SHOP TIPS

Motorcraft Ford

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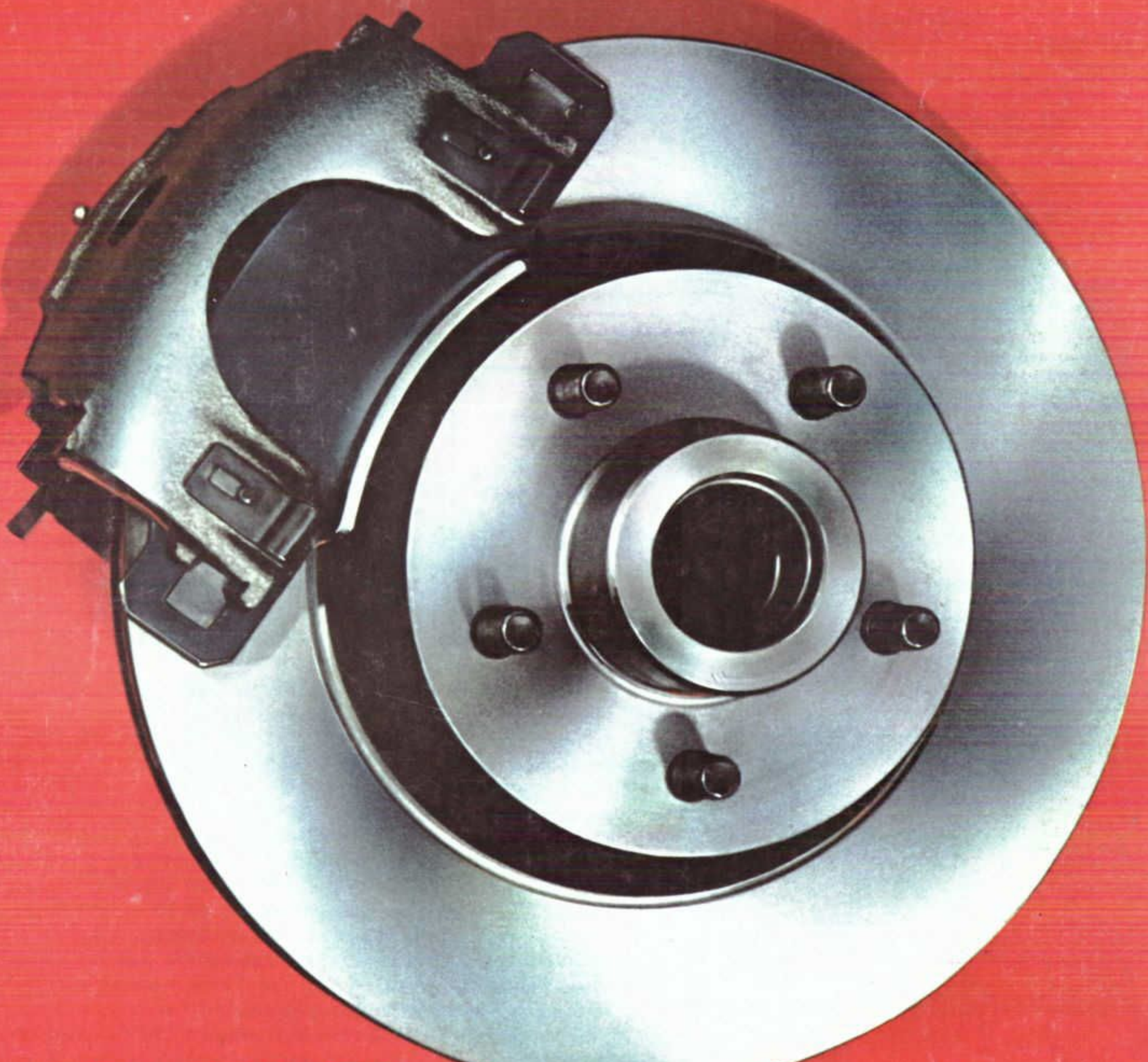


DISC BRAKES...
Servicing Tips and Information

Technical parts and service information published by the Autolite-Ford Parts Division and distributed by Ford and Lincoln-Mercury Dealers to assist servicemen in Service Stations, Independent Garages and Fleets.

IN THIS ISSUE

Be sure to file this and future issues for ready reference. If you have any suggestions for articles that you would like to see included in this publication, please write to: Autolite-Ford Parts Division Merchandising Services Dept., P.O. Box 3000, Livonia, Michigan 48151.

Motorcraft

Vol. 72 MSD 32

LITHO IN U.S.A.

A car traveling at 75 mph has a lot of momentum . . . just about as much as a car that has fallen from the top floor of a 14-story building. Yet, the car's brake system must be capable of absorbing this tremendous amount of momentum through friction . . . all within a few seconds in order to bring it to a safe, quick stop on the highway. Time after time after time!

GENERAL DESCRIPTION

In the automotive passenger car field, disc brakes have only gained wide acceptance in the last few years. However, the idea itself is almost as old as the automobile. In fact, the first patent for a disc type brake was taken out in 1902 (almost 70 years ago) by an Englishman named Dr. Lanchester. Strangely enough, the design he worked out at that time has a striking similarity to the systems in common use today.

It was not until 1953 when Jaguar won at LeMans with a disc-brake equipped car that the American automotive industry started to apply their talents, technical know-how and production capabilities to mass produce a disc brake equipped passenger car.

With disc brakes, as with drum type brakes, the basic principle employed is the harnessing of friction to overcome the motion of the car so that this energy is changed into heat.

With drum brakes the two friction surfaces are the metal drum and specially compounded friction lining material.

Disc brake operation follows this principle to the letter. The mechanical exception is that a circular disc, called a rotor, is used in place of the drum and a clamp-like arrangement called a caliper, which works like a vise, grips the rotating disc when hydraulic pressure is applied to friction pads. The caliper, containing a single piston . . . or in some applications more than one piston . . . is attached firmly to the front suspension.

And since clearance between the disc and the pads is critical, any slight increase in clearance produces excessive pedal travel. Therefore, in the Ford disc brake system, the brake pad is withdrawn a mere .005″ and retained in position by a rubber seal. Because of this method for maintaining the pad-to-disc clearance, wear of the friction material is automatically taken up so that the system is self-adjusting.

Ford-built cars for 1972 use either a single piston *floating* caliper or a single piston *sliding* caliper. The sliding caliper type is standard equipment for the front wheels on the Thunderbird, Continental Mark IV, and the Torino and Montego models.

Another version of the sliding caliper type is also a regular production option (RPO) on the Pinto.

The floating caliper type is available as optional equipment for the front wheels on 1972 Ford, Mercury, Mustang and Cougar.

TIPS AND INFORMATION

HISTORICAL

In the development of modern braking systems, the first novel idea for stopping a moving vehicle came with the introduction of the wagon brake shoe. A simple mechanical arrangement of this is shown in Figure 1. It was a crude device and the "shoe" was usually only a piece of curved wood faced with a band of cast iron which was forced against the cast iron rim of a spoked wheel. Mechanical linkage, operated by a lever, was the means for applying this force. For stopping or slowing down a wagon, this was sufficient. However, even for early motorized vehicles, the type of brake described was hardly adequate.

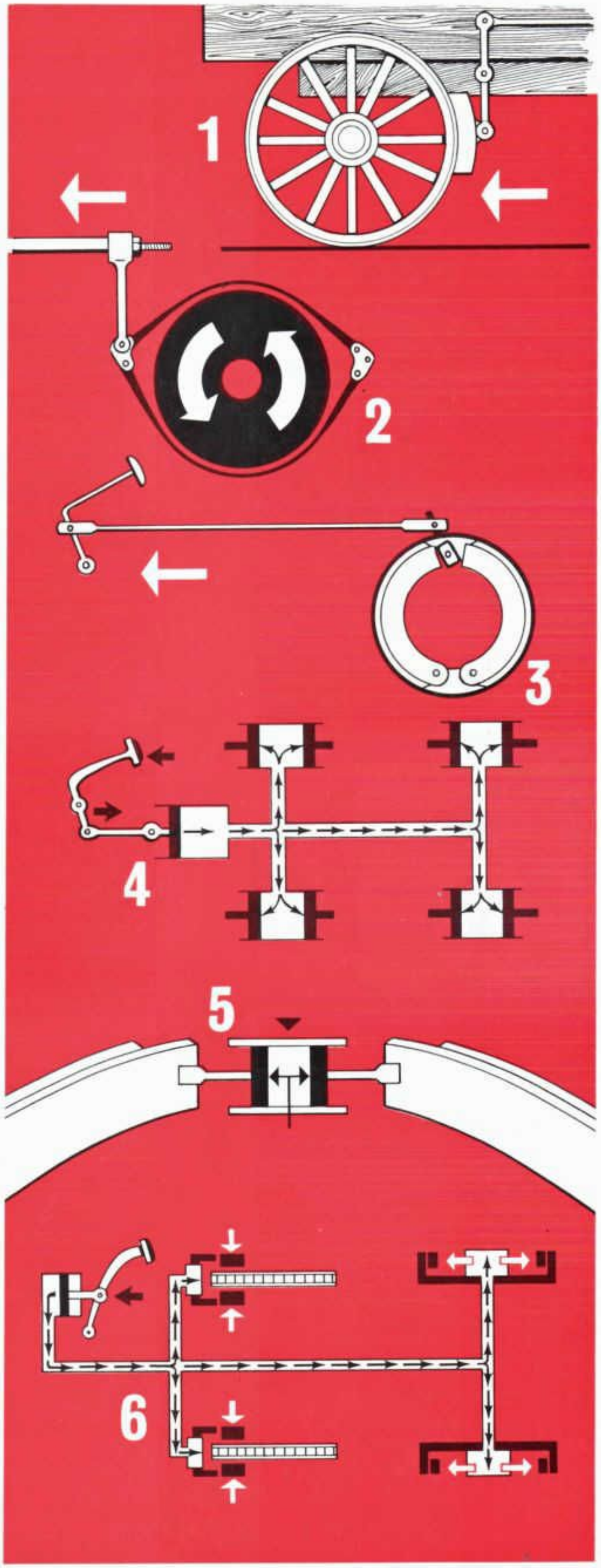
A brake drum was then developed that employed an external contracting brake band as shown in Figure 2. This "wrap around" band lined with friction material resulted in better braking action through increased friction surface area and better mechanical leverages. And, when applied to the rear wheels, this external contracting brake system was a new and effective method for stopping vehicles.

