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9

BRAKES

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BRAKE OPERATING SYSTEM

Basic Operating Principles

Hydraulic systems are used to actuate the brakes of all modern automobiles. The system transports the power required to force the frictional surfaces of the braking system together from the pedal to the individual brake units at each wheel. A hydraulic system is used for two reasons.

First, fluid under pressure can be carried to all parts of an automobile by small pipes and flexible hoses without taking up a significant amount of room or posing routing problems.

Second, a great mechanical advantage can be given to the brake pedal end of the system, and the foot pressure required to actuate the brakes can be reduced by making the surface area of the master cylinder pistons smaller than that of any of the pistons in the wheel cylinders or calipers.

The master cylinder consists of a fluid reservoir along with a double cylinder and piston assembly. Double type master cylinders are designed to separate the front and rear braking systems hydraulically in case of a leak. The master cylinder converts mechanical motion from the pedal into hydraulic pressure within the lines. This pressure is translated back into mechanical motion at the wheels by either the wheel cylinder (drum brakes) or the caliper (disc brakes).

Steel lines carry the brake fluid to a point on the vehicle's frame near each of the vehicle's wheels. The fluid is then carried to the calipers and wheel cylinders by flexible tubes in order to allow for suspension and steering movements.

In drum brake systems, each wheel cylinder contains two pistons, one at either end, which push outward in opposite directions and force the brake shoe into contact with the drum.

In disc brake systems, the cylinders are part of the calipers. At least one cylinder in each caliper is used to force the brake pads against the disc.

All pistons employ some type of seal, usually made of rubber, to minimize fluid leakage. A rubber dust boot seals the outer end of the cylinder against dust and dirt. The boot fits around the outer end of the piston on disc brake calipers, and around the brake actuating rod on wheel cylinders.

The hydraulic system operates as follows: When at rest, the entire system, from the piston(s) in the master cylinder to those in the wheel cylinders or calipers, is full of brake fluid. Upon application of the brake pedal, fluid trapped in front of the master cylinder piston(s) is forced through the lines to the wheel cylinders. Here, it forces the pistons outward, in the case of drum brakes, and inward toward the disc, in the case of disc brakes. The motion of the pistons is opposed by return springs mounted outside the cylinders in drum brakes, and by spring seals, in disc brakes.

Upon release of the brake pedal, a spring located inside the master cylinder immediately returns the master cylinder pistons to the normal position. The pistons contain check valves and the master cylinder has compensating ports drilled in it. These are uncovered as the pistons reach their normal position. The piston check valves allow fluid to flow toward the wheel cylinders or calipers as the pistons withdraw. Then, as the return springs force the brake pads or shoes into the released position, the excess fluid reservoir through the compensating ports. It is during

the time the pedal is in the released position that any fluid that has leaked out of the system will be replaced through the compensating ports.

Dual circuit master cylinders employ two pistons, located one behind the other, in the same cylinder. The primary piston is actuated directly by mechanical linkage from the brake pedal through the power booster. The secondary piston is actuated by fluid trapped between the two pistons. If a leak develops in front of the secondary piston, it moves forward until it bottoms against the front of the master cylinder, and the fluid trapped between the pistons will operate the rear brakes. If the rear brakes develop a leak, the primary piston will move forward until direct contact with the secondary piston takes place, and it will force the secondary piston to actuate the front brakes. In either case, the brake pedal moves farther when the brakes are applied, and less braking power is available.

All dual circuit systems use a switch to warn the driver when only half of the brake system is operational. This switch is usually located in a valve body which is mounted on the firewall or the frame below the master cylinder. A hydraulic piston receives pressure from both circuits, each circuit's pressure being applied to one end of the piston. When the pressures are in balance, the piston remains stationary. When one circuit has a leak, however, the greater pressure in that circuit during application of the brakes will push the piston to one side, closing the switch and activating the brake warning light.

In disc brake systems, this valve body also contains a metering valve and, in some cases, a proportioning valve. The metering valve keeps pressure from traveling to the disc brakes on the front wheels until the brake shoes on the rear wheels have contacted the drums, ensuring that the front brakes will never be used alone. The proportioning valve controls the pressure to the rear brakes to lessen the chance of rear wheel lock-up during very hard braking.

Warning lights may be tested by depressing the brake pedal and holding it while opening one of the wheel cylinder bleeder screws. If this does not cause the light to go on, substitute a new lamp, make continuity checks, and, finally, replace the switch as necessary.

The hydraulic system may be checked for leaks by applying pressure to the pedal gradually and steadily. If the pedal sinks very slowly to the floor, the system has a leak. This is not to be confused with a springy or spongy feel due to the compression of air within the lines. If the system leaks, there will be a gradual change in the position of the pedal with a constant pressure.

Check for leaks along all lines and at wheel cylinders. If no external leaks are apparent, the problem is inside the master cylinder.

DISC BRAKES

Instead of the traditional expanding brakes that press outward against a circular drum, disc brake systems utilize a disc (rotor) with brake pads positioned on either side of it. An easily-seen analogy is the hand brake arrangement on a bicycle. The pads squeeze onto the rim of the bike wheel, slowing its motion. Automobile disc brakes use the identical

principle but apply the braking effort to a separate disc instead of the wheel.

The disc (rotor) is a casting, usually equipped with cooling fins between the two braking surfaces. This enables air to circulate between the braking surfaces making them less sensitive to heat buildup and more resistant to fade. Dirt and water do not drastically affect braking action since contaminants are thrown off by the centrifugal action of the rotor or scraped off by the pads. Also, the equal clamping action of the two brake pads tends to ensure uniform, straight line stops. Disc brakes are inherently self-adjusting. There are three general types of disc brake:

1. A fixed caliper.
2. A floating caliper.
3. A sliding caliper.

The fixed caliper design uses two pistons mounted on either side of the rotor (in each side of the caliper). The caliper is mounted rigidly and does not move.

The sliding and floating designs are quite similar. In fact, these two types are often lumped together. In both designs, the pad on the inside of the rotor is moved into contact with the rotor by hydraulic force. The caliper, which is not held in a fixed position, moves slightly, bringing the outside pad into contact with the rotor. There are various methods of attaching floating calipers. Some pivot at the bottom or top, and some slide on mounting bolts. In any event, the end result is the same.

DRUM BRAKES

Drum brakes employ two brake shoes mounted on a stationary backing plate. These shoes are positioned inside a circular drum which rotates with the wheel assembly. The shoes are held in place by springs. This allows them to slide toward the drums (when they are applied) while keeping the linings and drums in alignment. The shoes are actuated by a wheel cylinder which is mounted at the top of the backing plate. When the brakes are applied, hydraulic pressure forces the wheel cylinder's actuating links outward. Since these links bear directly against the top of the brake shoes, the tops of the shoes are then forced against the inner side of the drum. This action forces the bottoms of the two shoes to contact the brake drum by rotating the entire assembly slightly (known as servo action). When pressure within the wheel cylinder is relaxed, return springs pull the shoes back away from the drum.

Most modern drum brakes are designed to self-adjust themselves during application when the vehicle is moving in reverse. This motion causes both shoes to rotate very slightly with the drum, rocking an adjusting lever, thereby causing rotation of the adjusting screw. Some drum brake systems are designed to self-adjust during application whenever the brakes are applied. This on-board adjustment system reduces the need for maintenance adjustments and keeps both the brake function and pedal feel satisfactory.

POWER BOOSTERS

Virtually all modern vehicles use a vacuum assisted power brake system to multiply the braking force and reduce pedal effort. Since vacuum is always available when the engine is operating, the system is

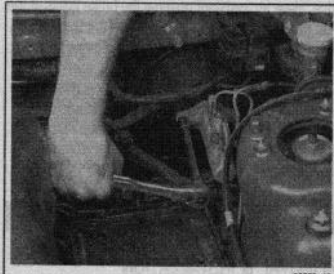


Fig. 8 Unfasten the master cylinder-to-power booster retaining nuts . . .

1. Disconnect the negative battery cable.
2. Remove the master cylinder reservoir cap, then use a clean turkey baster or equivalent to siphon out as much fluid as possible and place in a suitable container. Install the cap.

*** CAUTION

Brake fluid contains polyglycol ethers and polyglycols. Avoid contact with the eyes and wash your hands thoroughly after handling brake fluid. If you do get brake fluid in your eyes, flush your eyes with clean, running water for 15 minutes. If eye irritation persists, or if you have taken brake fluid internally, IMMEDIATELY seek medical assistance.

3. Disconnect and plug the lines from the brake master cylinder reservoir.
4. Detach the fluid level sensor connector, unfasten the retainers, then remove the master cylinder reservoir.
5. For vehicles equipped with manual transaxle, remove the clutch master cylinder reservoir bracket.
6. Disconnect and plug the brake lines from the master cylinder.
7. Unfasten the master cylinder-to-power booster retaining nuts, then remove the master cylinder from the vehicle.

To install:

8. Adjust the clearance (A) between the brake booster pushrod and the primary piston as follows:
 - a. Calculate the clearance A from the B, C and D measurements, as shown in the accompanying figure. A equals B minus C minus D.
 - b. The clearance should be 0.256–0.335 in. (0.65–0.858mm). When brake booster negative pressure 9.7 psi (67 kPa) is applied, then clear-

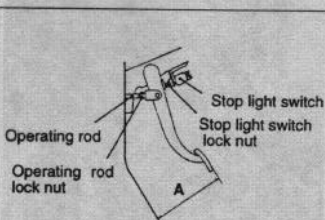


Fig. 11 Measure the brake pedal height at A and compare to specifications

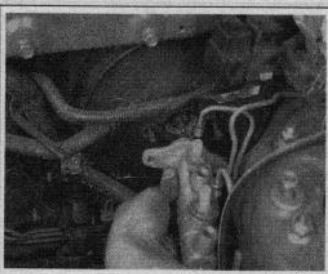


Fig. 9 . . . then remove the master cylinder assembly from the vehicle

- ance value will become 0.004–0.012 in. (0.1–0.3mm).
9. Install the master cylinder to the brake booster, then install the retaining nuts. Tighten the nuts to 7 ft. lbs. (10 Nm).
 10. Install the master cylinder reservoir, securing the retainers.
 11. Attach the fluid level sensor connector, then unplug and connect the fluid lines to the reservoir.
 12. The remainder of installation is the reverse of the removal procedure. Fill the reservoir with the proper type and amount of DOT 3 brake fluid from a fresh, sealed container.

*** WARNING

Clean, high quality brake fluid is essential to the safe and proper operation of the brake system. You should always buy the highest quality brake fluid that is available. If the brake fluid becomes contaminated, drain and flush the system, then refill the master cylinder with new fluid. Never reuse any brake fluid. Any brake fluid that is removed from the system should be discarded. Also, do not allow any brake fluid to come in contact with a painted surface; it will damage the paint.

13. Bleed the brake system, as outlined later in this section.
14. Adjust the brake pedal, as outlined later in this section.

BRAKE PEDAL ADJUSTMENTS

Brake Pedal Height

- ♦ See Figures 11, 12, and 13

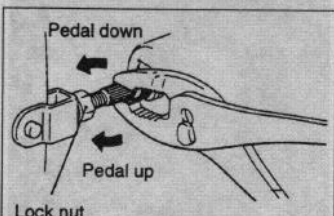


Fig. 12 Adjust the brake pedal height by increasing or decreasing the length of the operating rod

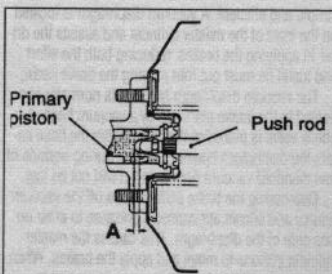


Fig. 10 The brake booster pushrod and primary piston clearance (A) must be adjusted

Measure the brake pedal height from the floor of the vehicle to the upper surface of the brake pedal. The distance should be 6.9–7.1 in. (176–181mm). If the brake pedal height is incorrect, adjust as follows:

1. Detach the stop lamp switch connector.
2. Loosen the locknut on the base of the stop light switch and move the switch to a position where it does not contact the brake pedal.
3. Loosen the operating rod locknut. Adjust the height of the brake pedal by turning the operating rod using pliers. Once the desired pedal height is obtained, tighten the locknut on the operating rod.
4. Screw the stop light switch until it contacts the brake pedal stopper. Turn switch in until the brake pedal just starts to move. At this point, return (loosen) the stoplight switch $\frac{1}{2}$ –1 turn and secure in this position by tightening the locknut. In this position, the distance between the lower stop light switch case and the brake pedal stop should be 0.02–0.04 in. (0.5–1.0mm).
5. Attach the electrical connector to the stop light switch.
6. Check to be sure that the stop lights are not illuminated with no pressure on the brake pedal.
7. Without starting the vehicle, depress the brake pedal. If the brake light switch is properly connected, the brake lights will illuminate.

Brake Pedal Free-Play

- ♦ See Figure 14

1. With the engine off, depress the brake pedal fully several times to evacuate the vacuum in the booster.
2. Once all the vacuum assist has been eliminated, press the brake pedal down by hand and con-

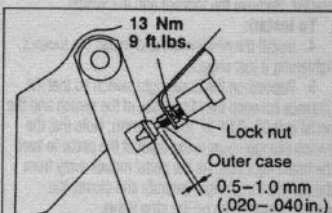
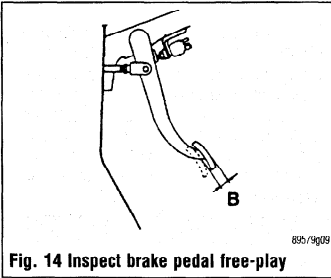


Fig. 13 Inspect the clearance between the stop light switch and the brake pedal stop and compare to specifications



firm that the amount of movement before resistance is felt is within 0.1–0.3 in. (3–8mm).

3. If the free-play is less than desired, confirm that the brake light switch is in proper adjustment.
4. If there is excessive free-play, look for wear or play in the clevis pin and brake pedal arm. Replace worn parts as required and recheck brake pedal free-play.

Power Brake Booster

REMOVAL & INSTALLATION

▶ See Figure 15

1. Disconnect the negative battery cable.
2. Siphon the brake fluid from the master cylinder reservoir.

***** CAUTION**

Brake fluid contains polyglycol ethers and polyglycols. Avoid contact with the eyes and wash your hands thoroughly after handling brake fluid. If you do get brake fluid in your eyes, flush your eyes with clean, running water for 15 minutes. If eye irritation persists, or if you have taken brake fluid internally, IMMEDIATELY seek medical assistance.

3. Remove and relocate the air conditioning relay box and the solenoid valve located at the power brake unit.
4. Disconnect the vacuum hose from the booster by pulling it straight off. Prying off the vacuum hose could damage the check valve installed in the brake booster vacuum hose.
5. Detach the electrical harness connector from the brake level sensor.
6. Remove the nuts attaching the master cylinder to the booster and remove the master cylinder and position aside. If necessary, disconnect and plug the brake fluid lines at the master cylinder.
7. From inside the passenger compartment, remove the cotter pin and clevis pin that secures the booster pushrod to the brake pedal.
8. From inside the vehicle, remove the nuts that attach the booster to the dash panel. Remove the brake booster from the engine compartment.

To install:

9. Install the brake booster to the dash panel. From inside the vehicle, install the attaching nuts and tighten to 12 ft. lbs. (17 Nm).

10. Apply grease to the clevis pin and install with washers in place. Install new cotter pin and bend to secure in place.

11. Attach the vacuum hose to the booster fitting.
12. Install the master cylinder assembly to the mounting studs on the brake booster. Install the master cylinder mounting nuts and tighten to 9 ft. lbs. (12 Nm).
13. Reconnect the brake fluid reservoir to the master cylinder, if disconnected. Attach the electrical connector to the brake fluid level sensor.
14. Install the solenoid valve assembly and the relay box, if removed.
15. Connect the negative battery cable.
16. Add fluid to the brake fluid reservoir as required.

