETTER AT THE REAR

People often ask why disc brakes aren't used both front and rear. The answer is a combination of economics and need. Disc brakes at the rear would seriously complicate the parking brake design. It would take a complicated and bulky leverage system to provide enough apply force to insure adequate parking brakes if discs were used at the rear.

On the other hand, drum-type brakes provide a simple and effective mechanical parking brake system. Besides, under the severe braking conditions which make disc brakes desirable up front, little or nothing would be gained by installing disc brakes at the rear. Our new rear drum brakes provide just about all the wheel-stopping force the rear tire-to-road friction can utilize on hard braking from higher speeds. That's because the weight shift reduces braking traction in the rear and increases it up front. It makes economic sense to put the discs where the traction is!

SERVICE SUGGESTIONS AND PRECAUTIONS

This is a good place to remind you that your Service Manuals contain complete information on servicing floating caliper disc brakes. You'll also find sections covering the master cylinder and complete hydraulic system and the new rear-wheel brakes used with this disc-brake system. It's also a good idea, when servicing these brakes or any other part of the car for that matter, to check your Service Bulletin file for possible changes in service instructions.

It would serve no useful purpose to reproduce the Service Manual here. However, the following suggestions and precautions may help you avoid costly mistakes and possible comebacks.

YOU CAN MACHINE THESE DISCS

The positive shoe retention provided by the guide pins makes it safe to resurface the discs used with the floating-caliper brake. However, if you resurface one face you must resurface the other face without rechucking the disc. That's because the maximum allowable variation in thickness must not exceed .0005 of an inch. It is virtually impossible to rechuck a disc and hold this tolerance. It is very easy to hold this tolerance if you use good equipment that permits refinishing both faces without rechucking the disc.

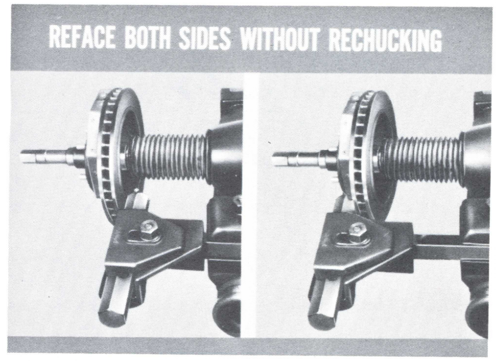

Fig. 29—Maximum allowable variation in thickness is .0005″

NOT MORE THAN .050 OF AN INCH, PLEASE

When you resurface a disc, you must not remove more than a total of .050″. For example, this could be .040″ from one side and a maximum of .010″ from the other . . . or any other combination that does not exceed a total of .050″. In addition, you must not reduce disc thickness to less than 1.20″. So, take it easy and don't remove any more material than necessary to clean up both faces.

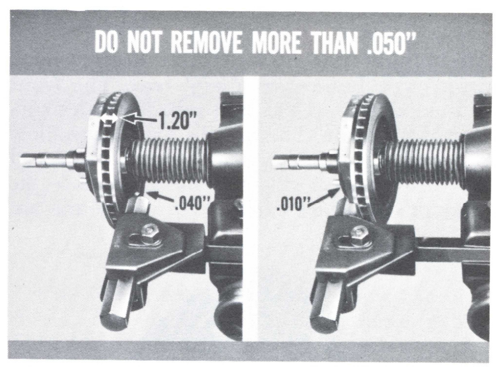

Fig. 30—Disc thickness must not be less than 1.200″

WHY THICKNESS VARIATION IS CRITICAL

You'll notice in the Service Manual that thickness must be measured at twelve points around the circumference of the disc at a distance of one-inch from the edge. This is the method used to determine maximum variation in thickness. If thickness varies more than .0005″, the piston will be pushed in and out as the disc rotates. This will cause objectionable brake pulsation.

RUNOUT IS LESS CRITICAL

Since the caliper is free to float from side-to-side, a small amount of runout will not affect braking adversely. The maximum allowable runout, measured one inch from the edge of the disc, must not exceed .0025″.