But as automobile popularity and horsepower increased and as roads improved, it was evident that more controlled power was needed for the driver to stop his car safely and smoothly. This led to the development of drum brakes on all four wheels. At first they were *external contracting,* then *internal expanding*.

As shown in Figure 3, mechanically actuated, internal expanding brake systems, in their first stage of development, used brake rods connected to a pedal while some used flexible wire cables. Some employed both. When the driver pushed on the brake pedal, the rod (or cable) pulled a cam-shaft lever at the wheel which in turn rotated a cam and thus expanded the brake shoes against the drum. The mechanical advantage of this arrangement was about 8 to 1 to allow the driver to apply a large amount of force against the brake shoes without great physical exertion.

Next in the evolutionary chain of development came hydraulically operated brake shoes using wheel cylinders and pistons in place of the cam as shown in Figure 4. A master cylinder is used to contain the hydraulic fluid supply, and metal tubing transfers the fluid pressure force equally from the master cylinder to all four wheel cylinders. See Figure 5. This arrangement has been a successful passenger car brake for many years and during this period has undergone many significant engineering changes.

But brake system progress has never stood still. The next major development was the disc brake which gets rid of the brake heat much more readily than a typical drum brake. See Figure 6. First used extensively on heavy military and commercial aircraft, the advantages became apparent for utilization in the modern American passenger car. Namely, better resistance from fade after repeated applications at high speed . . . freedom from pulls because the equal clamping action of the brake pads produces more uniform straight-line stops . . . and a minimum difference in performance whether dry or wet since the disc throws off moisture through its natural centrifugal action.



FLOATING CALIPER DISC BRAKES

DESCRIPTION

The floating caliper assembly shown in the installed position in Figure 7, has two major sections. They are the caliper housing and an anchor plate. This anchor plate is attached firmly to the wheel spindle arm by two anchor plate bolts as shown in Figure 9. The floating caliper is attached to the anchor plate by two steel stabilizers on 1972 Ford, Mercury and Lincoln Continental models. Mustang and Cougar for 1972 use only one steel stabilizer. See Figure 9A.

The floating caliper slides on two steel locating pins which also attach to the stabilizers. Right and left side calipers are not interchangeable. Inside the caliper is a single cylinder and piston assembly. The bore contains a square-sectioned rubber piston seal which is positioned in a groove machined into the cylinder bore and is used to provide sealing action between the cylinder surfaces and piston.

A molded rubber dust boot fits around the piston and seals the cylinder bore from dust and water contamination. See Figure 8. When you compare the outer brake shoe and pad to the inner brake shoe and pad, you will find that the outer assembly is longer and therefore not interchangeable. The outer shoe and pad are fixed to the floating caliper and retained in their position by two steel pins and spring clips. The friction material is riveted (1971-72 models) or bonded (1968-70 models) to a metal plate called the shoe. The shoe and lining assembly is replaced as a unit.

The circular disc, called a rotor, also called a "disc," is cast iron and is ventilated by cooling fins as it rotates with the wheel hub. A splash shield is bolted to the spindle and is used primarily to prevent road splash from contacting the inner surfaces of the disc and shoe pad.

Outer surfaces of the disc are protected from road contamination by the wheel assembly.

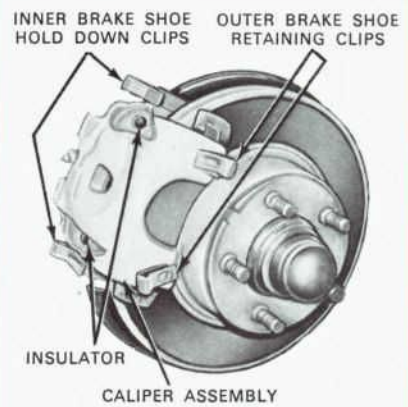


Figure 7

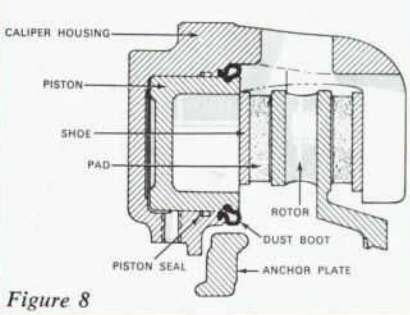


Figure 8

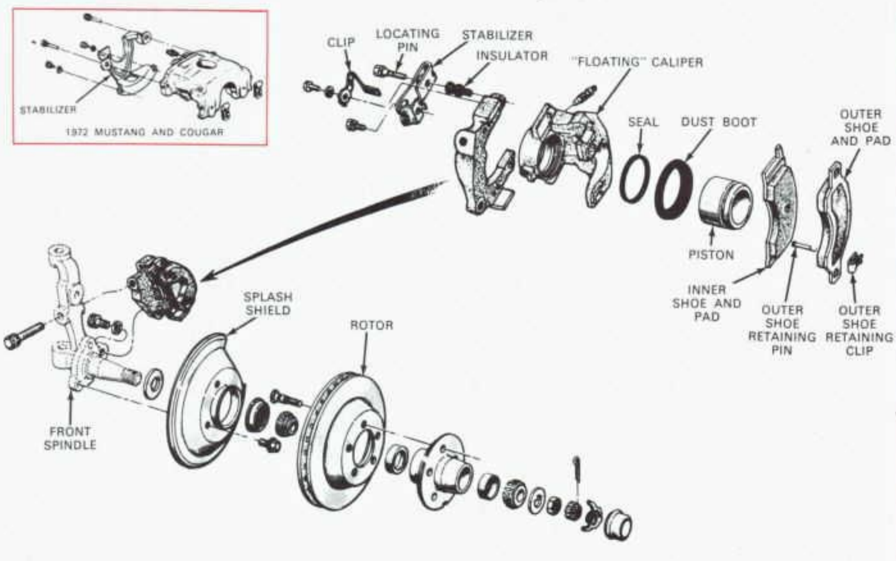


Figure 9

Figure 7 – Here is the "floating caliper" type of disc brake in the installed position.

Figure 8 – A cross section view of the "floating caliper" type of disc brake. Note that the single piston design is similar to that of the sliding type shown on the opposite page.

Figure 9 – This is the "floating" type of disc brake. In this design, the caliper is mounted on the anchor plate in such a manner that it can "float" inboard or outboard as the brakes are applied and released . . . yet held firmly against movement either forward or backward, depending upon the direction of braking forces. Two caliper locating pins hold the caliper in correct position. They extend through rubber insulators which are held in holes in the anchor plate and thread into the ears of the caliper. The caliper is held in position on the anchor plate by two flexible steel stabilizers. Only one stabilizer, as shown in Figure 9A, is used on Mustang and Cougar models.

SLIDING CALIPER DISC BRAKES

DESCRIPTION

A new sliding caliper disc brake assembly is used on 1972 Continental Mark IV, Montego, Thunderbird and Torino. A similar one is used on 1971-72 Pinto models. And, like the floating caliper type, this sliding caliper assembly has two major sections. They are the caliper housing and an anchor plate. Two bolts attach the anchor plate to the wheel spindle arm. See the exploded view, Figure 12.

On the upper end of the caliper housing are two machined surfaces which contact and slide on matching surfaces machined on the anchor plate.

A steel plated key and a caliper support spring fits between the machined surfaces at the lower end of the caliper and the machined surface of the anchor plate. See Figure 10.

This key is held in position by an Allenhead retaining screw. The caliper support spring is designed to hold the caliper in proper position against the machined surfaces on the anchor plate. A brake shoe anti-rattle spring clip is located on the anchor plate at the lower end of the inner brake shoe and pad. Insulator gaskets are bonded to the back of each brake shoe.

NOTE: *The inner and outer brake shoes and pads are not interchangeable.*

The sliding caliper contains a single cylinder and piston with a molded rubber dust boot to seal the cylinder bore and piston surfaces from road dust and contamination.

And, to provide a fluid seal between the cylinder and the piston, a square-sectioned rubber piston seal is located in a groove in the cylinder bore. See Figure 11.