***** WARNING**

Clean, high quality brake fluid is essential to the safe and proper operation of the brake system. You should always buy the highest quality brake fluid that is available. If the brake fluid becomes contaminated, drain and flush the system, then refill the master cylinder with new fluid. Never reuse any brake fluid. Any brake fluid that is removed from the system should be discarded. Also, do not allow any brake fluid to come in contact with a painted surface; it will damage the paint.

17. Bleed the master cylinder. If after bleeding the master cylinder the brake pedal feels soft, bleed the brake system at all wheels.
18. Check the brake system for proper operation.

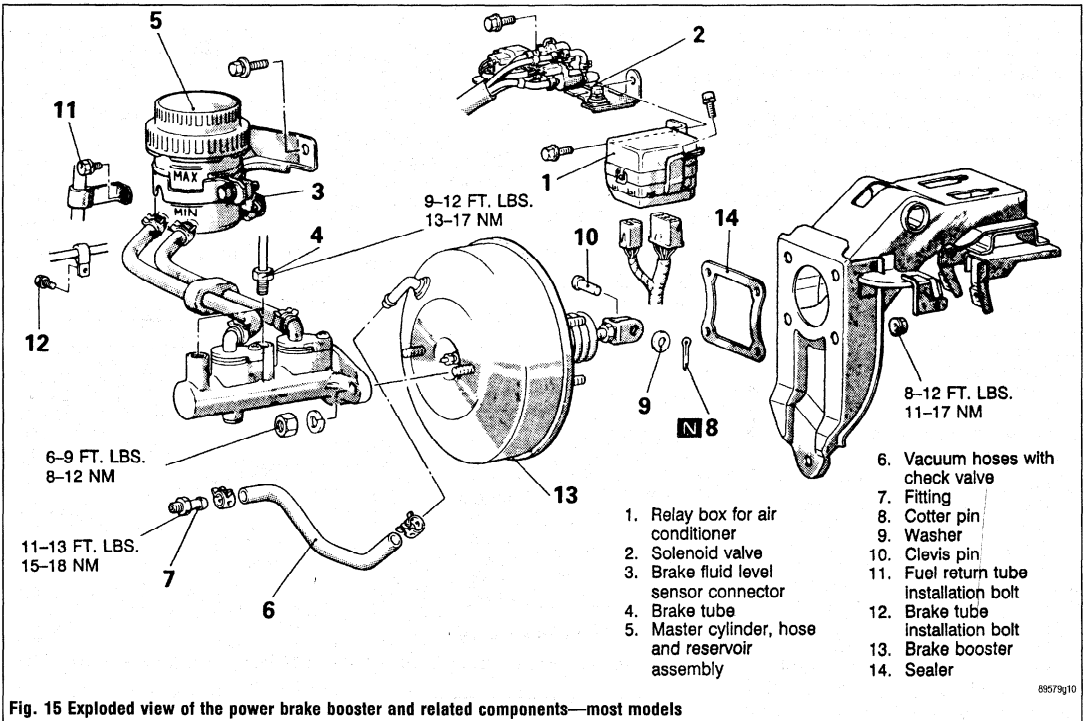


Fig. 15 Exploded view of the power brake booster and related components—most models

Proportioning Valve

REMOVAL & INSTALLATION

♦ See Figure 2

1. Disconnect the negative battery cable.
2. Locate the proportioning valve, usually below the master cylinder.
3. Tag and disconnect the brake lines from the valve.

*** CAUTION

Brake fluid contains polyglycol ethers and polyglycols. Avoid contact with the eyes and wash your hands thoroughly after handling brake fluid. If you do get brake fluid in your eyes, flush your eyes with clean, running water for 15 minutes. If eye irritation persists, or if you have taken brake fluid internally, IMMEDIATELY seek medical assistance.

4. Remove the proportioning valve from the engine compartment.

To install:

5. The installation is the reverse of the removal procedure. Bleed the brakes in the following order:

6. Diamante

- a. Right rear caliper
- b. Left front caliper
- c. Left rear caliper
- d. Right front caliper

7. Mirage and Galant

- a. Left rear wheel cylinder or caliper
- b. Right front cylinder
- c. Right rear wheel cylinder or caliper
- d. Left front caliper

6. Connect the negative battery cable and check the brakes for proper operation.

*** WARNING

Clean, high quality brake fluid is essential to the safe and proper operation of the brake system. You should always buy the highest quality brake fluid that is available. If the brake fluid becomes contaminated, drain and flush the system, then refill the master cylinder with new fluid. Never reuse any brake fluid. Any brake fluid that is removed from the system should be discarded. Also, do not allow any brake fluid to come in contact with a painted surface; it will damage the paint.

Brake Hoses and Lines

Metal lines and rubber brake hoses should be checked frequently for leaks and external damage. Metal lines are particularly prone to crushing and kinking under the vehicle. Any such deformation can restrict the proper flow of fluid and therefore impair braking at the wheels. Rubber hoses should be checked for cracking or scraping; such damage can create a weak spot in the hose and it could fail under pressure.

Any time the lines are removed or disconnected, extreme cleanliness must be observed. Clean all joints and connections before disassembly (use a

stiff bristle brush and clean brake fluid); be sure to plug the lines and ports as soon as they are opened. New lines and hoses should be flushed clean with brake fluid before installation to remove any contamination.

REMOVAL & INSTALLATION

♦ See Figures 16, 17, 18, and 19

1. Disconnect the negative battery cable.
2. Raise and safely support the vehicle on jackstands.
3. Remove any wheel and tire assemblies necessary for access to the particular line you are removing.
4. Thoroughly clean the surrounding area at the joints to be disconnected.
5. Place a suitable catch pan under the joint to be disconnected.
6. Using two wrenches (one to hold the joint and one to turn the fitting), disconnect the hose or line to be replaced.
7. Disconnect the other end of the line or hose, moving the drain pan if necessary. Always use a back-up wrench to avoid damaging the fitting.
8. Disconnect any retaining clips or brackets holding the line and remove the line from the vehicle.

➡ If the brake system is to remain open for more time than it takes to swap lines, tape or plug each remaining clip and port to keep contaminants out and fluid in.

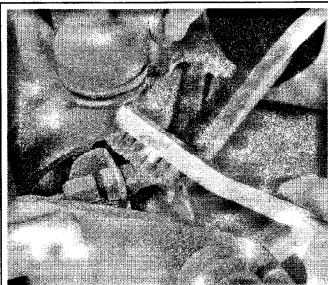


Fig. 16 Use a brush to clean the fittings of any debris

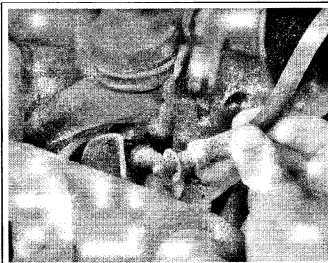


Fig. 18 Any gaskets/crush washers should be replaced with new ones during installation

To install:

9. Install the new line or hose, starting with the end farthest from the master cylinder. Connect the other end, then confirm that both fittings are correctly threaded and turn smoothly using finger pressure. Make sure the new line will not rub against any other part. Brake lines must be at least 1/2 in. (13mm) from the steering column and other moving parts. Any protective shielding or insulators must be reinstalled in the original location.

*** WARNING

Make sure the hose is NOT kinked or touching any part of the frame or suspension after installation. These conditions may cause the hose to fail prematurely.

10. Using two wrenches as before, tighten each fitting.
11. Install any retaining clips or brackets on the lines.
12. If removed, install the wheel and tire assemblies, then carefully lower the vehicle to the ground.
13. Refill the brake master cylinder reservoir with clean, fresh brake fluid, meeting DOT 3 specifications. Properly bleed the brake system.

*** WARNING

Clean, high quality brake fluid is essential to the safe and proper operation of the brake system. You should always buy the highest

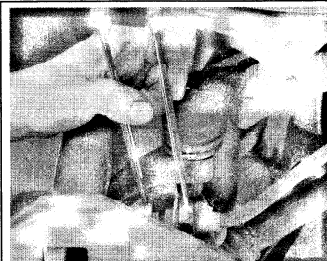


Fig. 17 Use two wrenches to loosen the fitting. If available, use flare nut type wrenches



Fig. 19 Tape or plug the line to prevent contamination

quality brake fluid that is available. If the brake fluid becomes contaminated, drain and flush the system, then refill the master cylinder with new fluid. Never reuse any brake fluid. Any brake fluid that is removed from the system should be discarded. Also, do not allow any brake fluid to come in contact with a painted surface; it will damage the paint.

14. Connect the negative battery cable.

Bleeding Brake System

See Figures 20 thru 28

When any part of the hydraulic system has been disconnected for repair or replacement, air may get into the lines and cause spongy pedal action (because air can be compressed and brake fluid cannot). To correct this condition, it is necessary to bleed the hydraulic system so to be sure all air is purged.

When bleeding the brake system, bleed one brake cylinder at a time, beginning at the cylinder with the longest hydraulic line (farthest from the master cylinder) first. ALWAYS keep the master cylinder reservoir filled with brake fluid during the bleeding operation. Never use brake fluid that has been drained from the hydraulic system, no matter how clean it is.

The primary and secondary hydraulic brake systems are separate and are bled independently. During the bleeding operation, do not allow the reservoir to run dry. Keep the master cylinder reservoir filled with brake fluid.

1. Clean all dirt from around the master cylinder fill cap, remove the cap and fill the master cylinder with brake fluid until the level is within $\frac{1}{4}$ in. (6mm) of the top edge of the reservoir.



Fig. 20 Remove the bleeder screw cap

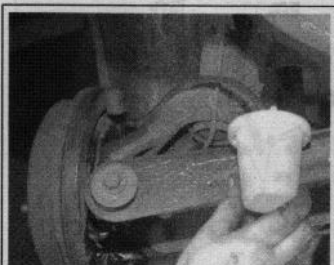


Fig. 21 Install a hose and container to the bleeder screw

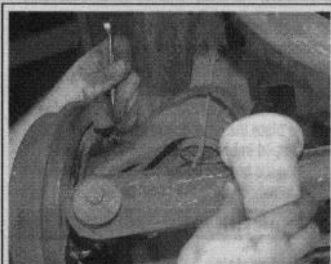


Fig. 22 Slowly crack open the bleeder screw while an assistant presses down the brake pedal



Fig. 23 The bleed screw for the rear brakes is located on the rear of the backing plate, just above the brake line

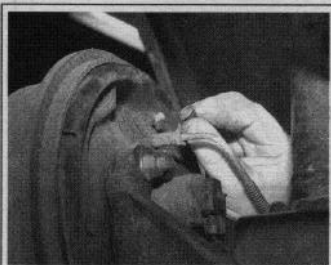


Fig. 24 Remove the protective rubber cap for the bleed screw

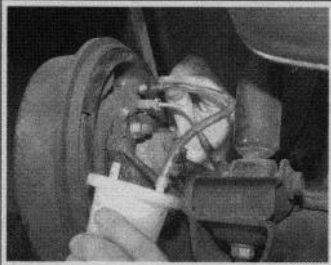
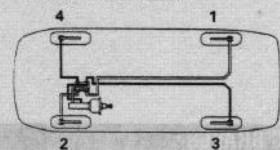


Fig. 25 Attach a hose connected to a bottle with a small amount of brake fluid in it to the bleed screw



Fig. 26 Slowly open the bleed screw and have an assistant depress the brake pedal while observing the hose for bubbles

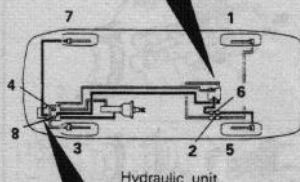
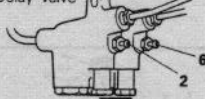
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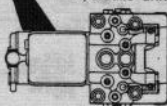
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FWD

Delay valve



Hydraulic unit



AWD

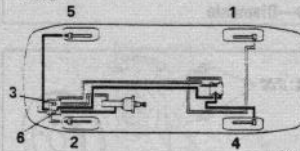


Fig. 27 Brake bleeding sequence—1993 Galant

9-8 BRAKES

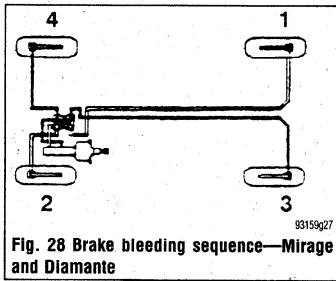


Fig. 28 Brake bleeding sequence—Mirage and Diamante

2. Clean the bleeder screws at all 4 wheels. The bleeder screws are located on the back of the brake backing plate (drum brakes) and on the top of the brake calipers (disc brakes).
3. Attach a length of rubber hose over the bleeder screw and place the other end of the hose in a glass jar, submerged in brake fluid.
4. Open the bleeder screw $\frac{1}{2}$ - $\frac{3}{4}$ turn. Have an assistant slowly depress the brake pedal.

⚠ CAUTION

Brake fluid contains polyglycol ethers and polyglycols. Avoid contact with the eyes and wash your hands thoroughly after handling brake fluid. If you do get brake fluid in your eyes, flush your eyes with clean, running water for 15 minutes. If eye irritation persists,

or if you have taken brake fluid internally, IMMEDIATELY seek medical assistance.

5. Close the bleeder screw and tell your assistant to allow the brake pedal to return slowly. Continue this process to purge all air from the system.
6. When bubbles cease to appear at the end of the bleeder hose, close the bleeder screw and remove the hose. Tighten the bleeder screw to the proper torque:
7. Check the master cylinder fluid level and add fluid accordingly. Do this after bleeding each wheel.
8. Repeat the bleeding operation at the remaining 3 wheels, ending with the one closest to the master cylinder.
9. Fill the master cylinder reservoir to the proper level.

DISC BRAKES

See Figures 29, 30, 31, and 32

Brake Pads

REMOVAL & INSTALLATION

⚠ CAUTION

Older brake pads or shoes may contain asbestos, which has been determined to be cancer causing agent. Never clean the brake surfaces with compressed air! Avoid inhaling any dust from any brake surface! When cleaning brake surfaces, use a commercially available brake cleaning fluid.

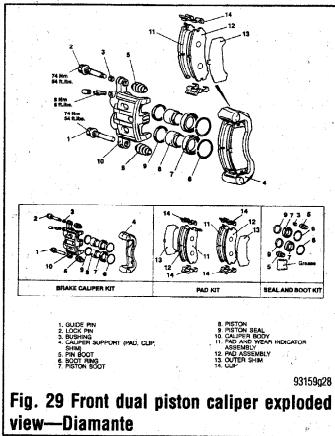


Fig. 29 Front dual piston caliper exploded view—Diamante

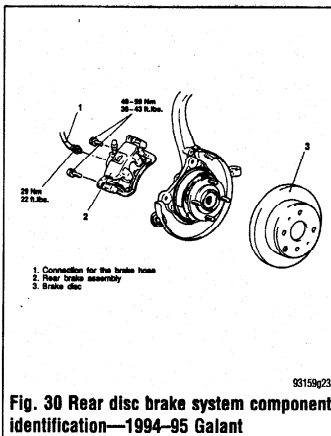


Fig. 30 Rear disc brake system component identification—1994-95 Galant

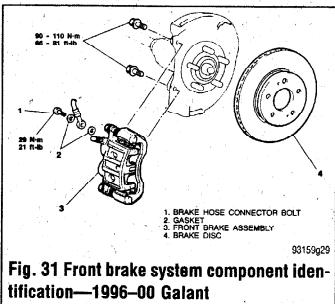


Fig. 31 Front brake system component identification—1996-00 Galant

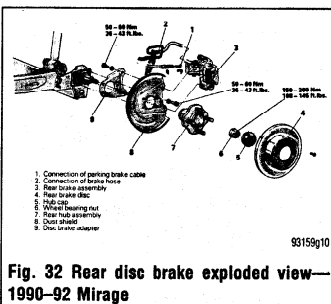


Fig. 32 Rear disc brake exploded view—1990-92 Mirage

Mirage and 1990-93 Galant

FRONT

See Figure 33

1. Remove some of the brake fluid from the master cylinder reservoir. The reservoir should be no more than half full. When the pistons are pressed into the calipers, excess fluid will flow up into the reservoir.