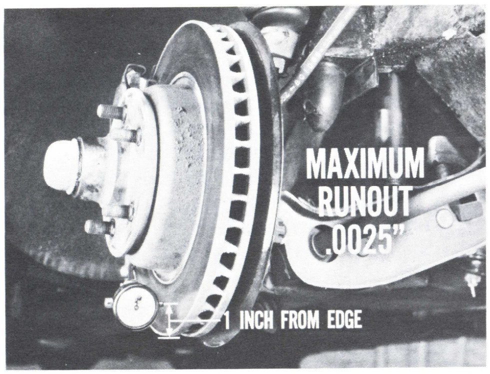

Fig. 31—Measuring disc runout

USE THE SPECIAL PISTON PULLER

A special piston-removing tool (C-4087) is available for pulling the piston out of its bore. This tool makes it much easier to remove the piston without damaging the sealing surface. Under no circumstances should air pressure be used to blow the piston out of its bore. This practice is dangerous and may result in serious personal injury.

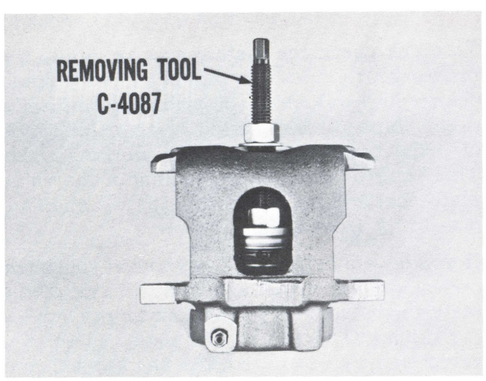

Fig. 32—Use special tool to remove piston from bore

Use a small, pointed wood or plastic stick to pry the piston seal out of its groove in the piston bore. Do not use a screwdriver or other metal tool to "dig" the seal out because you may scratch the bore or burr the seal groove.

CLEAN UP THE PISTON BORE AND GROOVES

A special large hone is available for cleaning up the cylinder bore and the land between the piston and the seal grooves. And, it is extremely important to clean out both the seal groove and the dust boot retaining groove. You can use a bronze wire brush dipped in brake fluid to clean these grooves. Whatever you do, don't scrape any metal from these grooves. Be sure and flush out all traces of dirt and grit after honing the cylinder and cleaning the grooves.

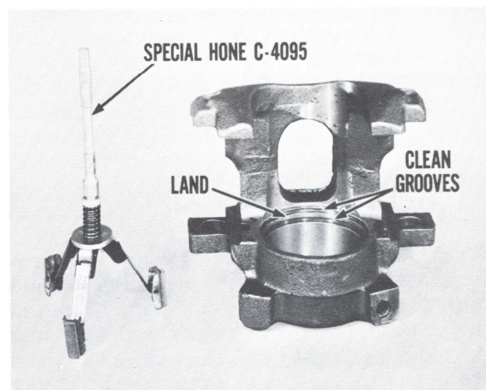

Fig. 33—Refinish and clean the bore and the grooves

USE A NEW SEAL AND DUST BOOT

Never try to re-use a seal or dust boot. When you service a caliper, always install new ones and be sure and use the special lubricant provided with the seal kit. This will make it much easier to install these rubber parts and minimize the possibility of damaging them. Don't use any other type of lubricant.

AIR PRESSURE POPS THE BOOT INTO PLACE

There is an easy way to install the dust boot. Lubricate the boot with the special lube provided and using fingers only, work the outer lip of the boot into its groove in the cylinder bore. Make sure the bleeder screw is closed and install a temporary brass plug in the pressure inlet of the caliper. Be sure the plug is brass and has the correct thread so you won't strip the threads in the caliper.

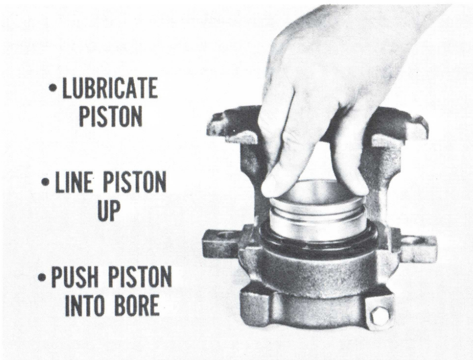

Fig. 34—Escaping air pops the boot into place

Lubricate the piston, slip it through the dust boot and line the piston up squarely and start it into the cylinder bore. Press down on the piston with your fingers and the trapped air escaping past the piston seal will pop the inner lip of the boot into the groove in the piston . . . slick as a whistle.

GUIDE PIN BUSHINGS AND POSITIONERS

When new shoes are installed or the caliper is serviced, you must use new positioners and must install new rubber guide pin bushings in the caliper. New positioners are needed because the old ones closed up as the linings wore and are not re-usable. Of course, constant caliper movement gradually wears the rubber bushings so they must be replaced.