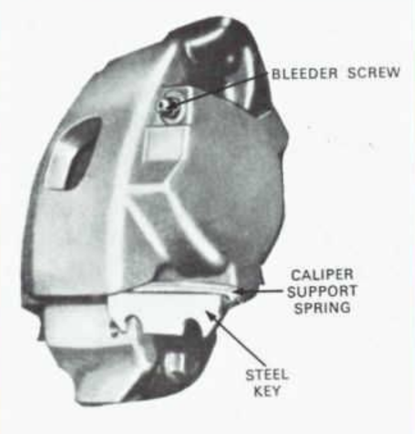


Figure 10

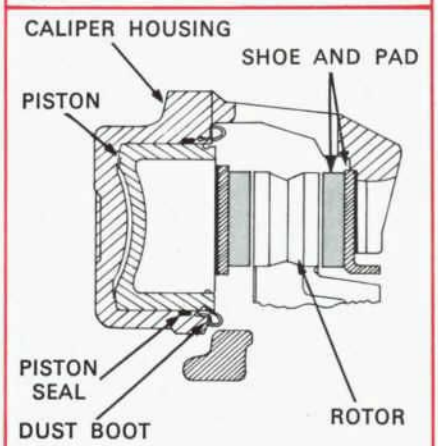


Figure 11

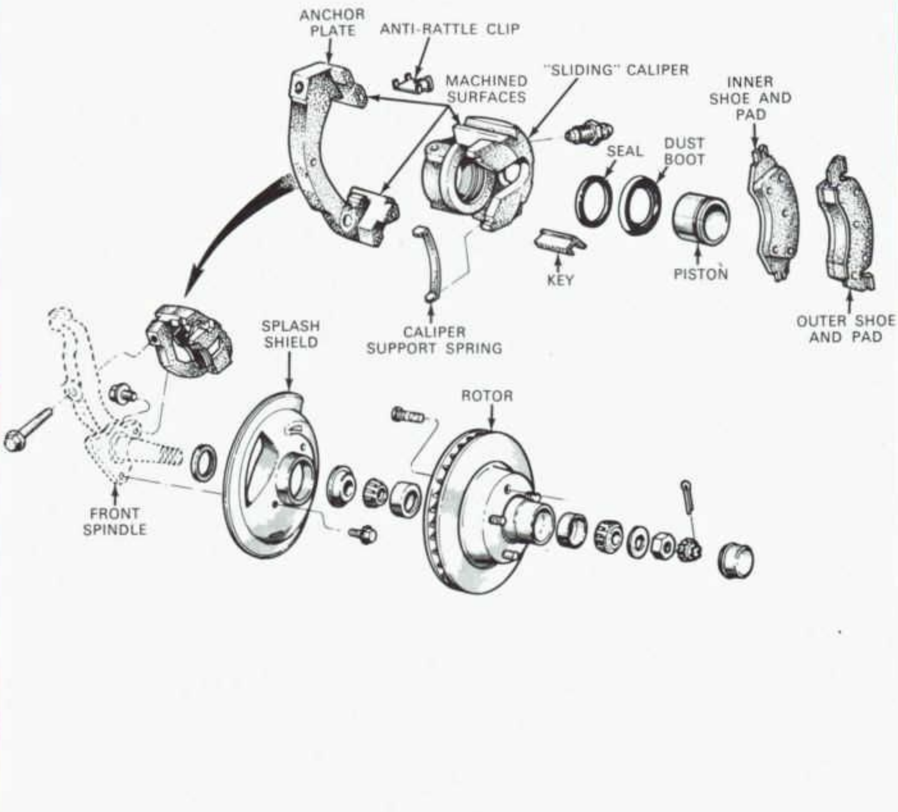


Figure 12

Figure 10 – Note the location and position of the caliper support spring and key.

Figure 11 – Here is a cross section view of the sliding caliper type of disc brake. Note the insulator gaskets bonded to the back of the inner and outer shoes.

Figure 12 – This is the sliding type of disc brake. In this design (like the "floating" type) the anchor plate is bolted to the wheel spindle arm with two bolts. However, note the difference between the anchor plate in this design and the one in the "floating caliper" type of disc brake shown on the opposite page.

INSTALLING NEW BRAKE SHOES AND PADS . . . FLOATING CALIPER TYPE

1972 FORD, MERCURY, LINCOLN CONTINENTAL

This type of disc brake is simple to service and requires no unusual procedures.

Follow the steps listed for 1972 Ford, Mercury and Lincoln Continental models. NOTE: 1972 Mustang and Cougar models with floating disc brakes have different service procedures which are described later on in the text.

REMOVAL

1. Remove the master cylinder cap and check the fluid level in the primary (large) reservoir. Remove enough fluid until the reservoir is half full. NOTE: Discard this fluid.
2. Remove the wheel and tire from the hub.
3. Remove the inner shoe hold-down clips. See Figure 7.
4. Place a small screwdriver under the outer shoe retaining clip tang and lift away from the pin groove. Then, slide the clip from the shoe retaining pin. Repeat this procedure with the other retaining clip.
5. Remove the caliper locating pins. See Figure 13.

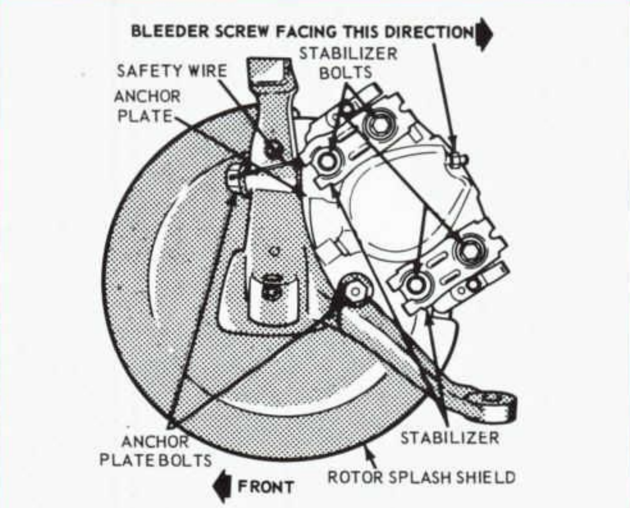


Figure 13 – A rear view of the floating caliper disc brake as it appears when installed to the anchor plate and wheel spindle arm.

6. Remove the upper stabilizer to anchor plate attaching bolt and remove the upper stabilizer to avoid interference with the brake hose during caliper removal.
7. Lift the caliper from the anchor plate and remove the outer shoe and retaining pins from the caliper assembly.
8. Suspend the caliper from the front suspension upper control arm with a wire hooked through the upper caliper locating pin hole.
9. Remove the caliper locating pin insulators. See Figure 14.
10. Remove the inner shoe and lining and inspect both rotor braking surfaces. If the rotor is scored or damaged, refinishing or replacement is indicated.

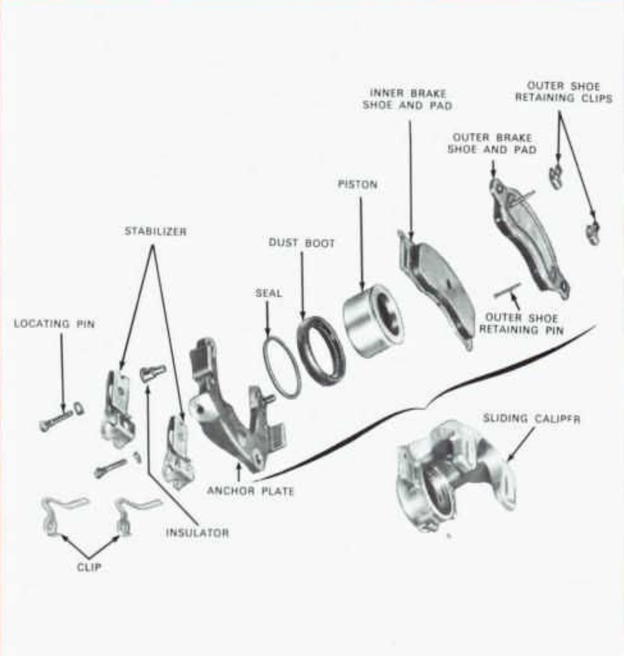


Figure 14 – The floating caliper disc brake disassembled. Note the insulator position to the anchor plate.