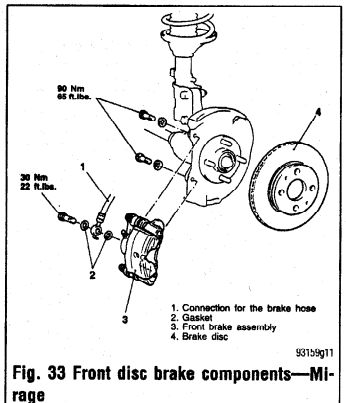


Fig. 33 Front disc brake components—Mirage

2. Raise the vehicle and support safely.
3. Remove the appropriate tire and wheel assemblies.
4. Remove the caliper guide and lock pins and lift the caliper assembly from the caliper support. Tie the caliper out of the way using wire. Do not allow the caliper to hang by the brake line.

➔ **On some vehicles, the caliper can be flipped up by leaving the upper pin in place and using it as a pivot point.**

5. Remove the brake pads, spring clip and shims. Take note of positioning to aid installation.
6. Install two wheel lug nuts onto the studs and lightly tighten. This is done to hold the disc on the hub.

To install:

7. Use a large C-clamp to compress piston(s) back into caliper bore. On two piston calipers both pistons will have to be retracted together.
8. Lubricate slide points and install the brake pads, shims and spring clip onto the caliper support. Install the caliper over the brake pads.

➔ **Be careful that the piston boot does not become caught when lowering the caliper onto the support. Do not twist the brake hose during caliper installation.**

9. Lubricate and install the caliper guide and lock pins in their original positions. Tighten the caliper guide and locking pins.
10. Install the tire and wheel assemblies. Lower the vehicle.

➔ **Pump the brake pedal several times, until firm, before attempting to move the vehicle.**

11. Road test the vehicle and check brakes for proper operation.

REAR

♦ **See Figures 32 and 34**

1. Remove some of the brake fluid from the master cylinder reservoir. The reservoir should be no more than half full. When the pistons are depressed into the calipers, excess fluid will flow up into the reservoir.
2. Raise the vehicle and support safely.
3. Remove the appropriate tire and wheel assemblies.
4. Loosen the parking brake cable adjustment from inside the vehicle.
5. Disconnect the parking brake cable end installed to the rear brake caliper assembly.
6. Remove the caliper lower pin and swing the caliper assembly upwards. Tie the caliper out of the way using wire.
7. Remove the outer shim, brake pads and spring clips from the caliper support. Take note of positioning of each to aid in installation.
8. Install two of the wheel lug nuts onto the studs and lightly tighten. This is done to hold the disc on the hub.
9. Thread the piston into the caliper bore clockwise using disc brake driver tool MB9F52 or its equivalent.

To install:

10. Lubricate all sliding and pivot points.
11. Install the brake pads, shims and spring clip to the caliper support.
12. Install the caliper over the brake pads.

➔ **Be careful that the piston boot does not become caught when lowering the caliper onto the support. Do not twist the brake hose during caliper installation.**

13. Lubricate, install and tighten the lower pin.
14. Install the tire and wheel assemblies. Lower the vehicle.
15. Test the brakes for proper operation.

Diamante and 1994-00 Galant

♦ **See Figures 29, 30, 31, 35 thru 47**

CAUTION

Brake pads and shoes contain asbestos, which has been determined to be a cancer causing agent. Never clean the brake surfaces with compressed air! Avoid inhaling any dust from brake surfaces! When cleaning brakes, use commercially available brake cleaning fluids.

➔ **Unlike most rear disc brake designs, this system does not incorporate the parking brake system, into the rear brake caliper, therefore, the rear brake system is serviced the same as the front system.**

1. Remove some of the brake fluid from the master cylinder reservoir. The reservoir should be no more than 1/2 full. When the pistons are depressed into the calipers, excess fluid will flow up into the reservoir.

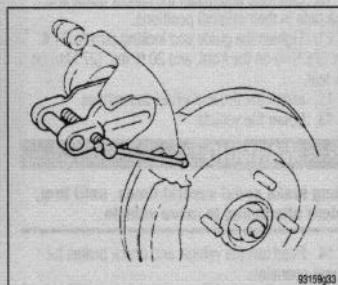


Fig. 34 Retracting brake caliper piston and aligning pad to piston—Mirage

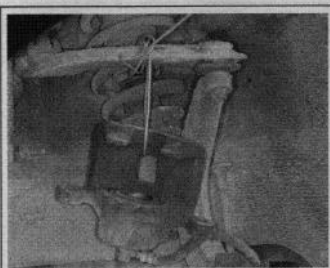


Fig. 35 Use mechanic's wire or a similar device to support the caliper out of the way

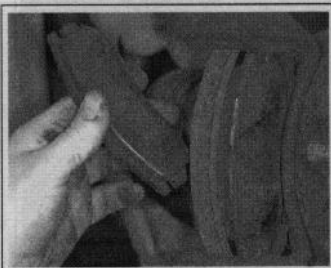


Fig. 36 Remove the inner brake pad and spring clip

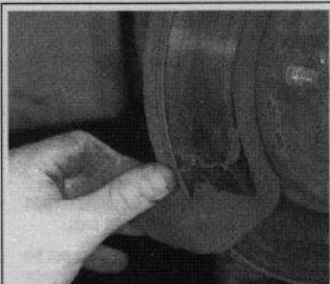


Fig. 38 Remove the spring clips and replace if necessary



Fig. 37 . . . also the outer pad from the caliper

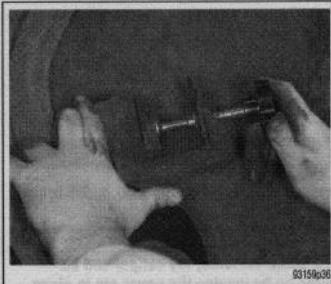


Fig. 39 The caliper piston can be depressed using a special tool, such as this one from Lisle® or . . .

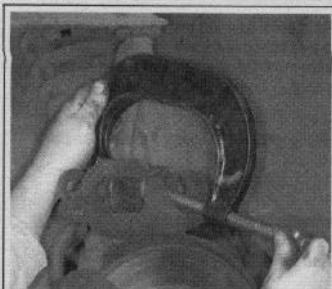


Fig. 40 . . . a large C-clamp will also work to compress the caliper piston



Fig. 41 Thoroughly clean the caliper slides . . .



Fig. 42 . . . then make sure to lubricate the caliper slides with a quality lubricant before installation



Fig. 43 Remember to remove the shims from the old pads to install on the new pads



Fig. 44 A quality disc brake quiet or equivalent should be applied to the new pads



Fig. 45 Spread the brake quiet evenly over the pad surface . . .



Fig. 46 . . . then install the shim on the pads



Fig. 47 Apply more brake quiet over the outside of the shim before installing the pads on the vehicle

2. Raise the vehicle and support safely.
3. Remove the appropriate tire and wheel assemblies.
4. Remove the caliper guide and lock pins and lift the caliper assembly from the caliper support. Tie the caliper out of the way using wire.

*** WARNING

Do not allow the caliper to hang by the brake line.

➔ On some vehicles, the caliper can be flipped up by leaving the upper pin in place and using it as a pivot point.

5. Remove the brake pads, spring clip and shims. Take note of positioning to aid installation.
6. Install the wheel lug nuts onto the studs and lightly tighten. This is done to hold the disc on the hub.

To install:

7. Use a large C-clamp to compress the piston(s) back into caliper bore.
8. Lubricate slide points and install the brake pads, shims and spring clip onto the caliper support.
9. Install the caliper over the brake pads.

➔ Be careful that the piston boot does not become caught when lowering the caliper onto the support. Do not twist the brake hose during caliper installation.

10. Lubricate and install the caliper guide and lock pins in their original positions.

11. Tighten the guide and locking pins to 54 ft. lbs. (75 Nm) on the front, and 20 ft. lbs. (27 Nm) on the rear.

12. Install the tire and wheel assemblies.
13. Lower the vehicle.

*** WARNING

Pump brake pedal several times, until firm, before attempting to move vehicle.

14. Road test the vehicle and check brakes for proper operation.

INSPECTION

➔ See Figures 48 and 49

*** CAUTION

Older brake pads or shoes may contain asbestos, which has been determined to be cancer causing agent. Never clean the brake surfaces with compressed air! Avoid inhaling any dust from any brake surface! When cleaning brake surfaces, use a commercially available brake cleaning fluid.

The disc brake pads have wear indicators that contact the brake disc when the brake pad thickness becomes 0.08 in. (2.0mm) and emit a squealing sound to warn the driver.

Brake Caliper

REMOVAL & INSTALLATION

*** CAUTION

Brake pads and shoes contain asbestos, which has been determined to be a cancer causing agent. Never clean the brake surfaces with compressed air! Avoid inhaling any dust from brake surfaces! When cleaning brakes, use commercially available brake cleaning fluids.

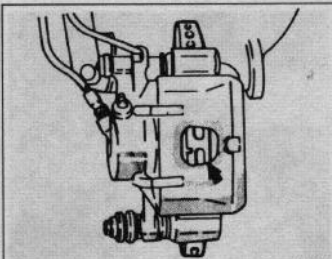


Fig. 48 Inspect front disc pad thickness through caliper body check port

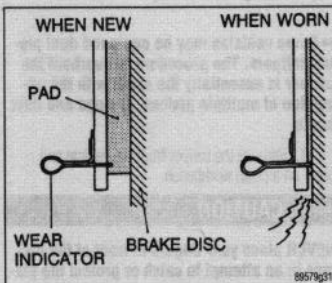


Fig. 49 The disc brake pads have wear indicators which will make a squeaking noise when the pads become worn and need to be replaced

Inspect the thickness of the brake linings by looking through the brake caliper body check port. The standard value of the brake pad is 0.39 in. (10mm). The thickness limit of the lining is 0.08 in. (2.0mm).

When the limit is exceeded, replace the pads on both sides of the brake disc and also the brake pads on the wheel on the opposite side of the vehicle. Do not replace 1 pad on a caliper because the wear indicator is hitting, without replacing the other pad on the same wheel as well as the brake pads on the other front or rear wheel, as applicable.

If there is a significant difference in the thickness of the pads on the left and right sides, check the sliding condition of the piston, lock pin sleeve and guide pin sleeve.

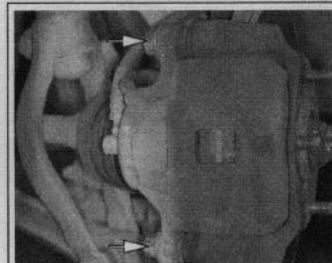


Fig. 50 The brake caliper is mounted to the caliper support with two bolts

Mirage and 1990-93 Galant

FRONT

♦ See Figure 33

1. Raise the vehicle and support safely.
2. Remove the appropriate tire and wheel assembly.

Do not let air into the master cylinder by allowing the reservoir to empty or complete system bleeding will be required.

3. To disconnect the front brake hose, hold the nut on the brake hose side and loosen the flared brake line nut. With the hose disconnected at the line, remove the brake hose from the caliper.

4. Remove the caliper guide and lock pins.
5. Remove the caliper assembly from the caliper support.

To install:

6. Position the brake caliper onto the caliper support.
7. Install and tighten the guide and lock pins.
8. Reconnect the brake hose.

Use caution not to twist brake hose during installation.

9. Bleed the brake system.
10. Apply brake pedal and inspect the system for proper operation and no leakage.
11. Install tire and wheel assembly.

REAR

♦ See Figure 17

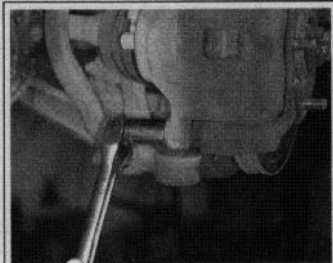


Fig. 51 Remove the brake caliper-to-caliper support retaining bolts

1. Disconnect the battery negative cable.
2. Raise the vehicle and support safely.
3. Remove the appropriate tire and wheel assemblies.
4. Loosen the parking brake cable adjustment from inside the vehicle.
5. Remove the retaining clips, and disconnect the parking brake cable from the rear brake caliper assembly.

Do not let air into the master cylinder by allowing the reservoir to empty or complete system bleeding will be required.

6. On FWD models, to disconnect the brake hose from the caliper, remove the banjo bolt from the brake caliper.

7. On AWD models, hold the nut on the brake hose side and loosen the flared brake line nut. With the hose disconnected at the line, remove the brake hose from the caliper.

8. Remove the caliper lock pin. Pivot the caliper upward, and slide the caliper assembly from the caliper support.

To install:

9. On FWD models, install the rear brake hose onto the caliper with new washers in place and tighten the brake hose retainer.
10. On AWD models, connect the brake hose to the caliper and tighten the fitting to 9-12 ft. lbs. (13-17 Nm). Then connect the hose at the bracket to the steel line and tighten the fitting to 9-12 ft. lbs. (13-17 Nm).

Do not twist the brake hose during installation.

11. Install the caliper over the brake pads, making sure stopper groove lines up with pad projection.
12. Lubricate and install the lock pin and tighten to 23 ft. lbs. (32 Nm).
13. Bleed the brake system.
14. Inspect the brake system for leaks and ensure proper operation.
15. Install tire and wheel assemblies.
16. Properly adjust parking brake cable.

Diamante and 1994-00 Galant

♦ See Figures 50 thru 55

Unlike most rear disc brake designs, this system does not incorporate the parking brake system into the rear brake caliper. Therefore, the rear brake system is serviced the same as the front system.

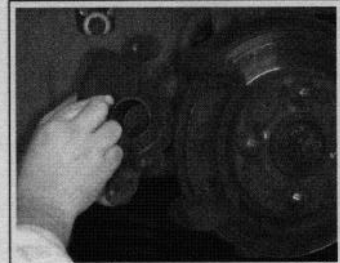
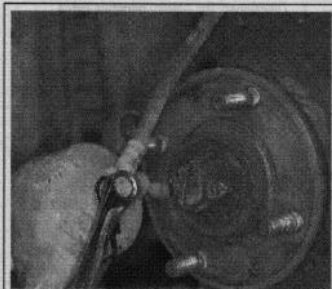


Fig. 52 Grasp the caliper and lift it from the caliper assembly from the caliper support



93159p47

Fig. 53 Loosen the caliper hose banjo bolt . . .

1. Raise the vehicle and support safely.
2. Remove the appropriate tire and wheel assembly.

➔ **Do not allow the master cylinder reservoir to empty. An empty reservoir will allow air to enter the entire brake system and complete system bleeding will be required.**

3. To disconnect the brake hose on models with a banjo-bolt connecting the brake hose to the caliper assembly, simply remove the bolt at the hose connection. To disconnect the brake hose on all other systems, hold the nut on the brake hose side and loosen the flared brake line nut.

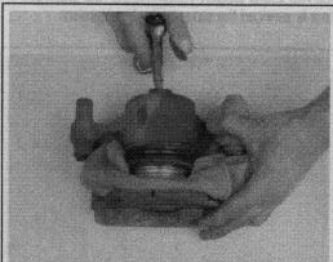
⚠ CAUTION

Brake fluid contains polyglycol ethers and polyglycols. Avoid contact with the eyes and wash your hands thoroughly after handling brake fluid. If you do get brake fluid in your eyes, flush your eyes with clean, running water for 15 minutes. If eye irritation persists, or if you have taken brake fluid internally, IMMEDIATELY seek medical assistance.

4. Once the hose has been disconnected from the line, remove the brake hose from the caliper.
5. Remove the caliper guide and lock pins and lift the caliper assembly from the caliper support.

To install:

6. Position the caliper onto the caliper support.



TCCA9p01

Fig. 56 For some types of calipers, use compressed air to drive the piston out of the caliper, but make sure to keep your fingers clear



93159p46

Fig. 54 . . . then remove the bolt from the fitting

7. Install the guide pin and lock pin. Tighten to 23 ft. lbs. (32 Nm).
8. Reconnect the brake hose or install the banjo bolt with new washers.