The rubber bushings for the guide pins must be installed in the caliper and fully seated before the pins are installed and threaded into the adapter. If, for example, you try to put the large inner bushings on the guide pins and push them into the caliper, the bushings probably won't seat properly. If you succeed in getting the pins threaded into the adapter, chances are you'll manage to ruin the bushings and collapse the positioners.

Fig. 35—Install the bushings in the caliper first

DON'T CROSS-THREAD THE GUIDE PINS

When you thread a guide pin into the adapter, make sure that the pin is properly aligned and that the outer end of the pin is started into the outer bushing. If you aren't careful at this point you could manage to cross-thread the guide pin threads. Also, make sure the locating tabs on the positioners are correctly located over the machined surface of the caliper before you tighten the guide pins.

MISCELLANEOUS BRAKE SYSTEM SERVICE TIPS

As stated earlier, your Service Manuals cover all phases of brake service in detail. However, the following hydraulic system suggestions are worth repeating for emphasis. If you ever run into a case of brakes dragging because the master cylinder won't compensate, it just could be the stoplight switch adjustment. Remember, it is a spring-loaded switch and if the plunger is too far forward it can keep the brake pedal from returning far enough to open the compensating ports. If this happens, brake fluid expansion from heat buildup can cause the brake shoes to drag.

CHECK METERING VALVE OPERATION

To quick-check the metering valve, apply the brakes gently . . . car parked. A very small change in pedal effort (described by some as a slight "bump") will be felt at about one-inch of pedal travel if the valve is working right. This "bump" signals the opening of the valve plate that occurs at about 115 psi, allowing flow to the front brakes.

If you have a helper handy, you can check the metering valve visually. Watch the end of the metering valve push rod as your helper applies the brakes. The rod should move out of the valve slightly as the brakes are applied and move into the valve as the brakes are released.

BLEEDING THE BRAKES

It is a simple matter to bleed the front brakes;

simply open the bleeder screw and gravity will do the job for you. Just make sure there is plenty of fluid in the master cylinder so it doesn't run dry and let air into the system.

If you use a pressure bleeder to bleed the entire system, the front brakes won't bleed properly unless you keep the metering valve open. That's because pressure bleeders are usually operated at about 30 psi and this pressure will close the metering valve and shut off all flow to the front brakes.

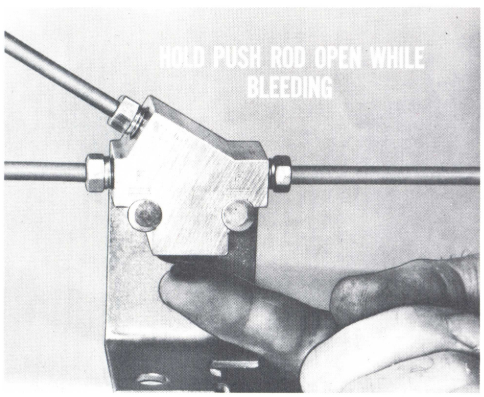

Fig. 36—Do not clamp or block the metering valve open

This situation is easily overcome. Simply hold the metering valve push rod open while bleeding the disc brakes. Do not force the push rod beyond its normal position, and never use a block or clamp to hold the valve open.

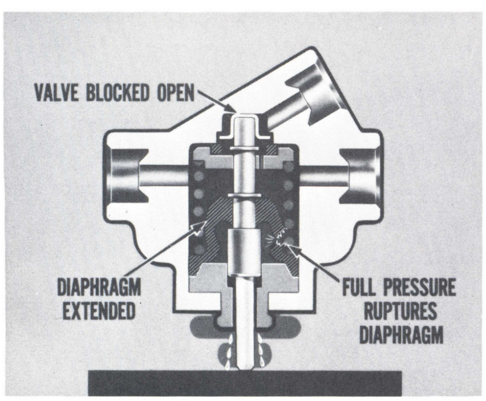

Fig. 37—If diaphragm is ruptured, fluid will be lost

Here's what could happen if you block the valve open and then forget to unblock it. When the brakes are applied, full pressure will act on the diaphragm at the lower end of the push rod. This can rupture the diaphragm and result in loss of fluid in the front brake system.

ABOUT THOSE NEW RING-MOUNT WHEELS

This note about the new wheels doesn't quite fit elsewhere but should be mentioned. A 15-JK wheel *must not* be used on a full-size 1969 model equipped with floating caliper disc brakes because this type wheel will interfere with the brake caliper. A 15-JJ or a 15-K wheel must be used with the floating caliper brake.

Fig. 38—Be sure and use the correct type wheel

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