INSTALLATION

1. Install the inner shoe and lining in the anchor plate. Next, install NEW locating pin INSULATORS (these are supplied in the shoe and lining kit). Use a cloth to protect the insulators during installation. Check to be certain that both insulator flanges straddle the anchor plate.
2. Install the inner brake shoe hold-down clips and tighten the retaining bolts to proper torque.
3. Install the piston retracting tool in the caliper, as shown in Figure 15, with the brake shoe lances positioned in the slots in the caliper outer legs. See Figure 15. Push the piston into the cylinder bore in the following manner:

NOTE: *A piston retracting tool can be made from a discarded outer brake shoe and a threaded rod. See Figure 16 for details.*

CAUTION: *When using the piston retracting tool, guide the threaded rod into the piston cavity with one hand and turn the threaded rod clockwise one-half turn at a time. Pause for a moment or two to permit the piston to move inward past the seal. Reduce the time interval as the piston nears the bottom of the cylinder bore to insure it bottoms fully. If the piston does not become fully bottomed, the spacing between the linings will not be sufficient to position the brake shoe and caliper assembly over the rotor. Remove the special tool.*

4. Inspect the piston dust boot for cracks due to overheating or road damage and replace as required.

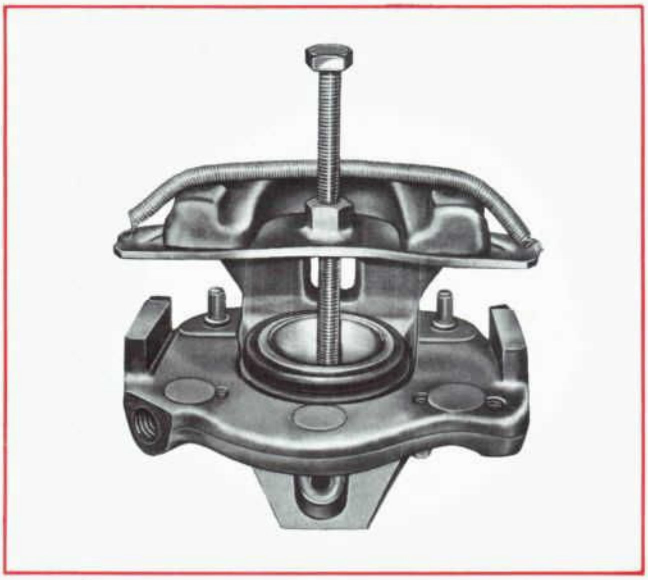


Figure 15 – The piston retracting tool positioned properly on the caliper legs.

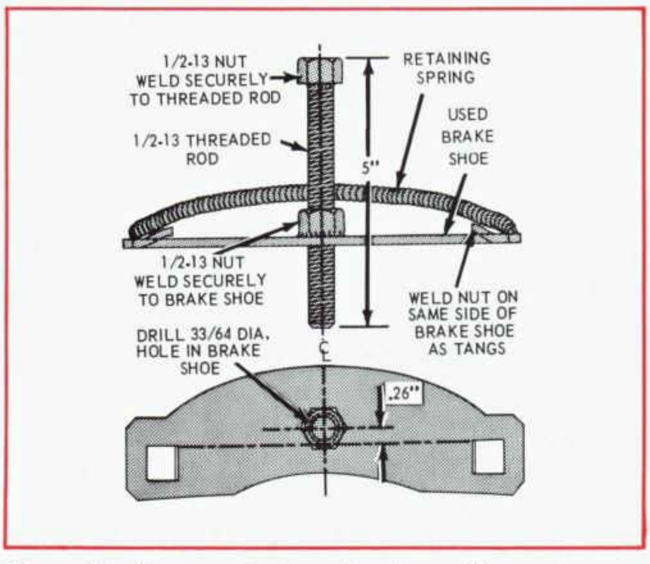


Figure 16 – Here are the dimensions for making a piston retracting tool locally. The spring is needed to hold the special tool to the caliper as it is being used.

5. Install the outer brake shoe and lining, then install the retaining pins and retaining clips.
6. Remove the caliper assembly you suspended from the wire hook and insert the caliper assembly in the anchor plate.
7. Position the upper stabilizer then install the stabilizer to anchor plate attaching bolt. CAUTION: Be careful to position the tab at the lower bolt location. Tighten the attaching bolt to proper torque.
8. Install the caliper locating pins and torque to proper specifications.
9. Add new fluid to the master cylinder as required until the fluid level is within ¼" of the top of the reservoir.

   NOTE: *If necessary, bleed the brakes as outlined later on in this article.*
10. Install the wheel and tire.
11. Pump the brake pedal several times before you move the car so as to position the brake linings properly.
12. Road test the car and observe braking action.

INSTALLING NEW BRAKE SHOES AND PADS . . . FLOATING CALIPER TYPE

1972 MUSTANG/COUGAR

This is the same type of disc brake as Ford, Mercury and Lincoln Continental models use, but the service procedures are somewhat different for the 1972 Mustang and Cougar. Therefore, follow the steps as listed below.

REMOVAL

1. Remove the wheel and tire from the hub.
2. Remove the caliper from the front suspension by first disconnecting the brake hose from the caliper.

   CAUTION: *Cap the hose and fitting to prevent brake system contamination and loss of brake fluid from the master cylinder.*
3. Mark the left and right caliper assemblies with chalk before you remove them from the vehicle.
4. Remove the caliper locating pins and the lower stabilizer attaching bolts and discard the stabilizer.
5. Lift and remove the caliper from the anchor plate.
6. Remove the inner brake shoe hold-down clips from the anchor plate. Then remove the locating pin insulators from the anchor plate and remove the inboard brake shoe and lining assembly.
7. Place a small screwdriver under the outer brake shoe retaining clip tang and lift away from the pin groove. Slide the clip from the brake shoe retaining pin.
8. Remove the outer brake shoe.

INSTALLATION

1. To install a new inner brake shoe in the anchor plate, it is necessary to install new caliper locating pin insulators (supplied in the brake shoe and lining kit). Use a cloth to protect the insulators during assembly.
2. Check to be certain that both insulator flanges straddle the anchor plate.
3. Install the inner brake shoe and hold-down clips and tighten the retaining screws to proper specifications.
4. Install the piston retracting tool in the caliper as shown in Figure 15, with the brake shoe lances positioned in the slots in the caliper outer legs. Push the piston into the cylinder bore in the following manner:

   NOTE: *A piston retracting tool can be made from a discarded outer brake shoe and a threaded rod. See Figure 15 for details.*

CAUTION: *When using the piston retracting tool, guide the threaded rod into the piston cavity with one hand and turn the threaded rod clockwise one-half turn at a time. Pause for a moment or two to permit the piston to move inward past the seal. Reduce the time interval as the piston nears the bottom of the cylinder bore to insure it bottoms fully. If the piston does not become fully bottomed, the spacing between the linings will not be sufficient to position the brake shoe and caliper assembly over the rotor. Remove the special tool.*

5. Install the new outer brake shoe and lining on the caliper and install the outer brake shoe retaining clips. Hold the retaining pins in position with an Allen wrench or bolt while installing the retaining clips.
6. Install the caliper over the rotor with the outer brake shoe against the rotor braking surface during installation in the anchor plate. NOTE: *This procedure prevents pinching of the piston boot between the inner brake shoe and the piston.*
7. Check to be certain that the correct caliper is installed on the correct anchor plate as marked during removal.
8. Position the new stabilizer (supplied in the brake kit).

   NOTE: *Apply water to the locating pins and attach the stabilizer to the caliper. Be sure the locating pins are free of oil, grease, or dirt.*
9. Tighten the caliper locating pins to proper torque specifications.
10. Install the stabilizer to anchor plate attaching screws and tighten to proper torque specifications.
11. Remove the protective cap from the brake hose fitting and install a new copper washer on each side of the hose fitting. Then install the brake hose to the caliper. Tighten the attaching bolt to proper torque specifications.
12. Fill the master cylinder as required to within ¼" of the top of the reservoir.
13. Bleed the brake system as outlined on pages 11 and 12 and centralize the brake pressure differential valve as outlined on page 12.
14. Install the wheel and tire.
15. Pump the brake pedal several times before you move the car so as to position the brake linings properly.
16. Road test the car to observe braking action.

INSTALLING NEW BRAKE SHOES AND PADS . . . SLIDING CALIPER TYPE

CONTINENTAL MARK IV, MONTEGO, TORINO, THUNDERBIRD

This type of disc brake . . . new for 1972 . . . uses the conventional rotor . . . lining and a single piston caliper. The rotors are marked for minimum thickness in the same basic manner as they were for 1971 models.

The minimum thickness dimensions (after refinishing) are cast in the inner surface of the rotor.

REMOVAL

1. With the car raised off the floor, remove the wheel and tire from the hub.
2. Disconnect the flexible brake hose from the caliper.

   NOTE: *To disconnect the hose, loosen the tube fitting which connects the end of the hose to the brake tube at its bracket on the frame. Remove the horseshoe clip from the hose and bracket, then disengage the hose from the bracket. Next, unscrew the entire hose assembly from the caliper.*
3. Remove the retaining screw from the caliper retaining key. See Figure 17.

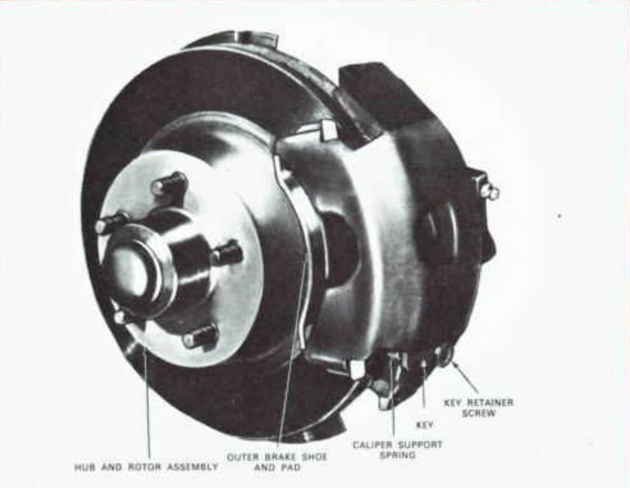


Figure 17 – The sliding caliper disc brake assembly used on the Continental Mark IV, Thunderbird, Montego, Torino. Note the position of the key retainer and screw.