➔ **Use caution not to twist the brake hose during installation.**

9. Bleed the brake system.

⚠ WARNING

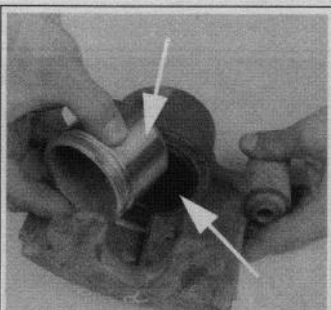
Clean, high quality brake fluid is essential to the safe and proper operation of the brake system. You should always buy the highest quality brake fluid that is available. If the brake fluid becomes contaminated, drain and flush the system, then refill the master cylinder with new fluid. Never reuse any brake fluid. Any brake fluid that is removed from the system should be discarded. Also, do not allow any brake fluid to come in contact with a painted surface; it will damage the paint.

10. Apply brake pedal and inspect the system for leaks. Ensure proper operation and no leakage.
11. Install tire and wheel assembly. Torque lug nuts to 87–101 ft. lbs. (120–140 Nm).

➔ **See Figures 56 thru 63**

OVERHAUL

➔ **See Figures 56 thru 63**



TCCA9p02

Fig. 57 Withdraw the piston from the caliper bore



93159p45

Fig. 55 Make sure that you remove the cop washers and replace them with new ones during reassembly

➔ **Some vehicles may be equipped dual piston calipers. The procedure to overhaul the caliper is essentially the same with the exception of multiple pistons, O-rings and dust boots.**

1. Remove the caliper from the vehicle and place on a clean workbench.

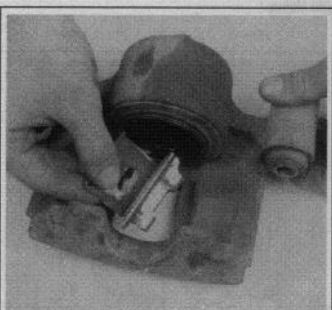
⚠ CAUTION

NEVER place your fingers in front of the pistons in an attempt to catch or protect the pistons when applying compressed air. This could result in personal injury!

➔ **Depending upon the vehicle, there are two different ways to remove the piston from the caliper. Refer to the brake pad replacement procedure to make sure you have the correct procedure for your vehicle.**

2. The first method is as follows:

- a. Stuff a shop towel or a block of wood into the caliper to catch the piston.
- b. Remove the caliper piston using compressed air applied into the caliper inlet hole. Inspect the piston for scoring, nicks, corrosion and/or worn or damaged chrome plating. The piston must be replaced if any of these conditions are found.



TCCA9p03

Fig. 58 On some vehicles, you must remove the anti-rattle clip

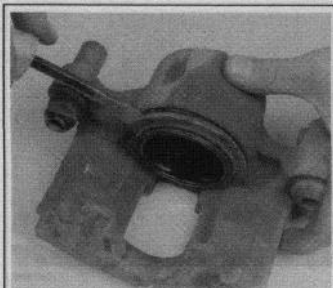


Fig. 59 Use a prytool to carefully pry around the edge of the boot . . .

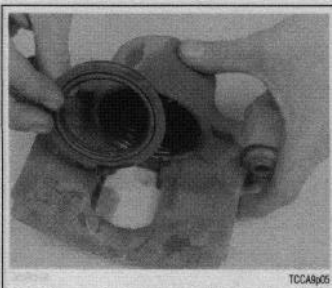


Fig. 60 . . . then remove the boot from the caliper housing, taking care not to score or damage the bore



Fig. 61 Use extreme caution when removing the piston seal; DO NOT scratch the caliper bore

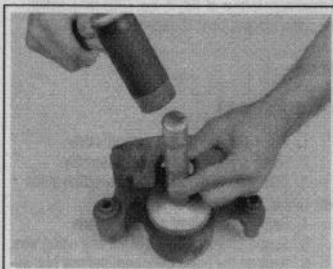


Fig. 62 Use the proper size driving tool and a mallet to properly seal the boots in the caliper housing

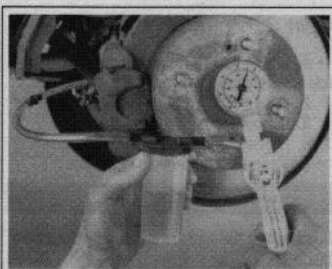


Fig. 63 There are tools, such as this Mighty-Vac, available to assist in proper brake system bleeding

3. For the second method, you must rotate the piston to retract it from the caliper.
4. If equipped, remove the anti-rattle clip.
5. Use a prytool to remove the caliper boot, being careful not to scratch the housing bore.
6. Remove the piston seals from the groove in the caliper bore.
7. Carefully loosen the brake bleeder valve cap and valve from the caliper housing.
8. Inspect the caliper bores, pistons and mounting threads for scoring or excessive wear.

9. Use crocus cloth to polish out light corrosion from the piston and bore.
 10. Clean all parts with denatured alcohol and dry with compressed air.
- To assemble:**
11. Lubricate and install the bleeder valve and cap.
 12. Install the new seals into the caliper bore grooves, making sure they are not twisted.
 13. Lubricate the piston bore.
 14. Install the pistons and boots into the bores of the calipers and push to the bottom of the bores.

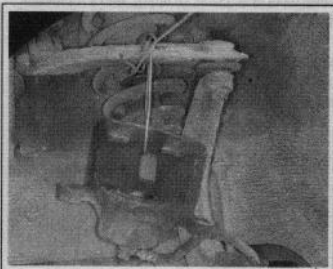


Fig. 64 Support the caliper using mechanic's wire or another suitable device. Do NOT let it hang by the brake hose



Fig. 65 Remove the caliper bracket retaining bolts . . .

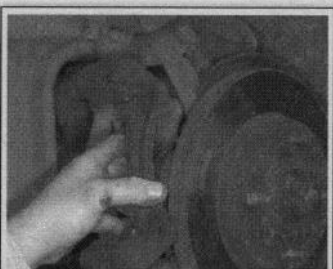


Fig. 66 . . . then remove the caliper bracket from the vehicle

15. Use a suitable driving tool to seat the boots in the housing.
16. Install the caliper in the vehicle.
17. Install the wheel and tire assembly, then carefully lower the vehicle.
18. Properly bleed the brake system.

Brake Disc (Rotor)

REMOVAL & INSTALLATION

*** CAUTION

Brake pads and shoes contain asbestos, which has been determined to be a cancer causing agent. Never clean the brake surfaces with compressed air! Avoid inhaling any dust from brake surfaces! When cleaning brakes, use commercially available brake cleaning fluids.

1993-00 Mirage, Diamante, and Galant

• See Figures 64 thru 70

The following procedure is applicable to both the front and rear brakes.

1. Raise the vehicle and support safely.
2. Remove the appropriate wheel.
3. Remove the caliper and brake pads.

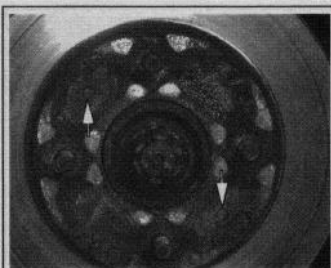


Fig. 67 There are two threaded holes located on the rotor



Fig. 70 . . . then remove the rotor from the hub assembly

4. Support the caliper out of the way using a wire.
5. On some models the rotor is held to the hub by two small threaded screws. Remove the screws and pull off the rotor.

To install:

6. Position the rotor on the hub and install the mounting screws.
7. Install the caliper holder and brake pads.
8. Slide the caliper over the brake pads and tighten the guide pins.
9. Install the wheel and tighten the lug nuts.

WARNING

Pump the brake pedal several times before attempting to move vehicle.

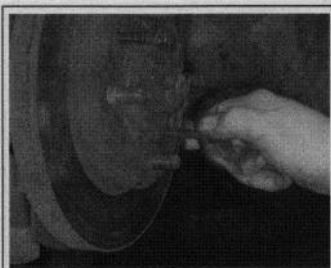


Fig. 68 Install a suitable size bolt into the threaded holes

1990-92 Mirage

FRONT

1. Loosen the large driveshaft nut while the vehicle is still on the ground with the brakes applied.
2. Raise and safely support vehicle.
3. Remove appropriate wheel assembly.
4. Remove the axle end nut and lock washer.
5. Remove the caliper from its bracket.

WARNING

Do not allow the caliper to hang by the brake line.

6. Remove the brake pads.
7. Remove the ball joint and tie rod end from the lower control arm.
8. Use an puller to push the halfshaft through the rotor/hub assembly.
9. Remove the lower strut bolts and remove the assembly from the vehicle.
10. To separate the rotor from the hub assembly, remove the rotor retainer bolts and separate using tool MB991001 or equivalent.

To install:

11. Assemble the rotor and hub. Tighten the nuts to 40 ft. lbs. (54 Nm) and install the assembly to the vehicle.
12. Install the washer so the chamfered edge faces outward. Install the nut and tighten temporarily.
13. Install the ball joint and tie rod end.
14. Install the brake components.
15. Install the wheel and lower the vehicle to the floor.

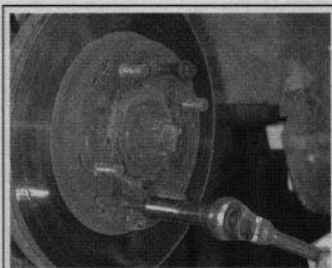


Fig. 69 Tighten the bolts until they force the rotor off of the hub . . .

16. Tighten the axle nut with the brakes applied to a maximum torque of 188 ft. lbs. (260 Nm). Install the cotter pin and bend to secure.

REAR

See Figure 17

1. Raise the vehicle and support safely.
2. Remove appropriate wheel assembly.
3. Detach the parking brake connection at the rear caliper assembly.
4. Remove the caliper and brake pads.
5. Support the caliper out of the way using wire.
6. Remove the brake rotor from the rear hub assembly.

To install:

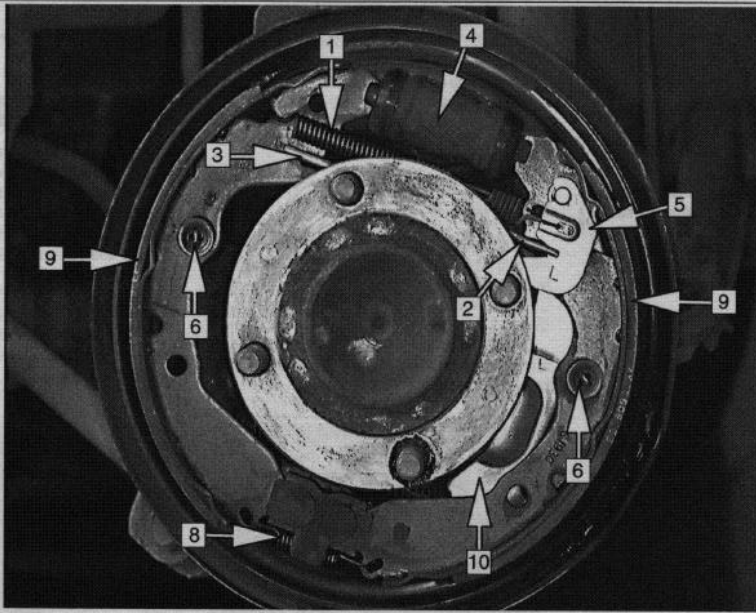
7. Position the rotor on the hub. Install a couple of lug nuts and lightly tighten to hold rotor on hub.
8. Install the caliper holder and place brake pads in holder.
9. Slide caliper over brake pads and install guide pins. Once caliper is secured, the lug nuts can be removed.
10. Reconnect parking brake cable and install wheel(s).

INSPECTION

Using a micrometer, measure the disc thickness at eight positions, approximately 45 degrees apart and 0.39 in. (10mm) in from the outer edge of the disc. The minimum thickness is 0.882 in. (22.4mm) for front rotors or 0.331 in. (8.4mm), with a maximum thickness variation of 0.0006 in. (0.015mm).

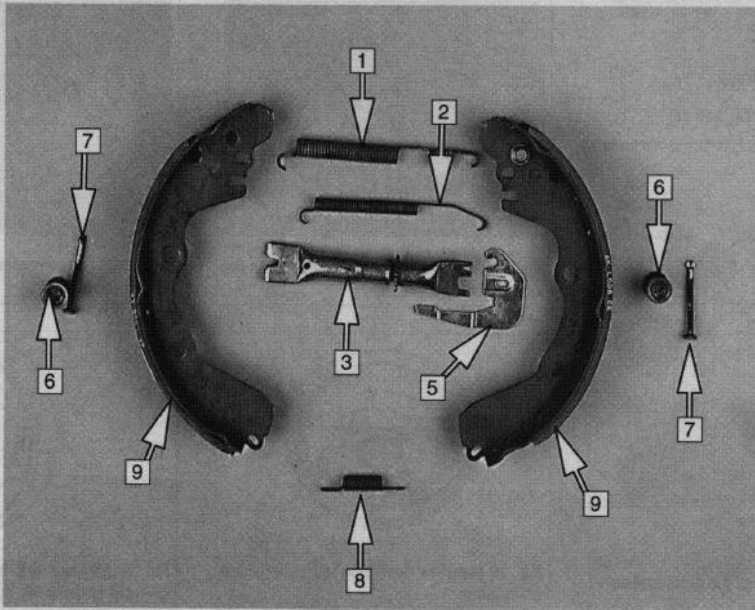
If the disc is beyond limits for thickness, remove it and install a new one. If the thickness variation exceeds the specifications, replace the disc or turn rotor with on the car type brake lathe.

DRUM BRAKES



DRUM BRAKE COMPONENTS

- | | |
|-------------------------|--------------------------|
| 1) Shoe-to-lever spring | 6) Shoe hold-down pin |
| 2) Shoe-to-shoe spring | 7) Shoe hold-down spring |
| 3) Adjuster assembly | 8) Retainer spring |
| 4) Wheel cylinder | 9) Shoes |
| 5) Adjuster lever | 10) Parking brake lever |



Brake Drums

REMOVAL & INSTALLATION

⚠ CAUTION

Brake pads and shoes contain asbestos, which has been determined to be a cancer causing agent. Never clean the brake surfaces with compressed air! Avoid inhaling any dust from brake surfaces! When cleaning brakes, use commercially available brake cleaning fluids.

1990-92 Mirage

♦ See Figure 71

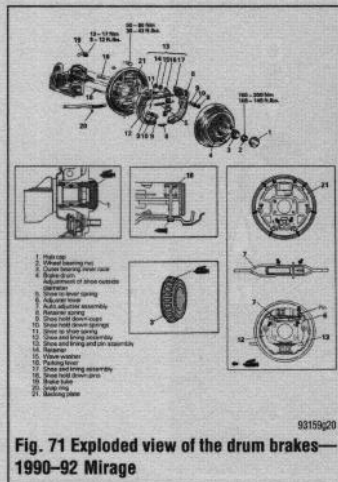
1. Raise the vehicle and support safely.
2. Remove the wheel and tire assembly.
3. Remove the dust cap.
4. Remove the self-locking nut.
5. Remove the outer wheel bearing.
6. Remove the drum with the inner wheel bearing from the spindle.
7. Remove the grease seal.

To install:

8. To determine if the self-locking nut is reusable:
 - a. Screw in the self-locking nut until about $\frac{1}{8}$ in. (3mm) of the spindle is showing.
 - b. Measure the torque required to turn the self-locking nut counterclockwise.
 - c. The lowest allowable torque is 48 inch lbs. (5.5 Nm). If the measured torque is less than the specification, replace the nut.
9. Lubricate and install the inner wheel bearing.
10. Install a new grease seal.
11. Install the drum to the spindle.
12. Lubricate and install the outer wheel bearing.
13. Tighten the self-locking nut to 108-145 ft. lbs. (150-200 Nm).
14. Install the grease cap.

Galant and 1993-00 Mirage

♦ See Figures 72, 73, 74, and 75



1. Raise and safely support the vehicle.
2. Remove the rear wheel.
3. Loosen the parking brake adjusting nut.
4. Pull the drum from the rear hub assembly. Tap the drum with a soft mallet if necessary.