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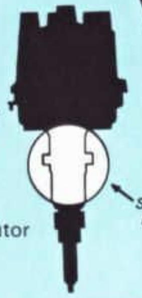
FIX TIP

FROZEN?

You're about to set the timing but the distributor is so frozen in the block you can't budge it one way or another. Hold it . . . don't reach for a hammer! Grab a small CO_2 fire extinguisher, and simply aim the nozzle at the distributor beneath the bowl casting and spray for a few seconds. The blast of CO_2 will shrink the machined portion of the distributor held in the block and make turning it a whiz.

If it's still stubborn or just barely turns, try some heat riser solvent. The combination should do the trick.

PS: Never use your regular fire extinguisher . . . that's for fires. Just buy a small inexpensive CO_2 fire extinguisher for just such tough distributor situations.



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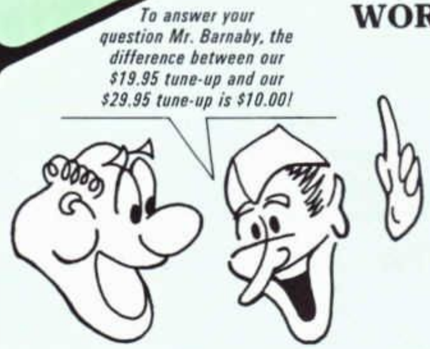

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ENGINE COMPONENTS ▪ Cylinder Heads ▪ Water Pumps ▪ Carburetors ▪ Rocker Arm Kits ▪ Crankshaft Kits ▪ Fuel Pumps ▪ Power Steering Pumps
POWER TRAIN COMPONENTS ▪ Clutch Discs ▪ Pressure Plates ▪ Brake Shoes ▪ Torque Converters ▪ Transmissions ▪ Power Brake Boosters

We Stand Behind This All The Way!

NATIONAL WARRANTY

Every Remanufactured Ford Part is warranted nationally by the Remanufacturer to be free of defects in materials and workmanship for 90 days or 4,000 miles from date of installation, whichever occurs first. Complete OHV engine assemblies are warranted for 12 months or 12,000 miles on passenger vehicles, and 6 months or 12,000 miles on trucks, whichever occurs first. This Warranty includes parts replacement plus related labor. Ford and Lincoln-Mercury dealers will honor this warranty anywhere in the country.

SO YOU'RE A BOWLER?

OK all you bowlers. What is the fewest number of balls that can be thrown in a full ten-frame bowling game? Answer is on this page.

THINGS YOU NEVER THOUGHT ABOUT

. . . and could easily forget

According to *Audubon Magazine*, the weight of insects destroyed by spiders in one year in England and Wales EXCEEDS the total weight of the human population of those two countries. The basis for this statement was determined by figuring the spider population of England and Wales at 2.2 billion and their annual consumption of insects at 220 billion. Converting this into weight resulted in the foregoing statement. Now you can rest at ease.

4. Slide the caliper retaining key and support spring either inward or outward from the anchor plate. Use a hammer and drift (if necessary) to remove the key and caliper support spring. Avoid damaging the key.

5. Lift the caliper away from the anchor plate by pushing the caliper downward against the anchor plate and rotating the upper end upward out of the anchor plate. See Figure 18.

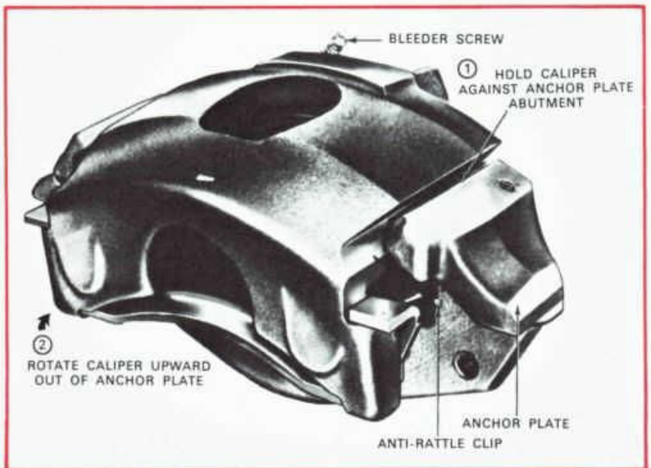


Figure 18 – Follow these steps in the order shown to remove the sliding caliper from the rotor.

6. Remove the inner shoe and pad from the anchor plate.

   NOTE: *The brake shoe anti-rattle clip (inner shoe only) may become displaced at this time. If so, reposition it on the anchor plate. Tap lightly on the outer shoe and pad to free it from the caliper.*

7. Clean the caliper, the anchor plate and rotor. Inspect for signs of brake fluid leakage, excessive wear or signs of damage. Inspect the brake shoes for wear.

NOTE: *If either of the pads are worn to within 1/32" of any rivet head . . . both shoe and pad assemblies must be replaced. Also, if you find it necessary to replace the shoe and pad on one wheel . . . they must be replaced on BOTH wheels in order to maintain equal braking action.*

INSTALLATION

1. If new shoe and pads are to be installed, use a 4-inch C-clamp and a block of wood 1¾ inches by 1 inch and approximately ¾-inch thick to seat the caliper hydraulic piston in its bore.

   NOTE: *This must be done to provide clearance for the caliper to fit over new brake shoes and pads when installed.*

2. First be sure that the brake pad anti-rattle clip is in place on the lower inner brake pad support on the anchor plate with the pigtail of the clip toward the inside of the anchor plate. Position the inner brake shoe and pad assembly on the anchor plate with the pad toward the rotor. See Figure 19.

3. Install the outer brake shoe with the lower flange ends against the caliper leg abutments and the brake shoe upper flanges over the shoulders on the caliper legs.

   NOTE: *The shoe flanges fit tightly against the shoulder machined surfaces.*

CAUTION: *If the same brake shoes and pads are reused, be certain the brake shoes and pads are reinstalled in their original positions as marked for identification purposes before disassembly.*

4. Now, remove the C-clamp (if used) from the caliper. NOTE: *The piston will remain seated in the bore.*

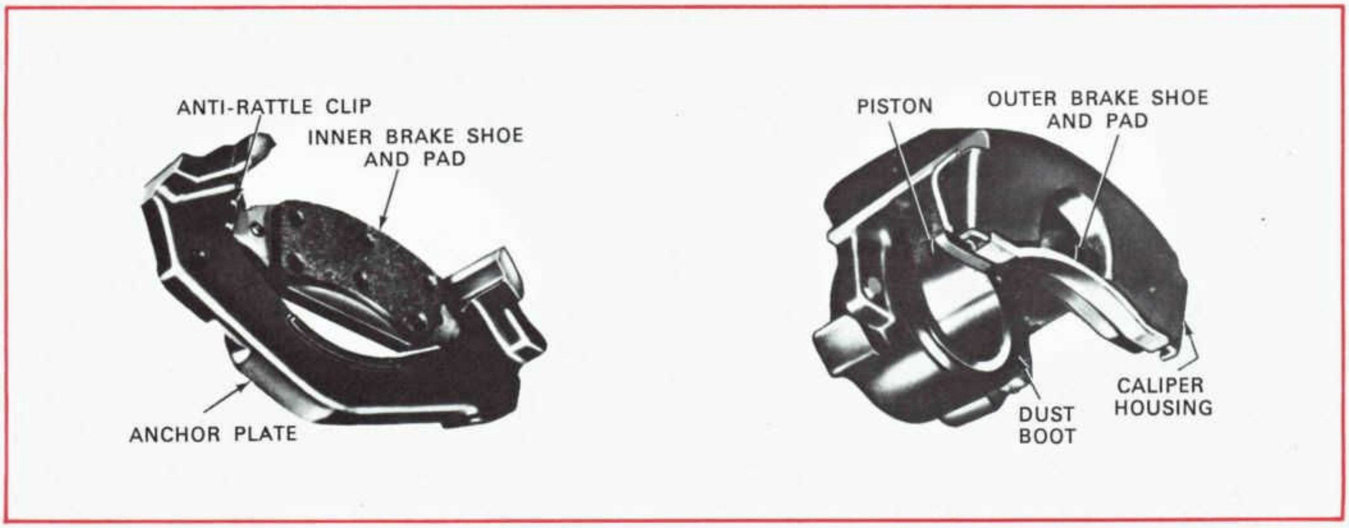
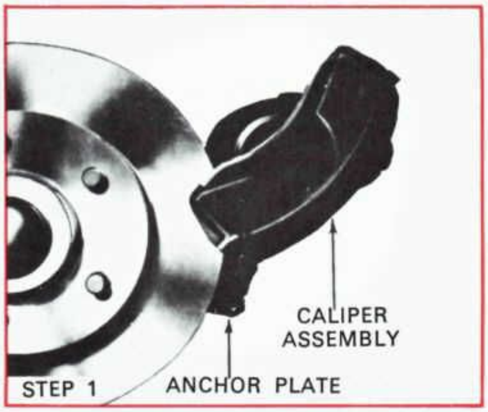
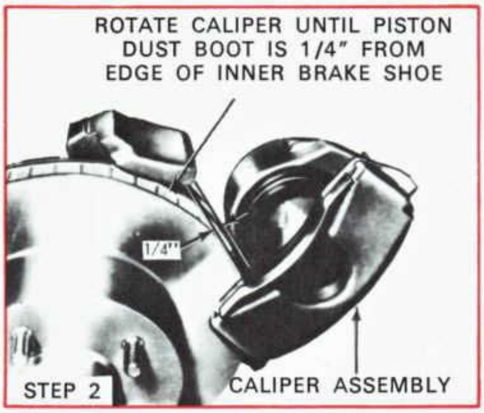


Figure 19—Note the position of the anti-rattle clip which is part of the inner brake shoe and pad assembly. This is the sliding caliper type of disc brake used on the 1972 Continental Mark IV, Thunderbird, Montego and Torino.

5. Position the caliper housing lower V-groove on the anchor plate lower abutment surface. See Step 1.

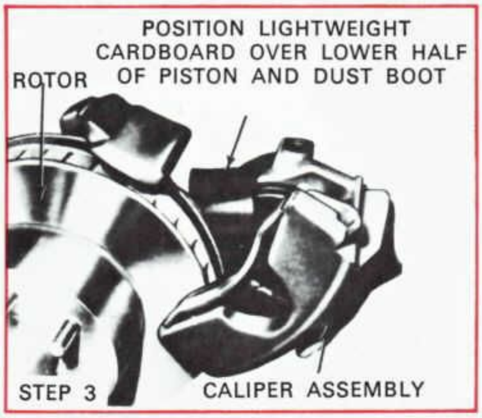


6. Pivot the caliper housing upward toward the rotor until the outer edge of the piston dust boot is about ¼-inch from the upper edge of the inboard brake shoe. See Step 2.

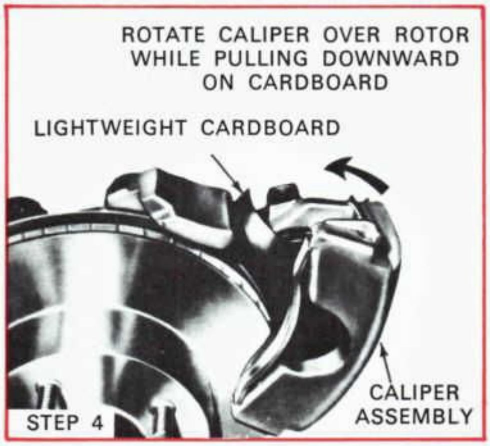


7. Position a clean piece of lightweight cardboard between the inboard brake shoe and over the lower half of the piston dust boot. See Step 3.

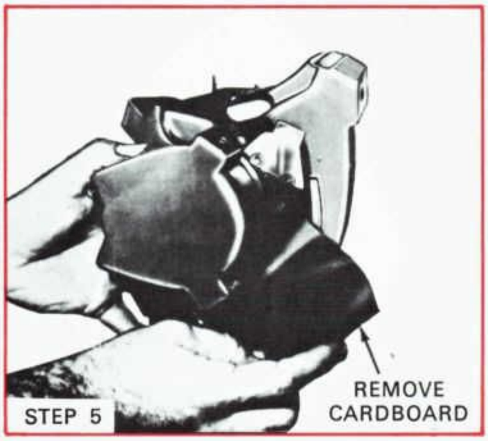
NOTE: *Cardboard is required to prevent pinching the dust boot between the piston and the inboard shoe during caliper installation to the rotor and anchor plate.*



8. Rotate the caliper housing toward the rotor until a slight resistance is felt.

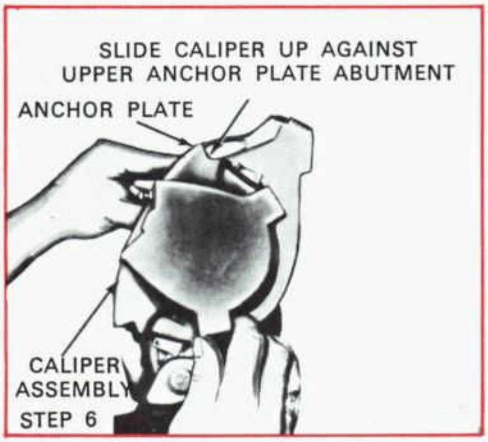


9. Pull the cardboard downward toward the rotor centerline while rotating the caliper over the rotor. See Step 4.



10. Remove the cardboard and rotate the caliper completely down over the rotor. See Step 5.

11. Slide the caliper up against the anchor plate upper abutment surfaces and center the caliper over the lower anchor plate abutment. See Step 6.



12. Position the caliper support spring and key in the key slot and slide them into the opening between the lower end of the caliper and the lower anchor plate abutment until the key semicircular slot is centered over the retaining screw threaded hole in the anchor plate. See Figure 20.

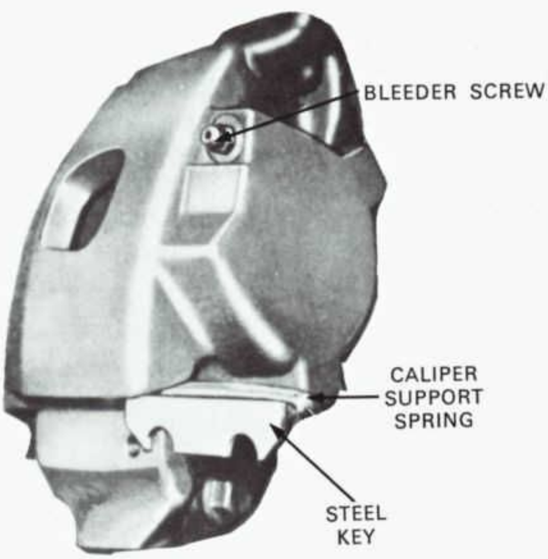


Figure 20 – Note how the caliper support spring and the key are installed on the sliding caliper type of disc brake.

13. Install the key retaining screw and tighten to 12-16 ft.-lbs. torque.

14. Thread the flexible brake hose and gasket into its fitting on the caliper, then torque the hose fitting to 12-20 ft.-lbs.

15. Position the upper end of the flexible brake hose in its bracket and install the retaining clip.

    CAUTION: *Do not twist the hose.*

16. Remove the plug (temporarily installed to prevent brake fluid from escaping) and connect the brake tube to the hose with the tube fitting nut and tighten to 10-15 ft.-lbs. torque.

17. Bleed the brake system. Apply the brakes several times to properly position the caliper and the brake shoes.

18. Install the tire and wheel and wheel cover.

19. Lower the car, then be sure you have a firm brake pedal application. Road test the car to check for proper brake operation.

BLEEDING THE BRAKES

NOTE: MODELS EQUIPPED WITH DISC BRAKES MUST BE BLED WITH PRESSURE BLEEDING EQUIPMENT.

Bleed the longest lines first. The bleeder tank should contain enough new fluid to complete the bleeding operation. Use Brake Fluid–Extra Heavy Duty (Ford Specification ESAM6C25-A or equivalent).

Ford Extra Heavy Duty Brake Fluid is colored Blue for identification purposes.

CAUTIONS

- Never mix low temperature brake fluid with the specified brake fluid during the bleeding operation
- Never reuse brake fluid that has been drained from the hydraulic system
- Charge the pressure bleeding tank with about 10 to 30 pounds of air pressure . . . and never exceed 50 pounds of pressure in the tank.

To bleed disc brakes for 1970-72 Ford-built passenger cars proceed as follows:

1. Clean all dirt from the master cylinder reservoir cover.
2. Remove the master cylinder cover and rubber gasket and fill the reservoir with the specified brake fluid.
3. Install the pressure bleeder adapter tool to the master cylinder and attach the bleeder tank hose to the adapter fitting.
   NOTE: *Master cylinder pressure bleeder adapter tools can be obtained from the various manufacturers of pressure bleeding equipment. Follow the instructions of the manufacturer when installing the adapter.*
4. If the master cylinder is equipped with a bleed screw, loosen the bleed screw and bleed the master cylinder until the fluid is free of air bubbles . . . then tighten the bleed screw.
   CAUTION: *Do not use the secondary piston stop screw, located on the bottom of the master cylinder to bleed the master cylinder.*
5. If the rear wheels (secondary brake system) are to be bled, position a ⅜-inch box wrench on the bleeder fitting at the right rear brake wheel cylinder. Attach a bleeder tube to the bleeder fitting. Make sure the end of the bleeder tube fits snugly around the bleeder fitting.
6. Open the valve on the bleeder tank to admit pressurized brake fluid to the master cylinder reservoir.
7. Submerge the free end of the tube in a clean container partially filled with clean brake fluid. Loosen the bleeder fitting.
8. When air bubbles no longer appear in the fluid at the submerged end of the bleeder tube, close the bleeder fitting and remove the tube.
   NOTE: *Repeat Steps 5 through 8 at the left rear wheel cylinder.*

9. On models with front disc brakes, repeat Steps 4 through 8 starting at the RIGHT FRONT CALIPER and ending at the left front caliper.