To install:

5. Install the drum on the rear hub assembly.
6. Install the wheel and adjust the parking brake.
7. Lower the vehicle to the floor.

INSPECTION

♦ See Figure 76

1. With the brake drum removed from the vehicle, measure the inside diameter of the hub and drum at two or more locations.
2. The service limit specification is 9.1 in. (231mm).
3. Replace the brake drums and shoe and lining assemblies when the wear exceeds the limit or is badly out of balance.

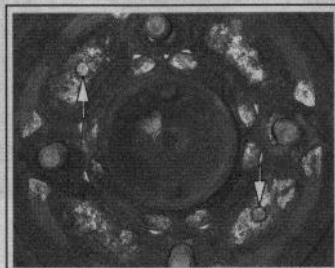


Fig. 72 There are two threaded holes located on the brake drum

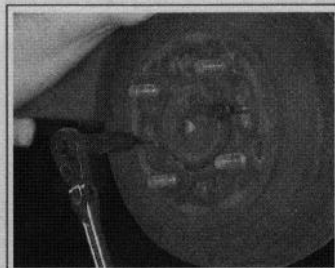


Fig. 74 Tighten the bolts until they force the drum off of the hub . . .

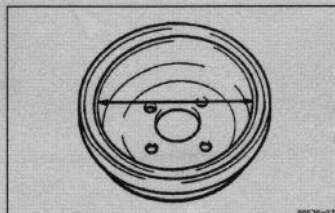


Fig. 76 Measure the inside diameter of the brake drum

Brake Shoes

INSPECTION

♦ See Figure 77

⚠ CAUTION

Brake pads and shoes contain asbestos, which has been determined to be a cancer causing agent. Never clean the brake surfaces with compressed air! Avoid inhaling any dust from brake surfaces! When cleaning brakes, use commercially available brake cleaning fluids.

1. Remove the brake drum.
2. Measure the wear of the brake lining at the place worn the most. The service limit for replacement is 0.039 in. (1.0mm).

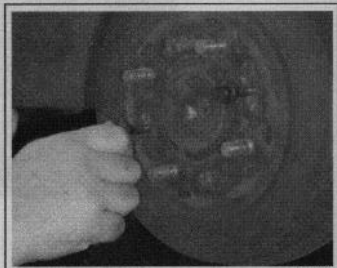


Fig. 73 Install a suitable size bolt into the threaded holes

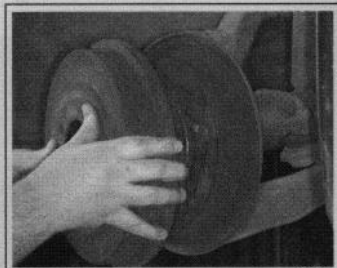


Fig. 75 . . . then remove the drum from the hub assembly

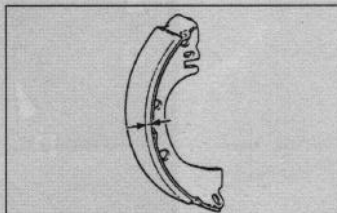


Fig. 77 Measure the thickness of the lining where it is worn the most

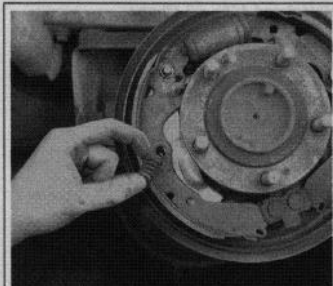


Fig. 84 . . . remove the hold-down spring and cup assembly

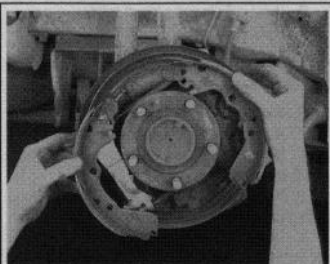


Fig. 85 With the shoes attached by the spring, pull them apart to clear the hub and bearing . . .

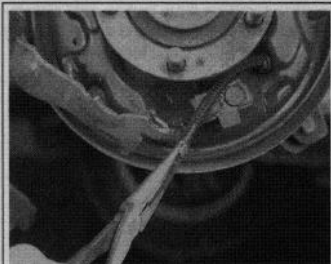


Fig. 86 . . . then detach the parking brake cable and remove the shoe and linings from the vehicle



Fig. 87 Use a small prytool to twist open the retainer joint and remove the retainer . . .

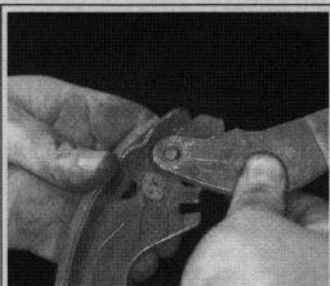


Fig. 88 . . . then remove the parking brake lever from the shoe

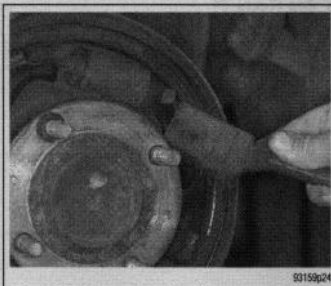


Fig. 89 Using a wire brush or other suitable tool, clean the shoe contact points on the backing plate



Fig. 90 Apply a high temp lubricant to the shoe contact points on the backing plate

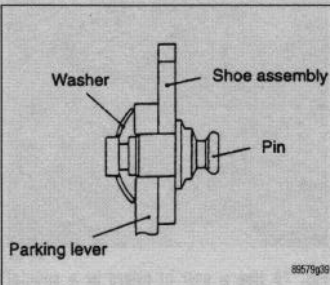


Fig. 91 Proper installation of the wave washer



Fig. 92 A portable cleaning tub made especially for cleaning brakes, like this one from SafetyKleen®, is extremely helpful



Fig. 93 If a cleaning tub is not available, a quality aerosol cleaning solvent can be used

20. Install the retainer spring.
21. Install the adjuster lever.
22. Install the shoe-to-lever spring.
23. Install the lever return spring.
24. Adjust the brake shoes and install the drum.
25. Install the wheel and tire assembly.
26. Lower the vehicle to the floor.

ADJUSTMENTS

The rear brakes are automatically adjusted while driving the vehicle. The brakes are also adjusted each time the parking brake is applied. Manual brake adjustment is only required after the brake shoes or

hardware has been replaced, or the adjuster has been replaced.

1. Remove the brake drum as described in this section.
2. Remove any excessive dust and dirt present on the brakes using the appropriate methods.
3. Using a brake adjustment gauge, measure the inside diameter of the brake drum.
4. Adjust the brake shoes to the same diameter as the drum by placing the brake adjustment gauge on the shoes and turn the adjusting star wheel.
5. Install the brake drum as described in this section.

Wheel Cylinders

REMOVAL & INSTALLATION

♦ See Figures 94, 95, 96, 97, and 98

1. Safely raise and support the vehicle.
2. Remove the rear wheel and the drum.
3. Remove the spring on the adjuster lever.
4. Remove the shoe-to-shoe spring.
5. Remove the auto adjuster assembly.

➤ **Special flare nut wrenches should be used on all line fittings to prevent damage to the flats on the nut.**

6. Place a drain pan under the wheel to catch the brake fluid and disconnect the brake line from the rear of the wheel cylinder.

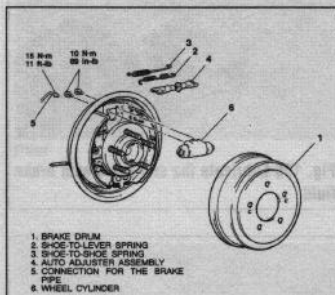


Fig. 94 Wheel cylinder removal—Galant

7. Remove the wheel cylinder mounting bolts and the wheel cylinder.

To install:

8. Install the wheel cylinder on the backing plate. Tighten the mounting bolts to 7 ft. lbs. (10 Nm).
9. Connect the brake line to the wheel cylinder. Tighten the line fitting to 11 ft. lbs. (15 Nm).
10. Add brake fluid to the reservoir and leave the wheel cylinder bleeder screw loose. Brake fluid will start the flow into the wheel cylinder and may save time when bleeding the brake system later.
11. Install the auto adjuster assembly.
12. Install the shoe-to-shoe spring.
13. Install the spring on the adjuster lever.
14. Install the drum and the wheel assembly.
15. Lower the vehicle and bleed the brake system.



Fig. 95 Use an appropriate size wrench to remove the brake line from the wheel cylinder

OVERHAUL

♦ See Figures 99 thru 108

Wheel cylinder overhaul kits may be available, but often at little or no savings over a reconditioned wheel cylinder. It often makes sense with these components to substitute a new or reconditioned part instead of attempting an overhaul.

If no replacement is available, or you would prefer to overhaul your wheel cylinders, the following procedure may be used. When rebuilding and installing wheel cylinders, avoid getting any contaminants into the system. Always use clean, new, high quality brake fluid. If dirty or improper fluid has been used, it will be necessary to drain the entire system, flush the system with proper brake fluid, replace all rubber components, then refill and bleed the system.

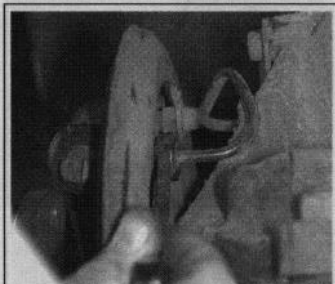


Fig. 96 When the line is sufficiently loosened, brake fluid will flow out of the fitting

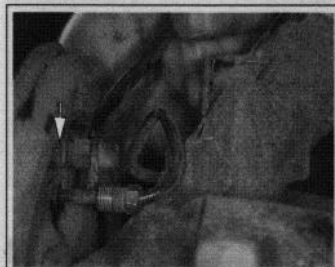


Fig. 97 The wheel cylinder is held by two retaining bolts; remove the bolts . . .



Fig. 98 . . . then remove the wheel cylinder from the backing plate

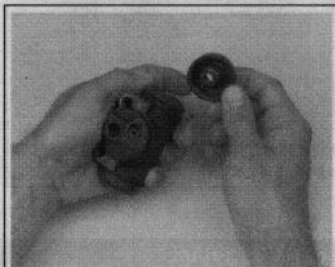


Fig. 99 Remove the outer boots from the wheel cylinder



Fig. 100 Compressed air can be used to remove the pistons and seals

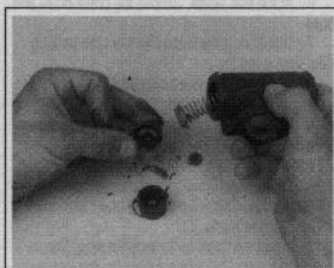


Fig. 101 Remove the pistons, cup seals and spring from the cylinder

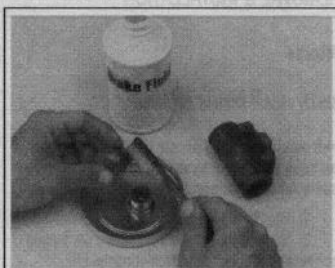


Fig. 102 Use brake fluid and a soft brush to clean the pistons . . .

1. Remove the wheel cylinder from the vehicle and place on a clean workbench.
2. First remove and discard the old rubber boots, then withdraw the pistons. Piston cylinders are equipped with seals and a spring assembly, all located behind the pistons in the cylinder bore.
3. Remove the remaining inner components, seals and spring assembly. Compressed air may be useful in removing these components. If no compressed air is available, be VERY careful not to score the wheel cylinder bore when removing parts from it.

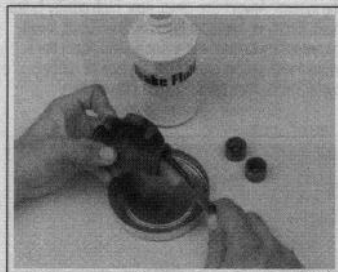


Fig. 103 . . . and the bore of the wheel cylinder

Discard all components for which replacements were supplied in the rebuild kit.

4. Wash the cylinder and metal parts in denatured alcohol or clean brake fluid.

⚠ WARNING

Never use a mineral-based solvent such as gasoline, kerosene or paint thinner for cleaning purposes. These solvents will swell rubber components and quickly deteriorate them.

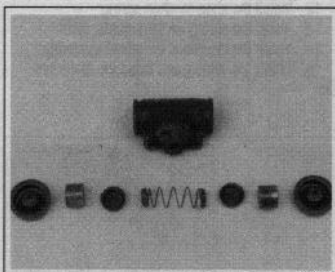


Fig. 104 Once cleaned and inspected, the wheel cylinder is ready for assembly

5. Allow the parts to air dry or use compressed air. Do not use rags for cleaning, since lint will remain in the cylinder bore.
6. Inspect the piston and replace it if it shows scratches.
7. Lubricate the cylinder bore and seals using clean brake fluid.
8. Position the spring assembly.
9. Install the inner seals, then the pistons.
10. Insert the new boots into the counterbores by hand. Do not lubricate the boots.
11. Install the wheel cylinder.

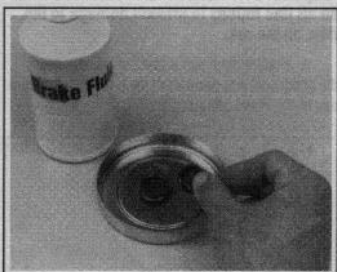


Fig. 105 Lubricate the cup seals with brake fluid

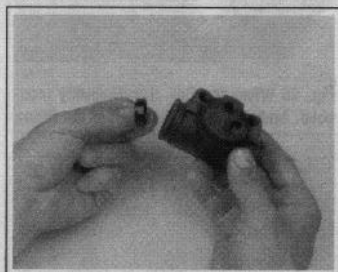


Fig. 106 Install the spring, then the cup seals in the bore

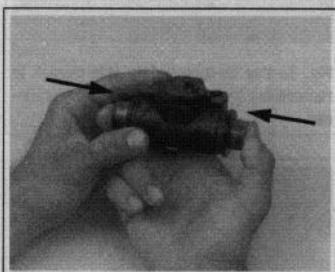


Fig. 107 Lightly lubricate the pistons, then install them

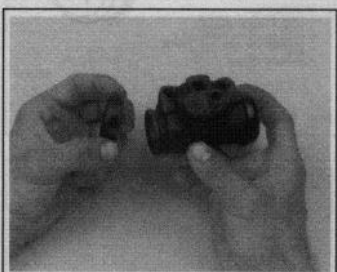


Fig. 108 The boots can now be installed over the wheel cylinder ends

PARKING BRAKE

Cable(s)

REMOVAL & INSTALLATION

Mirage

WITH REAR DRUM BRAKES

➔ If equipped with an air bag (SRS system), be sure to disarm system before starting repairs on the vehicle.

1. Disconnect the negative battery cable.
2. Remove the screws from the center section and remove the rear part of the console.

➔ If equipped with SRS, when removing the floor console, don't allow any impact or shock to the SRS diagnostic unit.

3. Remove the rear seat cushion.
4. Remove the center cable clamp and grommet.
5. Raise the vehicle and support safely.
6. At the rear wheel, remove the brake drum and shoes.
7. Disconnect the cable end from the parking brake strut lever.
8. Compress the retaining strips to remove the cable from the backing plate.
9. Unfasten any other frame retainers and remove the cables.

To install:

10. The parking brake cables may be color coded to indicate side. Check the parking brake cables for an identification mark.
11. Install the cable to the rear actuator. Secure in place with the parking brake cable clip and retainer spring.
12. Install the brake shoes and drum.

13. Position the cable and loosely install the retainers.
14. Reattach the parking brake cables to the actuator inside the vehicle.
15. Adjust the rear brake shoes.
16. Tighten the adjusting nut until the proper tension is placed on the cable. Adjust the parking brake stroke using appropriate method.
17. Secure all cable retainers.
18. Apply and release the parking brake a number of times once all adjustments have been made.
19. With the rear wheels raised, make sure the parking brake is not causing excess drag on the rear wheels.
20. Install the floor console and rear seat assembly.
21. Connect the negative battery cable.
22. Check that the parking brake holds the vehicle on an incline.