NOTE: *On all models (except the Pinto) that are equipped with front disc brakes, the METERING VALVE RELEASE ROD (see Figure 21), must be pulled outward and held a minimum of 1/16 inch while bleeding the PRIMARY (front brake system).*

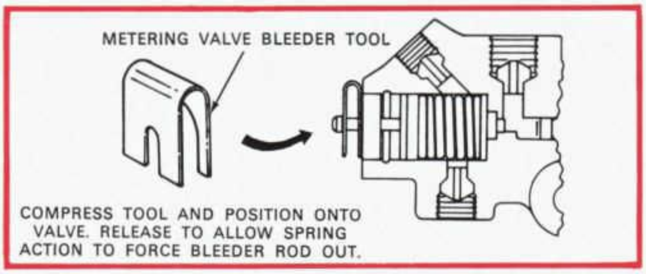


Figure 21 — Note the metering valve bleeder tool holding the metering valve release rod in the outward position. This special tool is necessary when bleeding the brake hydraulic system on disc brake equipped models.

10. When the bleeding operation is completed, close the bleeder tank valve and remove the tank hose from the adapter fitting.

11. Make sure the front brake pistons are returned to their normal positions and that the shoes and pads are properly seated by depressing the brake pedal several times until normal pedal travel is established.

12. Remove the special pressure bleeder adapter tool and fill the master cylinder reservoirs to within ¼ inch of the top. Install the master cylinder cover and gasket.

CAUTION: *Be sure the diaphragm type gasket is properly positioned in the master cylinder cover.*

13. Centralize the pressure differential valve following the procedures listed below.

CENTRALIZING THE PRESSURE DIFFERENTIAL VALVE

After any repair or bleeding of the PRIMARY (front) brake system or the SECONDARY (rear) brake system, the dual brake warning light will usually continue to be illuminated due to the pressure differential valve remaining in the off-center position.

To turn off the warning light by centralizing the pressure differential valve proceed as follows:

1. Turn the ignition switch to the ACC or the ON position.
2. Make sure the fluid level in the master cylinder reservoirs is within ¼ inch of the top. If necessary to add fluid, use only specified brake fluid as noted at the beginning of this session.
3. Depress the brake pedal and the valve will center itself in the bore causing the light to go out. Turn ignition switch off.
4. Before driving the car, check the operation of the brakes to be sure you have a firm pedal.

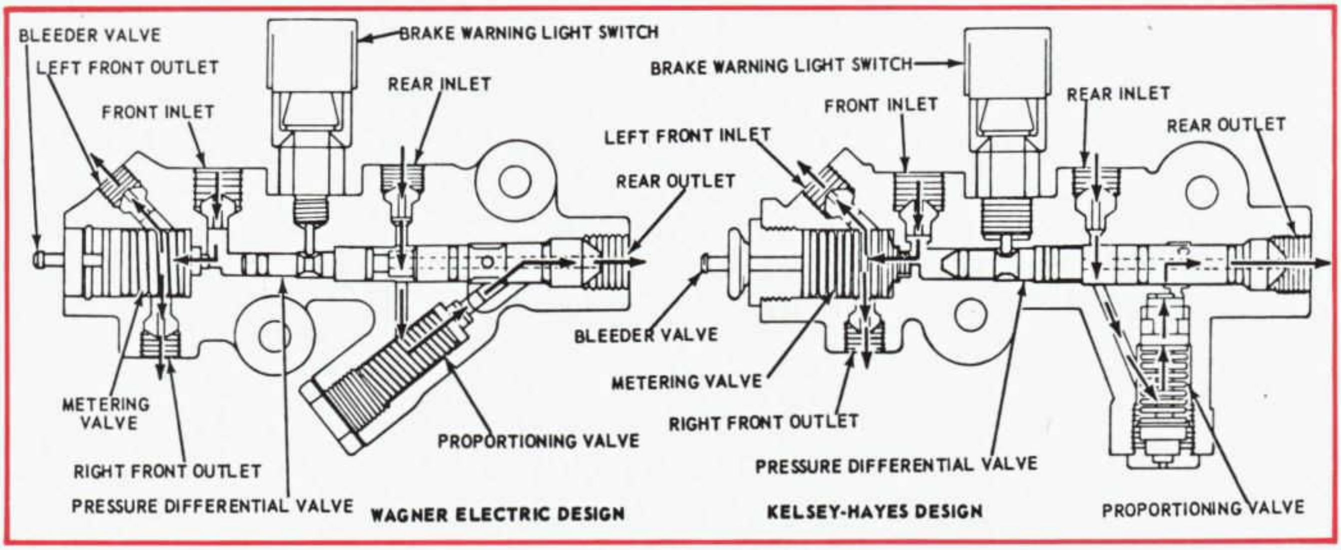


Figure 22 — The new brake control valve assembly combines the metering valve . . . the pressure differential valve . . . and the proportioning valve in a single cast iron housing.

The brake warning light switch is mounted on the top of the valve body casting above the piston tapered shoulder groove. When the piston is "centered," the spring loaded switch plunger fits into the tapered shoulder groove and the switch contacts are then open, interrupting the electrical circuit to the brake warning light on the instrument panel.

The function of the metering valve is to regulate hydraulic fluid pressure to the front disc brakes until the line pressure increases to approximately 355 to 530 psi. The metering valve location at the front end of the housing provides easy accessibility of the valve bleeder rod during the bleeding operation of the front brake (PRIMARY) system.

DISC BRAKE SPECIFICATIONS
FORD MOTOR COMPANY
Passenger Cars

Component	1970-1971		1972				
	Ford, Mercury Thunderbird Mark III Lincoln Continental	Torino, Fairlane Montego Mustang Cougar	Ford, Mercury Meteor Lincoln Continental	Thunderbird, Continental Mark IV	Torino Montego	Cougar, Mustang	Pinto
Lining Material	1970 Bonded 1971 Riveted	1970 Bonded 1971 Riveted	Riveted	Riveted	Riveted	Riveted	Riveted
Lining Size	7.38 x 2.27 outer 5.36 x 2.03 inner	6.82 x 1.80 outer 4.90 x 1.84 inner	7.38 x 2.27 outer 5.36 x 2.03 inner	6.40 x 1.80 outer 4.46 x 1.80 inner	6.40 x 1.80 outer 4.46 x 1.80 inner	6.82 x 1.80 outer 4.90 x 1.84 inner	4.00 x 1.42
Lining Area—Square Inches per Segment	12.25 outer 8.44 inner	11.30 outer 8.80 inner	12.25 outer 8.44 inner	10.06 outer 7.33 inner	10.06 outer 7.33 inner	11.30 outer 8.80 inner	5.00 outer 5.00 inner
Lining Thickness—Nominal	0.394	0.333 outer 0.362 inner	0.394	0.273 outer 0.370 inner	0.273 outer 0.370 inner	0.333 outer 0.362 inner	0.347
Lining Wear Limit (From Top of Rivets or Shoe Surface)	.030	.030	1/32	1/32	1/32	1/32	1/32
Lining Taper—Maximum	0.125	0.125	0.125	—	—	0.125	—
Lining to Rotor Clearance (Brakes Released)	0.000-0.010	0.000-0.010	0.000-0.010	0.000-0.010	0.000-0.010	0.000-0.010	0.000-0.010
Caliper Cylinder Bore Diam.	2.755	2.381	2.755	3.100	3.100	2.38	2.127
Master Cylinder Bore Diam.	1.000 ①	0.9375 ②	1.000	1.000	1.000	1.000	0.9375
Rotor Nominal Thickness	1.180	0.935	1.180	1.180	1.180	0.935	0.750
Rotor Minimum Thickness ③	③	③	1.120	1.120	1.120	0.875	0.685
Rotor Diameter	11.720 outside 7.785 inside	11.29 outside 7.355 inside	11.720 outside 7.785 inside	11.720 outside 7.785 inside	10.720 outside 6.785 inside	11.29 outside 7.35 inside	9.30 outside 6.06 inside
Rotor Allowable Runout	0.003	0.002	0.003	0.003	0.003	0.002	0.003
Rotor Finish (Micro-Inches)	15-80	15-80	15-80	15-80	15-80	15-80	15-80
Rotor Thickness Variation	0.0007	0.0007	0.007	0.005	0.005	0.007	0.007

① Includes Cougar and Mustang. ② Torino, Fairlane, Montego only. ③ Minimum safe thickness is shown on each Rotor for 1971-72 models.

TESTING THE IN-TANK ELECTRIC FUEL PUMP

1972 POLICE INTERCEPTOR WITH 429-4V ENGINE

This new electric fuel pump delivers fuel to the carburetor under a more uniform pressure and at a lower temperature than a conventional type of fuel pump.

OPERATION

Power to the new in-tank fuel pump must come through an oil pressure safety switch. It is a three-pole, double-contact switch. Note the electrical schematic in the illustration below.

As the ignition switch is turned to START, the starter relay and starter are energized and lead wire from the starter cable supplies power to the fuel pump through a closed set of points in the oil pressure safety switch. During this cranking period, the pump is supplied with 12 volts.

As the engine starts, and the ignition returns to the "run" position a normally open set of contacts in the oil pressure safety switch now CLOSE as the engine oil pressure rises.

Power to the fuel pump is now supplied through the ignition circuit . . . through a resistor wire and through the now closed contacts of the oil pressure switch. When the engine is running, the voltage to the pump is reduced through a resistor wire in the same manner that is used to reduce the voltage to the coil and points in the ignition circuit. The value of this resistor wire in the pump circuit is 1.4 ohms.

CURRENT TEST

In the event of a malfunction, the unit can be checked for circuit continuity as follows:

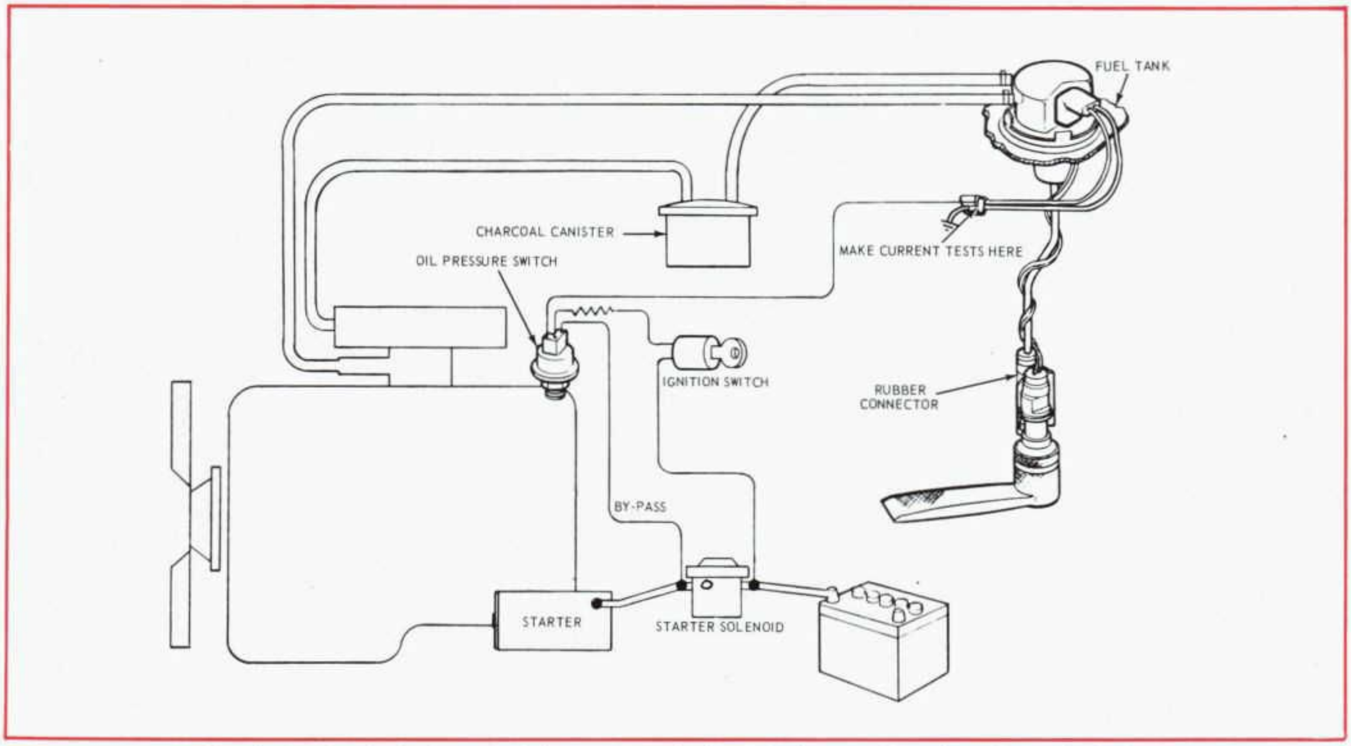
1. Disconnect the plug located just forward of the fuel tank.
2. Using a test light, connect one lead to the red/brown stripe wire and the other end of the lead to a good ground. This check will determine if current is available.
3. Using a self-powered test light or ohmmeter, connect one lead to the black wire and the other lead to a good clean ground. This check will determine if the circuit is grounded properly.

PRESSURE AND VOLUME TEST

NOTE: *If the pump does not operate to specifications, it cannot be overhauled and therefore must be replaced.*

To make a pressure test, it is necessary to have the full 12 volts delivered to the pump. To do this, connect a jumper wire across the starter solenoid with one end attached to the bypass circuit pigtail and the other end attached ahead of the solenoid.

Pressure should be a minimum of 4 psi, with a volume of 1 pint in 20 seconds.



Here is the electrical schematic of the new in-tank electric fuel pump. Note the resistor wire in the circuit to the pump. The oil pressure safety switch is a three-pole, double-contact type of switch.

REVISED INFORMATION ON THE PINTO . . . SPECIAL POINT GAP ADJUSTING SLEEVE (Replaces information shown on page 14, Oct., 1971, issue.)

Motorcraft Tune-Up Kits for the 1600 cc and 2000 cc Pinto engines (TKF-18 and TKF-24 respectively) contain a *new point gap adjusting sleeve*. This sleeve is designed to reduce the time needed to install the distributor point set and increase accuracy when the point gap is adjusted.

Instructions in the use of this gauge are included with each of the two kits.

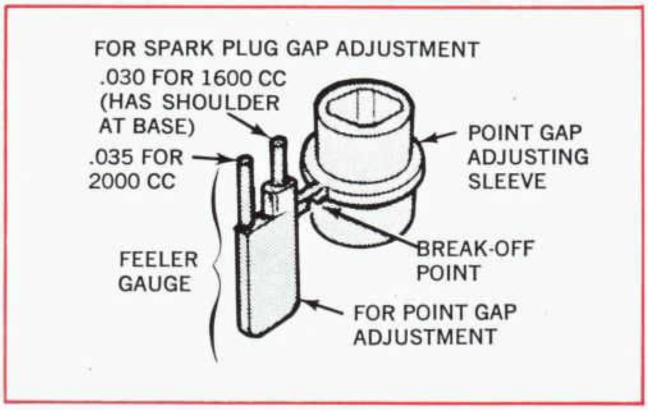
As shown in the illustration, the special sleeve is made of a plastic material and has a flat feeler gauge for checking the distributor points and two round gauges for setting the correct spark plug gap on both Pinto engines. This special gauge is simple to use after separating the point gap adjusting sleeve from the feeler gauges at the break-off point.

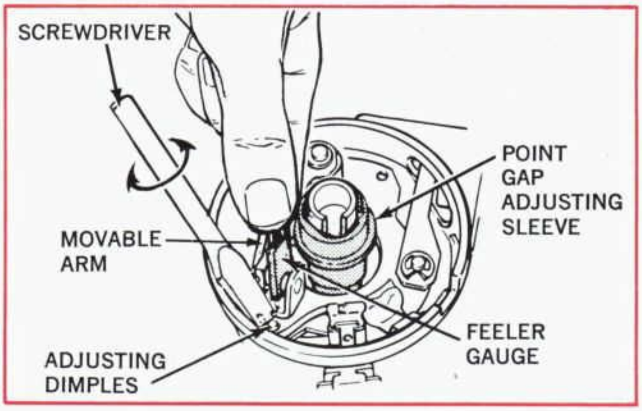
After the new distributor points have been installed, position the point set so that the rubbing block clears the distributor cam surfaces. Tighten attachment screws slightly. Then place the point gap adjusting sleeve down over the distributor cam. (Small diameter for 2000 cc engine and large diameter for 1600 cc engine.)

You probably will have to push the rubbing block away from the cam to allow the adjusting sleeve to be fully seated over the cam as shown in the illustration. Next the distributor points must be adjusted so that the contact point gap is .052" using the plastic feeler gauge.

NOTE: *This will give the correct point gap of .025" when the point gap adjusting sleeve is removed. This specification is correct for both Pinto engines.*

Adjustment is correct when the gauge will pass between the contact points with just a slight feel of touching between the points and the gauge. Tighten attaching screws securely and remove plastic sleeve.





NEW UPDATED INFORMATION ON 1972 FORD-BUILT PASSENGER CARS

The following service information should be noted in the 1972 Announcement Issue of this magazine . . . published in September of 1971.

ITEM	NOTE ON PAGE:	CAR MODELS	ORIGINAL INFORMATION	ADD THIS NEW INFORMATION
SPARK PLUG TYPE	41	1972 Lincoln Continental	BF 42	BRF 42
SPARK PLUG TYPE	43	1972 Continental Mark IV	BF 42	BRF 42
SPARK PLUG GAP	44	1972 Pinto—4 Cyl. 1600 cc (98 CID) ENGINE	.035"	.030"
DRAIN AND FLUSH COOLING SYSTEM	11	All 1972 Passenger Cars . . . Ford-Built	Each 24,000 miles or 12 months (whichever comes first)	Each 24,000 miles or 24 months (whichever comes first)

COMPLIMENTS OF

YOUR SOURCE FOR GENUINE FORD, MOTORCRAFT AND AUTOLITE ORIGINAL EQUIPMENT PARTS

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- ***Brake Parts****—meeting Ford's rigid specifications to resist fade, last longer; same as original equipment*
- ***Engine Parts****—rings, bearings, rocker arm assemblies—all "matching" for better fit and performance*
- ***Exhaust System Parts****—now with fewer mufflers covering all the models of the '60's and '70's*

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CALL US TODAY...we're headquarters for all genuine Ford, Motorcraft and Autolite replacement parts!