WITH REAR DISC BRAKES

➔ **If equipped with an air bag (SRS system), be sure to disarm the system before starting repairs on the vehicle.**

1. Disconnect the negative battery cable.
2. Remove the screws from the center section and remove the rear part of the console.

➔ **If equipped with SRS, when removing the floor console, don't allow any impact or shock to the SRS diagnostic unit.**

3. Remove the rear seat cushion.
4. Loosen the cable adjusting nut and disconnect the rear brake cables from the actuator.
5. Remove the center cable clamp and grommet.
6. Raise the vehicle and support safely.
7. Remove the parking brake cable clip and retainer spring.
8. Disconnect the cable end from the parking brake assembly.
9. Unfasten any remaining frame retainers and remove the cables from the vehicle.

To install:

10. The parking brake cables may be color coded to indicate side. Check the parking brake cables for an identification mark.
11. Install the cable to the rear actuator. Secure in place with the parking brake cable clip and retainer spring.
12. Position the cable and loosely install the retainers.
13. Reattach the parking brake cables to the actuator inside the vehicle.
14. Tighten the adjusting nut until the proper tension is placed on the cable. Adjust the parking brake stroke using appropriate method.
15. Secure all cable retainers.
16. Apply and release the parking brake a number of times once all adjustments have been made.
17. With the rear wheels raised, make sure the parking brake is not causing excess drag on the rear wheels.
18. Install the floor console and rear seat assembly.
19. Connect the negative battery cable.
20. Check console electrical components for proper operation.
21. Road test the vehicle and check for proper brake operation.
22. Check that the parking brake holds the vehicle on an incline.

1990-93 Galant

WITH REAR DRUM BRAKES

1. Disconnect the negative battery cable.
2. Remove the center console as follows:
 - a. Remove both side cover panels.
 - b. Remove the shifter knob on manual transaxle models. Remove the spacer trim piece on automatic transaxle models.
 - c. Remove the switch panel/box and remove the two screws beneath the panel/box.
 - d. Remove the radio trim panel.
 - e. Remove the radio and tape player.
 - f. Remove the console inner panel and remove the two screws for beneath the panel.
 - g. Remove the remaining screws from the sides of the console.

- h. Remove the console assembly from the vehicle.
3. While pressing downward on the front of the rear seat cushion, release the locking levers and remove the seat cushion.
4. Loosen the cable adjustment at the cable equalizer.
5. Remove the center cable clamp and grommet.
6. Raise the vehicle and support safely.
7. At the rear wheel, remove the brake drum and shoes.
8. Disconnect the cable end from the parking brake strut lever.
9. Remove the snapping securing the cable to the backing plate.
10. Unfasten any other frame retainers and remove the cables.

To install:

➔ **The parking brake cables may be color coded to indicate side. Check the parking brake cables for an identification mark.**

11. Install the cable to the rear actuator. Secure in place with the parking brake cable clip and snapping.
12. Install the brake shoes and drum.
13. Position the cable and loosely install the retainers.
14. Reattach the parking brake cables to the actuator inside the vehicle. Tighten the adjusting nut until the proper tension is placed on the cable. Adjust the parking brake stroke using appropriate method.
15. Secure all cable retainers.
16. Apply and release the parking brake a number of times once all adjustments have been made.
17. Adjust the rear brakes and parking brake cables.
18. Check the rear wheels to confirm that the rear brakes are not dragging.
19. Install the center console and rear seat cushion.
20. Connect the negative battery cable.
21. Check console electrical components for proper operation.
22. Check that the parking brake holds the vehicle on an incline.

WITH REAR DISC BRAKES

1. Disconnect the negative battery cable.
2. Remove the center console as follows:
 - a. Remove both side cover panels.
 - b. Remove the shifter knob on manual transaxle models. Remove the spacer trim piece on automatic transaxle models.
 - c. Remove the switch panel/box and remove the two screws beneath the panel/box.
 - d. Remove the radio trim panel.
 - e. Remove the radio and tape player.
 - f. Remove the console inner panel and remove the two screws from beneath the panel.
 - g. Remove the remaining screws from the sides of the console.
 - h. Remove the console assembly from the vehicle.
3. While pressing downward on the front of the rear seat cushion, release the locking levers and remove the seat cushion.
4. Loosen the cable adjusting nut and disconnect the rear brake cables from the actuator.
5. Remove the center cable clamp and grommet.
6. Raise the vehicle and support it safely.

7. At the rear caliper assembly, remove the parking brake cable clip and retainer spring.
8. Disconnect the cable end from the caliper.
9. Unfasten any remaining frame retainers and remove the cables from the vehicle.

To install:

➔ **The parking brake cables may be color coded to indicate side. Check the parking brake cables for an identification mark.**

10. Connect the cable to the actuator at the brake caliper. Secure in place with the parking brake cable clip and retainer spring.
11. Position the cable and loosely install the retainers.
12. Reattach the parking brake cables to the actuator inside the vehicle. Tighten the adjusting nut until the proper tension is placed on the cable.
13. Adjust the parking brake stroke using appropriate method.
14. Secure all cable retainers.
15. Apply and release the parking brake a number of times once all adjustments have been made.
16. With the rear wheels raised, make sure the parking brake is not causing excess drag on the rear wheels.
17. Install the floor console assembly and rear seat cushion.
18. Connect the negative battery cable.
19. Check console electrical components for proper operation.
20. Road test the vehicle and check for proper brake operation.
21. Check that the parking brake holds the vehicle on an incline.

1994-00 Galant

WITH REAR DRUM BRAKES

1. Disconnect the negative battery cable.

*** WARNING

The SRS control unit is mounted beneath the center console. Use care when working with the center console assembly not to impact or shock the control unit.

2. Remove the center floor console assembly as follows:
 - a. Remove the shifter knob on models equipped with a manual transaxle.
 - b. Remove the shifter trim panel.
 - c. Remove the center instrument panel.
 - d. Remove the panel box from the console assembly.
 - e. Remove the two screws from the center of the console.
 - f. Remove the four side panel screws and remove the console from the vehicle.
3. Loosen the cable adjuster nut, then remove the parking brake cable by pulling it from the passenger compartment.
4. Raise the vehicle and support safely.
5. At the rear wheel, remove the brake drum and shoes.
6. Disconnect the cable end from the parking brake strut lever. Compress the retaining strips to remove the cable from the backing plate.

7. Unfasten any other frame retainers and remove the cables.

To install:

8. Install the cable to the rear actuator. Secure in place with the parking brake cable clip and retainer spring.
9. Install the brake shoes and drum.
10. Position the cable and loosely install the retainers.
11. Reattach the parking brake cables to the actuator inside the vehicle.
12. Tighten the adjusting nut until the proper tension is placed on the cable.
13. Adjust the parking brake stroke using appropriate method.
14. Secure all cable retainers. Apply and release the parking brake a number of times once all adjustments have been made.
15. Assemble the interior components which were removed.
16. Adjust the rear brakes and parking brake cables.
17. Connect the negative battery cable.
18. Check the rear wheels to confirm that the rear brakes are not dragging.
19. Check that the parking brake holds the vehicle on an incline.

WITH REAR DISC BRAKES

♦ See Figure 109

Unlike conventional rear disc brake systems, the parking brake operation is NOT incorporated into the brake caliper. This system, uses a separate set of brake shoes, located behind the brake rotor.

1. Disconnect the negative battery cable.

**** WARNING**

The SRS control unit is mounted beneath the center console. Use care when working with the center console assembly not to impact or shock the control unit.

2. Remove the center floor console assembly as follows:
 - a. Remove the shifter knob on models equipped with a manual transaxle.

- b. Remove the shifter trim panel.
- c. Remove the center instrument panel.
- d. Remove the panel box from the console assembly.
- e. Remove the two screws from the center of the console.
 1. Remove the four side panel screws and remove the console from the vehicle.
 2. Loosen the cable adjuster nut, then remove the parking brake cable by pulling it from the passenger compartment.
 3. Raise the vehicle and support safely.
 4. At the rear wheel, remove the brake caliper and rotor.
 5. Remove the parking brake shoes. Refer to the procedure in this section.
 6. Disconnect the cable end from the parking brake strut lever.
 7. Compress the retaining strips to remove the cable from the backing plate.
 8. Unfasten any other frame retainers and remove the cables.

To install:

9. Install the cable to the rear actuator. Secure in place with the parking brake cable clip and retainer spring.
 11. Install the parking brake shoes.
 12. Install the brake rotor and caliper assembly.
 13. Position the cable and loosely install the retainers.
 14. Reattach the parking brake cables to the actuator inside the vehicle.
 15. Tighten the adjusting nut until the proper tension is placed on the cable.
 16. Adjust the parking brake stroke using appropriate method.
 17. Secure all cable retainers.
 18. Apply and release the parking brake a number of times once all adjustments have been made.
 19. Assemble the interior components which were removed.
 20. Adjust the parking brake shoes and parking brake cables.
 21. Connect the negative battery cable.
 22. Check the rear wheels to confirm that the rear brakes are not dragging.
 23. Check that the parking brake holds the vehicle on an incline.

c. Remove the four side panel screws and remove the console from the vehicle.

→ If equipped with SRS, don't allow any impact or shock to the SRS diagnostic unit when removing the floor console.

3. Loosen the cable adjuster nut, then remove the parking brake cable by pulling it from the passenger compartment.
4. Raise the vehicle and support it safely.
5. At the rear wheel, remove the brake caliper and rotor.
6. Remove the parking brake shoes.
7. Disconnect the cable end from the parking brake strut lever.
8. Compress the retaining strips to remove the cable from the backing plate.
9. Unfasten any other frame retainers and remove the cables.

To install:

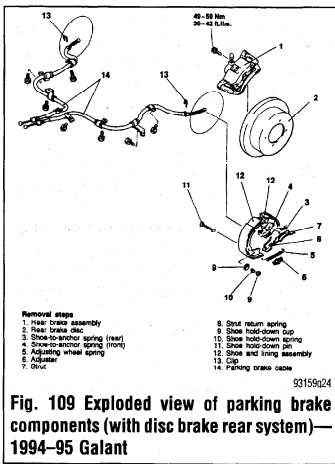
10. Install the cable to the rear actuator. Secure in place with the parking brake cable clip and retainer spring.
11. Install the parking brake shoes.
12. Install the brake rotor and caliper assembly.
13. Position the cable and loosely install the retainers.
14. Reattach the parking brake cables to the actuator inside the vehicle.
15. Tighten the adjusting nut until the proper tension is placed on the cable.
16. Adjust the parking brake stroke using appropriate method.
17. Secure all cable retainers.
18. Apply and release the parking brake a number of times once all adjustments have been made.
19. Assemble the interior components which were removed.
20. Adjust the parking brake shoes and parking brake cables.
21. Connect the negative battery cable.
22. Check the rear wheels to confirm that the rear brakes are not dragging.
23. Check that the parking brake holds the vehicle on an incline.

ADJUSTMENT

Mirage

♦ See Figure 110

→ If the vehicle is equipped with rear drum brakes, make certain that the brake shoes are properly adjusted before attempting to adjust the parking brake.



Diamante

Unlike conventional rear disc brake systems, the parking brake operation is NOT incorporated into the brake caliper. This system, uses a separate set of brake shoes, located behind the brake rotor.

1. Disconnect the negative battery cable.

**** CAUTION**

Work must be started after 90 seconds from the time the ignition switch is turned to the LOCK position and the negative battery cable is disconnected.

- If equipped with an air bag, be sure to disarm it before starting repairs on the vehicle.**
2. Remove the center floor console assembly as follows:
 - a. Remove the ashtray or console switch panel from the console assembly.
 - b. Remove the two screws from the center of the console.

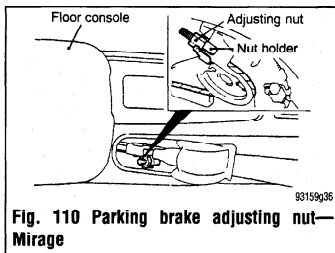


Fig. 110 Parking brake adjusting nut—Mirage

1. Make sure the parking brake cable is free and not frozen or sticking.
2. Apply the parking brake with 45 lbs. (200 N) of force while counting the number of notches. The desired parking brake stroke should be 5–7 notches.
3. If adjustment is required, access the adjusting nut from inside the floor console.
4. Loosen the locknut on the cable rod.
5. Rotate the adjusting nut to adjust the parking brake stroke to the 5–7 notch setting. After making the adjustment, check there is no looseness between the adjusting nut and the parking brake lever, then tighten the locknut.

➔ **Do not adjust the parking brake too tight. If the number of notches is less than specification, the cable has been pulled too much and the automatic adjuster will fail or the brakes will drag.**

6. After adjusting the lever stroke, raise the rear of the vehicle and safely support. With the parking brake lever in the released position, turn the rear wheels to confirm that the rear brakes are not dragging.
7. Check that the parking brake holds the vehicle on an incline.

Galant

1990–93 VEHICLES

♦ See Figure 111

1. Pull the parking brake lever up with a force of about 45 lbs. (200 N). The total number of clicks heard should be 5–7 clicks. If the number of clicks was not within that range, the system requires adjustment.

➔ **The parking brake shoes must be adjusted before attempting to adjust the cable mechanism**

2. To adjust the parking brake shoes perform the following steps:
 - a. Remove the floor console, release the lever and back off the cable adjuster locknut at the base of the lever.
 - b. Raise the vehicle, support safely and remove the wheel.
 - c. Remove the hole plug in the brake rotor.
 - d. Remove the brake caliper and hang out of the way with wire. Do not disconnect the fluid line.
 - e. Use a suitable prybar to pry up on the self-adjuster wheel until the rotor will not turn.
 - f. Return the adjuster 5 notches in the opposite direction. Make sure the rotor turns freely with a slight drag.

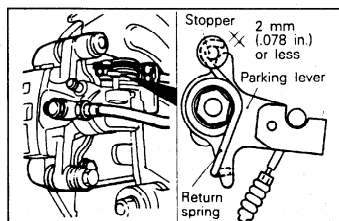


Fig. 111 Parking brake system adjustment points—1993 Galant

- g. Install the caliper and check operation.
3. Once the parking brake shoes have been properly adjusted, adjust the cable mechanism, by performing the following steps:
 - a. Turn the adjusting nut to give the proper number of clicks when the lever is raised full travel.
 - b. Raise and support the rear of the car on jacksstands.
 - c. Raise the brake lever and make sure that the rear wheels turn freely. If not, back off on the adjusting nut until they do.

1994–00 VEHICLES

1. Pull the parking brake lever with a force of approx. 45 lbs. (200 N) and count the number of notches. Standard value is: 5–7 notches.

⚠ CAUTION

The 45 lbs. (200 N) force of the parking brake lever must be strictly observed.

2. If the parking brake lever is not the standard value, adjust in the following manner:
 - a. Remove the inner compartment mat of the floor console
 - b. Loosen the adjusting nut at the end of the cable rod, freeing the parking brake.
 - c. With the engine idling, forcefully depress the brake pedal five or six times and confirm that the pedal stroke stops changing. If the pedal stroke stops changing, the automatic-adjustment mechanism is functioning normally, and the clearance between the shoe and the drum is correct.
 - d. After adjusting the parking brake lever stroke, safely raise and support the rear of the vehicle and with the parking brake lever in the released position, turn the rear wheels to confirm that there is no brake drag.

Diamante

1. Pull the parking brake lever up with a force of about 45 lbs. (200 N). The total number of clicks heard should be 3–5. If the number of clicks was not within that range, the system requires adjustment.

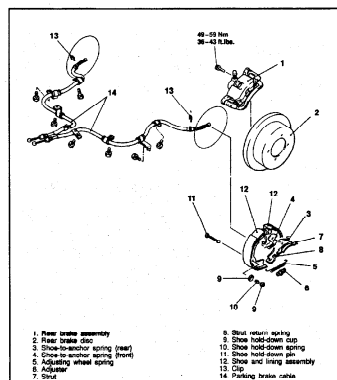


Fig. 112 Exploded view of the parking shoes and related components—1994–00 Galant with disc brakes

➔ **The parking brake shoes must be adjusted before attempting to adjust the cable mechanism**

2. To adjust the parking brake shoes, perform the following steps:
 - a. Remove the floor console, release the lever and back off the cable adjuster locknut at the base of the lever.
 - b. Raise the vehicle, support safely and remove the wheel. Remove the hole plug in the brake rotor.
 - c. Remove the brake caliper and hang out of the way with wire. Do not disconnect the fluid line.
 - d. Use a suitable prybar to pry up on the self-adjuster wheel until the rotor will not turn.
 - e. Return the adjuster 5 notches in the opposite direction. Make sure the rotor turns freely with a slight drag.
 - f. Install the caliper and check operation.
3. Once the parking brake shoes have been properly adjusted, adjust the cable mechanism, by performing the following steps:
 - a. Pull the parking brake lever up with a force of 45 lbs. (200 N). The total number of clicks heard should be 3–5.
 - b. Turn the adjusting nut to give the proper number of clicks when the lever is raised.
 - c. Raise and support the rear of the car on jacksstands.
 - d. Release the brake lever and make sure that the rear wheels turn freely.

Brake Shoes

REMOVAL & INSTALLATION

1994–00 Galant and 1992–96 Diamante

♦ See Figures 112, 113, and 114

1. Raise and safely support the vehicle securely on jacksstands.
2. Remove the caliper assembly.
3. Remove the rear brake rotor.

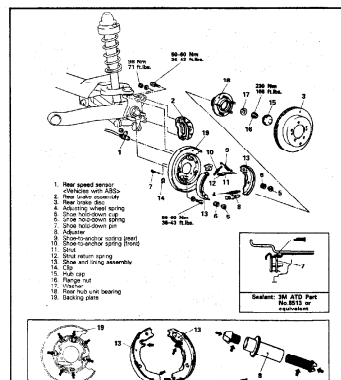


Fig. 113 Exploded view of the parking brake shoes and related components—1992–96 Diamante

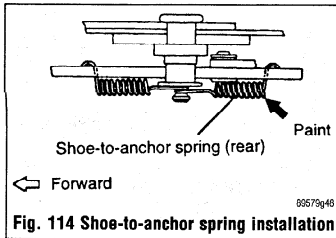


Fig. 114 Shoe-to-anchor spring installation

➔ **When servicing drum brakes, only disassemble and assemble one side at a time, leaving the remaining side intact for reference.**

4. Remove the front and rear shoe-to-anchor springs.
5. Remove the adjusting wheel spring and the adjuster.
6. Remove the strut and the strut return spring.
7. Remove the shoe hold-down cup, spring and pin.
8. Remove the shoe and lining assembly.
9. Unfasten the clips and the retaining bolts, then remove the parking brake cable(s).

To install:

10. Installation is the reverse of the removal procedure.
11. Install the adjuster so the shoe adjusting bolt of the left hand wheel is attached toward the front of

the vehicle and the shoe adjusting bolt of the right hand wheel is toward the rear of the vehicle.
 12. The load on the respective shoe-to-anchor springs is different, so the spring in the figure has been painted, as shown in the accompanying figure.

1997-00 Diamante

♦ **See Figure 115**

1. Raise and safely support the vehicle securely on jackstands.
2. Remove the caliper assembly.
3. Remove the rear brake rotor.

➔ **When servicing drum brakes, only disassemble and assemble one side at a time, leaving the remaining side intact for reference.**

4. Remove the shoe hold-down spring retaining screw.
5. Remove the shoe hold-down spring.
6. Remove the shoe assembly from the backing plate.
7. The installation is the reverse of removal.

ADJUSTMENT

1. Remove the floor console, release the lever and back off the cable adjuster locknut at the base of the lever.
2. Raise the vehicle, support safely and remove the wheel.

3. Remove the hole plug in the brake rotor.
4. Remove the brake caliper and hang out of the way with wire. Do not disconnect the fluid line.
5. Use a suitable prybar to pry up on the self-adjuster wheel until the rotor will not turn.
6. Return the adjuster 5 notches in the opposite direction. Make sure the rotor turns freely with a slight drag.
7. Install the caliper and check operation.

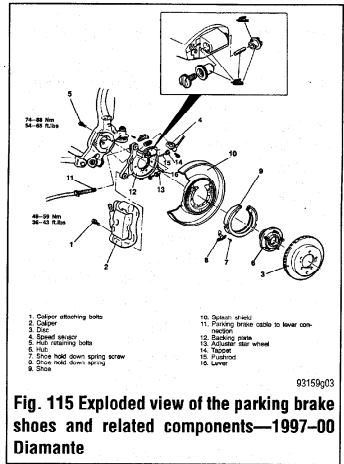


Fig. 115 Exploded view of the parking brake shoes and related components—1997-00 Diamante

ANTI-LOCK BRAKE SYSTEM

General Information

The 4-Wheel Anti-lock Brake System (ABS) is an electronically operated, all wheel brake control system. Major components include the vacuum power brake booster, master cylinder, the wheel speed sensors, the Hydraulic Control Unit (HCU), Anti-lock control unit, a relay, and on the AWD Galant, a G sensor.

The system is designed to retard wheel lockup during periods of high wheel slip when braking. Retarding wheel lockup is accomplished by modulating fluid pressure to the wheel brake units. When the control unit detects a variation in voltage across the wheel speed sensors, the ABS is activated. The control unit opens and closes various valves located inside the HCU. These valves, called dump and isolation valves, modulate the hydraulic pressure to the wheels by applying and venting the pressure to the brake fluid circuits.

PRECAUTIONS

- Certain components within the Anti-Lock Brake System (ABS) are not intended to be serviced or repaired individually. Only those components with removal and installation procedures should be serviced.
- Do not use rubber hoses or other parts not specifically specified for an ABS system. When using repair kits, replace all parts included in the kit. Partial or incorrect repair may lead to functional problems and require the replacement of components.

- Lubricate rubber parts with clean, fresh brake fluid to ease assembly. Do not use lubricated shop air to clean parts; damage to rubber components may result.
- Use only specified brake fluid from an unopened container.
- If any hydraulic component or line is removed or replaced, it may be necessary to bleed the entire system.
- A clean repair area is essential. Always clean the reservoir and cap thoroughly before removing the cap. The slightest amount of dirt in the fluid may plug an orifice and impair the system function. Perform repairs after components have been thoroughly cleaned; use only denatured alcohol to clean components. Do not allow ABS components to come into contact with any substance containing mineral oil; this includes used shop rags.
- The Anti-Lock control unit is a microprocessor similar to other computer units in the vehicle. Ensure that the ignition switch is **OFF** before removing or installing controller harnesses. Avoid static electricity discharge at or near the controller.
- If any arc welding is to be done on the vehicle, the control unit should be unplugged before welding operations begin.

Diagnosis and Testing

♦ **See Figures 116 thru 123**

The diagnosis of the ABS system is rather complex and requires quite a few special tools including scan

tools, special test harnesses and other special and expensive tools. Alternative methods and common sense can be substituted, however, We at Chilton feel that it is beyond the scope of the average do-it-yourselfer. If you experience the amber ANTI LOCK light on in the instrument cluster of your vehicle, check the fluid level in the master cylinder first. Low fluid level will usually illuminate the red BRAKE lamp in the instrument cluster as well as, but not always, the amber ANTI LOCK lamp in the instrument cluster. The low fluid level could indicate a leak, but sometimes just indicates low, worn brake linings that have caused the caliper pistons and wheel cylinders to extend further, and thus using more fluid to exert force on them. Inspect the brake system for hydraulic fluid leaks and also inspect the brake linings for excessive wear.

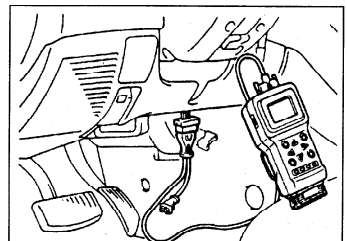


Fig. 116 You can connect a scan tool to the data link connector to retrieve ABS trouble codes

Diagnostic trouble code No.	Inspection item	Diagnostic content	Detection conditions
11	Right front wheel speed sensor	Open circuit	A, B
12	Left front wheel speed sensor		
13	Right rear wheel speed sensor		
14	Left rear wheel speed sensor		
15	Wheel speed sensor system	Abnormal output signal	B
16	Power supply system	Abnormal battery positive voltage	A, B
21	Right front wheel speed sensor	Excessive gap or short circuit	B
22	Left front wheel speed sensor		
23	Right rear wheel speed sensor		
24	Left rear wheel speed sensor		
38	Stop light switch system	Open circuit or ON malfunction	A, B
41	Right front solenoid valve system	No response to solenoid valve drive signal	A, B
42	Left front solenoid valve system		
43	Rear solenoid valve system		
51	Valve relay system	Valve relay OFF failure	A, B
53	Motor relay or motor system	Motor relay OFF failure and motor drive failure	B
63	ABS-ECU	Malfunction in ABS-ECU (program maze, etc.)	A, B

Detection conditions

- A: During system check immediately after starting
- B: When driving

Fig. 117 ABS diagnostic trouble code list—1992–96 Diamante

8957954

Diagnostic trouble code no.	Inspection item	Detection conditions
11	Front right wheel speed sensor	Open circuit
12	Front left wheel speed sensor	
13	Rear right wheel speed sensor	
14	Rear left wheel speed sensor	
15	Wheel speed sensor output signal abnormal	A, B
16	Power supply system	A, B, C
21	Front right wheel speed sensor	Short circuit
22	Front left wheel speed sensor	
23	Rear right wheel speed sensor	
24	Rear left wheel speed sensor	
38	Stop light switch system	B, C
41	Front right solenoid valve (inlet)	B, C
42	Front left solenoid valve (inlet)	
43	Rear right solenoid valve (inlet)	
44	Rear left solenoid valve (inlet)	
45	Front right solenoid valve (outlet)	B, C
46	Front left solenoid valve (outlet)	
47	Rear right solenoid valve (outlet)	
48	Rear left solenoid valve (outlet)	
51	Valve relay	A, B, C
53	Motor relay	R
63	ABS-ECU	A, B, C

Detection conditions

- A: During system check immediately after starting
- B: While ABS control is not operating while driving
- C: While ABS control is operating

Fig. 118 ABS diagnostic trouble code list—1997–00 Diamante

9316504

The ABS control unit performs system tests and self-tests during startup and normal operation. The valves, wheel sensors and fluid level circuits are monitored for proper operation. If a fault is found, the

ABS will be deactivated and the amber ANTI LOCK light will be lit until the ignition is turned OFF. When the light is lit, the Diagnostic Trouble Code (DTC) may be obtained. Under normal operation, the ANTI-

Diagnostic trouble code		Diagnostic trouble code	
No.	Scan tool (DRB-II) display letters	No.	Scan tool (DRB-II) display letters
11	FL SPD SENSOR	41	SOL V FRONT L
12	FR SPD SENSOR	42	SOL V FRONT R
13	RL SPD SENSOR	43	SOL V REAR
14	RFR SPD SENSOR	51	VALVE RLY
15	SENSOR FAULT	52	MOTOR RLY
22	STOP SW	55	ECU

8957953

Fig. 119 ABS diagnostic trouble code list—1990–93 Galant

LOCK warning lamp will flash either twice (FWD) or 4 times (AWD) vehicles, in about 1 second with the ignition switch ON, then the lamp will turn OFF.

The Diagnostic Trouble Codes (DTC) are an alphanumeric code and a scan tool, such as DRB-III, MUT-II or equivalent diagnostic scan tool, is required to retrieve the codes. Refer to the scan tool manufacturer's instructions for operating the tool and retrieving the codes.

The Data Link Connector (DLC) for the ABS is located under the dash on the driver's side. It is the same connector used for the electronic engine control system.

Hydraulic Control Unit

REMOVAL AND INSTALLATION

The Hydraulic Control Unit (HCU) is located in the engine compartment. It contains the solenoid valves and the pump/motor assembly which provides pressurized fluid for the anti-lock system when necessary. Hydraulic units are not interchangeable on any vehicles. Neither unit is serviceable; if any fault occurs within the hydraulic unit, the entire unit must be replaced.

Diamante

♦ See Figure 124

1. Disconnect the negative battery cable.
2. Remove the splash shield from beneath the vehicle.
3. Use a syringe or similar device to remove as much fluid as possible from the reservoir. Some fluid will be spilled from lines during removal of the hydraulic unit; protect adjacent painted surfaces.

** CAUTION

Brake fluid contains polyglycol ethers and polyglycols. Avoid contact with the eyes and wash your hands thoroughly after handling brake fluid. If you do get brake fluid in your eyes, flush your eyes with clean, running water for 15 minutes. If eye irritation persists, or if you have taken brake fluid internally, IMMEDIATELY seek medical assistance.

4. Lift the relay box with the harness attached and position it aside.
5. Remove the air intake duct.
6. Disconnect the brake lines from the hydraulic unit. Correct reassembly is critical. Label or identify the lines before removal. Plug each line immediately

Diagnostic trouble code no.	Inspection item	Detection conditions	
11	Front right wheel speed sensor	Open circuit	
12	Front left wheel speed sensor		
13	Rear right wheel speed sensor		
14	Rear left wheel speed sensor		
16	Power supply system	Short circuit	
21	Front right wheel speed sensor		
22	Front left wheel speed sensor		
23	Rear right wheel speed sensor		
24	Rear left wheel speed sensor	Excessive gap	
25	Front right wheel speed sensor		
26	Front left wheel speed sensor		
27	Rear right wheel speed sensor		
28	Rear left wheel speed sensor	Pulse processing (wheel speed input corresponding to a vehicle speed of 300 km/h (186 mph) or more)	
33	Stop light switch system		
35	Front right wheel speed sensor		
36	Front left wheel speed sensor		
37	Rear right wheel speed sensor	B, C	
38	Rear left wheel speed sensor		
41	Front right solenoid valve (inside)		
42	Front left solenoid valve (inside)		
43	Rear right solenoid valve (inside)	A, B, C	
44	Rear left solenoid valve (inside)		
45	Front right solenoid valve (outside)		
46	Front left solenoid valve (outside)		
47	Rear right solenoid valve (outside)	A	
48	Rear left solenoid valve (outside)		
51	Valve relay		ON impossible
52	Valve relay		OFF impossible
53	Motor relay	ON impossible	B
54	Motor relay	OFF impossible	B, C

Detection conditions

- A. During system check immediately after starting
- B. While ABS control is not operating while driving
- C. While ABS control is operating

93159j05

Fig. 120 ABS diagnostic trouble code list—1994-98 Galant

DIAGNOSTIC TROUBLE CODE NO.	INSPECTION ITEM	DIAGNOSTIC CONTENT
11	Front right wheel speed sensor	Open circuit or short circuit
12	Front left wheel speed sensor	
13	Rear right wheel speed sensor	
14	Rear left wheel speed sensor	
16	Power supply system	ABS-ECU power supply voltage below or above the standard value. Not displayed if the voltage recovers.
21	Front right wheel speed sensor	
22	Front left wheel speed sensor	
23	Rear right wheel speed sensor	
24	Rear left wheel speed sensor	
38	Stoplight switch system	Open circuit or short circuit
41	Solenoid valve inside hydraulic unit	
42	ABS-ECU	
51	Hydraulic unit solenoid valve relay open or short circuit	
53	Malfunction of hydraulic unit	ABNORMAL OUTPUT SIGNAL
63	ABS-ECU	

93159j06

Fig. 121 ABS diagnostic trouble code list—1999-00 Galant

Diagnostic trouble code No.	Inspection item	Diagnosis content
11	Front right wheel speed sensor	Open circuit
12	Front left wheel speed sensor	
13	Rear right wheel speed sensor	
14	Rear left wheel speed sensor	
15	Open circuit in sensor	Open circuit in sensor
18	Drop of battery voltage	Drop of ABS operation voltage
21	Front right wheel speed sensor	Short circuit
22	Front left wheel speed sensor	
23	Rear right wheel speed sensor	
24	Rear left wheel speed sensor	
25	Both rear wheel speed sensors	Open circuit in both rear wheel speed sensors, short circuit
31	Rotor of front right wheel speed sensor	Chipped tooth of rotor
32	Rotor of front left wheel speed sensor	
33	Rotor of rear right wheel speed sensor	
34	Rotor of rear left wheel speed sensor	
35	Generator	
41	Front right solenoid valve	No response to solenoid valve drive signal
42	Front left solenoid valve	
43	Rear right solenoid valve	
44	Rear left solenoid valve	
51	Valve relay 1	Detection impossible in OFF condition
52	Valve relay 2	Detection impossible in ON condition
53	Motor relay, motor 1	ON impossible
54	Motor relay, motor 2	OFF impossible
55	Sticking of motor	Motor operation impossible
62	Malfunction inside hydraulic unit	Hydraulic pressure reduction impossible
63	Malfunction inside ABS-ECU	Irregular program, etc.

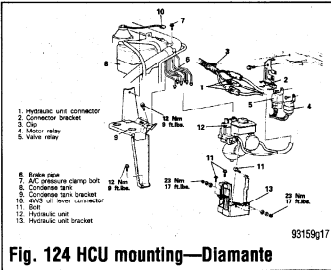
93159j07

Fig. 122 ABS diagnostic trouble code list—1993-96 Mirage

Diagnostic trouble code no.	Inspection item	Diagnostic content
11	Front right wheel speed sensor	Open circuit or short circuit
12	Front left wheel speed sensor	
13	Rear right wheel speed sensor	
14	Rear left wheel speed sensor	
15	Wheel speed sensor	Abnormal output signal
16	Power supply system	
21	Front right wheel speed sensor	
22	Front left wheel speed sensor	
23	Rear right wheel speed sensor	
24	Rear left wheel speed sensor	
33	Stop light switch system	
41	Front right solenoid valve (inside)	
42	Front left solenoid valve (inside)	
43	Rear right solenoid valve (inside)	
44	Rear left solenoid valve (inside)	
51	Valve relay	
53	Motor relay, motor	
63	ABS-ECU	

93159j08

Fig. 123 ABS diagnostic trouble code list—1997-00 Mirage



after removal. It will be necessary to hold the relay box aside to allow wrench access.

7. Detach the wiring harness connections at the hydraulic unit.

8. Disconnect the hydraulic unit ground strap from the chassis.

9. Remove the 3 bolts holding the hydraulic unit bracket. Remove the unit and the bracket.

➔ **The hydraulic unit is heavy; use care when removing it. The unit must remain in the upright position at all times and be protected from impact and shock.**

10. Set the unit upright, supported by blocks on the workbench. The hydraulic unit must not be tilted or turned upside down. No component of the hydraulic unit should be loosened or disassembled.

11. Loosen the nut holding the bracket to the hydraulic unit and remove the bracket.

12. Disconnect the external ground wire from the bracket.

To install:

- 13. Install the bracket if removed.
- 14. Connect the ground wire to the bracket.
- 15. Install the hydraulic unit into the vehicle, keeping it upright at all times.
- 16. Install the retaining nuts and tighten.
- 17. Connect the hydraulic unit wiring harness.
- 18. Connect each brake line loosely to the correct port and double check the placement. Tighten each line to 11 ft. lbs. (15 Nm).

19. Fill the reservoir to the MAX line with brake fluid.

20. Bleed the master cylinder, then bleed the brake lines.

21. Secure the relay box in position and install the air duct.

22. Install the splash shield.

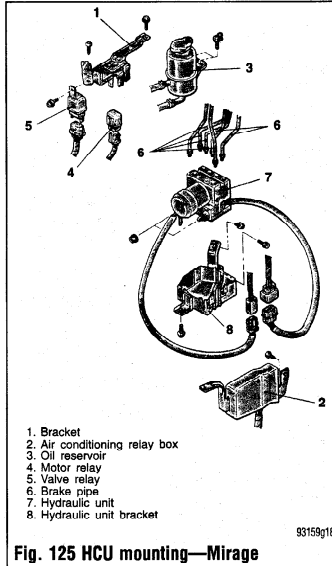
Galant and Mirage

➔ **See Figures 125 and 126**

1. Use a syringe or similar device to remove as much fluid as possible from the reservoir. Some fluid will be spilled from lines during removal of the hydraulic unit; protect adjacent painted surfaces.

CAUTION

Brake fluid contains polyglycol ethers and polyglycols. Avoid contact with the eyes and wash your hands thoroughly after handling brake fluid. If you do get brake fluid in your eyes, flush your eyes with clean, running water for 15 minutes. If eye irritation persists,



or if you have taken brake fluid internally, IMMEDIATELY seek medical assistance.

2. Remove the splash shield from the left front wheel house or fender area.

3. Remove the coolant reserve tank.

4. Remove the coolant reservoir bracket.

5. Remove the dust shield from below the hydraulic unit.

6. Disconnect the brake hoses and lines from the hydraulic unit. Correct reassembly is critical. Label or identify the lines before removal. Plug each line and each port immediately after removal.

7. Remove the cover from the relay box. Disconnect the electrical harness to the hydraulic unit.

8. Remove the bolts holding the 3 mounting brackets to the vehicle; remove the unit downward and out of the vehicle.

➔ **The hydraulic unit is heavy; use care when removing it. The unit must remain in the upright position at all times and be protected from impact and shock.**

9. Set the unit upright, supported by blocks on the workbench. The hydraulic unit must not be tilted or turned upside down. No component of the hydraulic unit should be loosened or disassembled.

10. The brackets and relays may be removed if desired.

To install:

11. Install the brackets and relays if they were removed. Tighten the bracket bolts to 16 ft. lbs. (22 Nm).

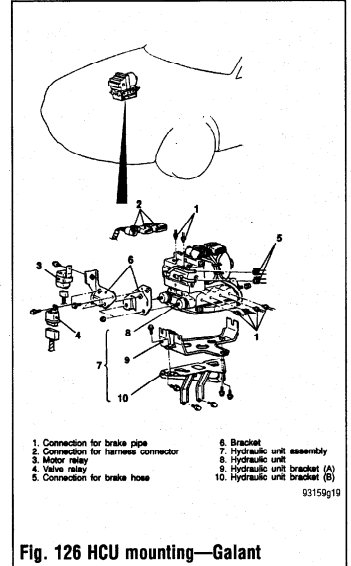
12. Install the hydraulic unit into the vehicle, keeping it upright at all times.

13. Install the retaining bolts holding the brackets to the vehicle. Tighten the bolts to 16 ft. lbs. (22 Nm).

14. Connect the hydraulic unit wiring harness.

15. Install the cover on the relay box.

16. Connect each brake line loosely to the correct port and double check the placement. Tighten each line to 10 ft. lbs. (13 Nm).



17. Fill the reservoir to the MAX line with brake fluid.

18. Bleed the brake system.

19. Install the dust shield and the coolant reserve tank with its bracket.

20. Install the fender splash shield.

21. Check ABS system function by turning the ignition ON and observing the dashboard warning lamp. Test drive the vehicle and confirm system operation.

Anti-Lock Control Unit

REMOVAL AND INSTALLATION

➔ **See Figures 127 and 128**

1. Ensure that the ignition switch is OFF throughout the procedure.

2. For Galant and Diamante models, remove the left side luggage compartment trim panel.

3. For Mirage models, remove the floor console assembly.

4. Release the lock on the bottom of the connector. Detach the multi-pin connector from the control unit.

5. Remove the retaining nuts and remove the control unit from its bracket. The bracket may be removed if desired.

To install:

6. Place the bracket in position if it was removed. Install the controller and tighten the retaining nuts.

7. Connect the ground wire to the bracket, if removed. Insure a proper, tight connection. The ground must be connected before the multi-pin harness is connected.

8. Attach the multi-pin connector and secure the lock.

9. Install the luggage compartment trim or the floor console.

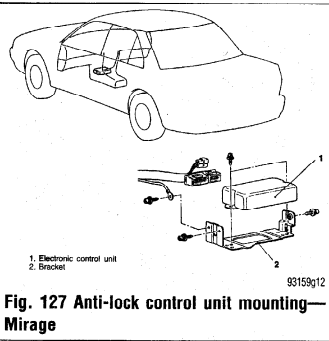


Fig. 127 Anti-lock control unit mounting—Mirage

Speed Sensors

REMOVAL & INSTALLATION

FRONT

FRONT

▶ See Figure 129

1. Disconnect the negative battery cable.

CAUTION

Wait at least 90 seconds after the negative battery cable is disconnected to prevent possible deployment of the air bag.

2. Raise and safely support the vehicle.
3. Remove the splash shield.
4. Detach the speed sensor connector.
5. Remove the clips holding the sensor harness.
6. Remove the speed sensor from the bracket.

To install:

7. Install the speed sensor to the bracket and secure with mounting bolt.
8. Install the clips holding the sensor harness.
9. Attach the speed sensor connector.
10. Connect the negative battery cable.

REAR

▶ See Figure 129 and 130

1. Disconnect the negative battery cable.

CAUTION

Wait at least 90 seconds after the negative battery cable is disconnected to prevent possible deployment of the air bag.

2. Raise and safely support the vehicle.
3. Detach the speed sensor connector.
4. Remove the clips holding the sensor harness.
5. Remove the mounting bolt and the speed sensor.

To install:

6. Install the speed sensor and loosely tighten the mounting bolt.
7. Install the clips holding the sensor harness.

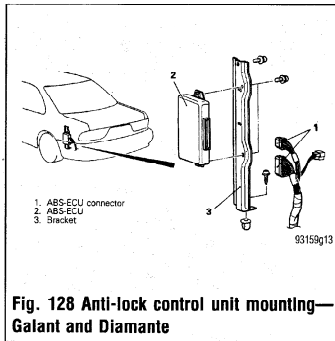


Fig. 128 Anti-lock control unit mounting—Galant and Diamante

8. Install the sensor wire harness and attach the connector.

9. Using a non-magnetic feeler gauge, adjust the sensor air gap so the clearance between the rotor and the sensor is 0.012–0.035 inches (0.3–0.9mm).

10. Tighten the sensor bracket and recheck the clearance.

11. Connect the negative battery cable.

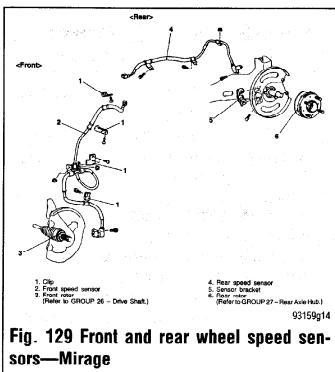


Fig. 129 Front and rear wheel speed sensors—Mirage

Galant

FRONT

▶ See Figures 131 and 132

1. Disconnect the negative battery cable. Wait at least 90 seconds before performing any work.
2. Raise and safely support the vehicle. Remove the necessary tire and wheel assembly.
3. Remove the fender splash shield.
4. Detach the ABS speed sensor connector.
5. Remove the sensor harness clamp bolts and clamps.
6. Remove the ABS speed sensor mounting bolt and the sensor.

To install:

7. Install the ABS speed sensor with its mounting bolt.

▶ The clearance between the wheel speed sensor and the rotor's toothed surface is not adjustable, but measure the distance between the sensor installation surface and the rotor's toothed surface. Standard value is: 1.11–1.12 in. (28.2–28.4mm). If not within specifications, replace the speed sensor or the toothed rotor.

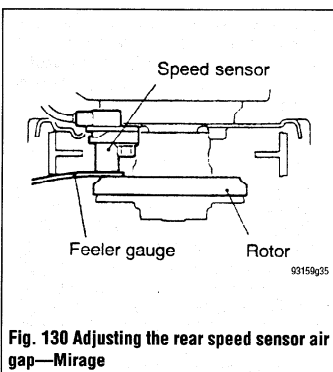


Fig. 130 Adjusting the rear speed sensor air gap—Mirage

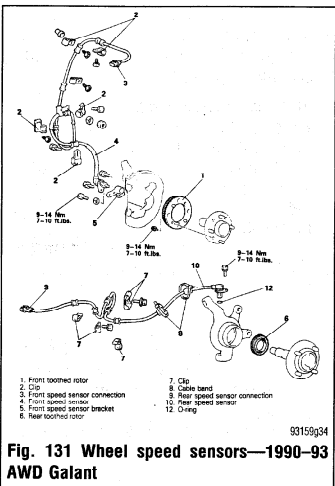


Fig. 131 Wheel speed sensors—1990–93 AWD Galant

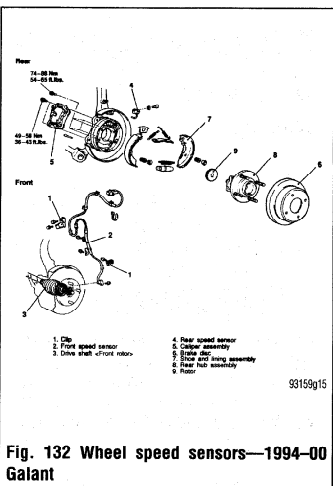


Fig. 132 Wheel speed sensors—1994–00 Galant

8. Reinstall the sensor harness with its clamps and bolts.
9. Reconnect the speed sensor connector.
10. Install the fender splash shield.
11. Reinstall the tire and wheel, safely lower the vehicle, and reconnect the negative battery cable.

REAR

♦ See Figure 131 and 132

1. Disconnect the negative battery cable. Wait at least 90 seconds before performing any work.
2. Raise and safely support the vehicle. Remove the necessary tire and wheel assembly.
3. Detach the ABS speed sensor connector.
4. Remove the sensor harness clamp bolts and clamps.
5. Remove the ABS speed sensor mounting bolt and the sensor.

To install:

6. Install the ABS speed sensor with its mounting bolt.

➤ **The clearance between the wheel speed sensor and the rotor's toothed surface is not adjustable, but measure the distance between the sensor installation surface and the rotor's toothed surface. Standard value is: 1.11–1.12 in. (28.2–28.4mm). If not within specifications, replace the speed sensor or the toothed rotor.**

7. Reinstall the sensor harness with its clamps and bolts.
8. Reconnect the speed sensor connector.
9. Reinstall the tire and wheel, safely lower the vehicle, and reconnect the negative battery cable.

Diamante

FRONT

♦ See Figure 133

1. Disconnect the negative battery cable.

CAUTION

Work must be started after 90 seconds from the time the ignition switch is turned to the LOCK position and the negative battery cable is disconnected.

2. Raise and safely support the vehicle.
3. Remove the splash shield.
4. Detach the speed sensor connector.
5. Remove the clips holding the sensor harness.
6. Remove the speed sensor.

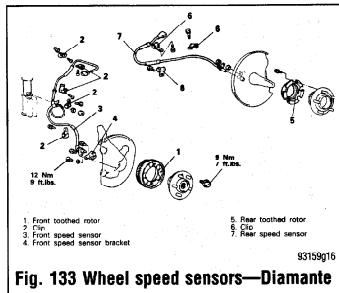


Fig. 133 Wheel speed sensors—Diamante

To install:

7. Install the speed sensor and torque to 9 ft. lbs. (12 Nm).
8. Install the clips holding the sensor harness.
9. Reconnect the speed sensor connector.
10. Connect the negative battery cable.

REAR

♦ See Figure 133

1. Disconnect the negative battery cable.

CAUTION

Work must be started after 90 seconds from the time the Ignition switch is turned to the LOCK position and the negative battery cable is disconnected.

2. Raise and safely support the vehicle.
3. Detach the speed sensor connector.
4. Remove the clips holding the sensor harness.
5. On AWD models, remove the cable band.
6. Remove the mounting bolt and the speed sensor with the O-ring.

To install:

7. Install the speed sensor with the O-ring and torque to 9 ft. lbs. (12 Nm).
8. Install the clips holding the sensor harness.
9. Install the cable band.
10. Install the sensor wire harness and connect the connector.
11. Connect the negative battery cable.

G-Sensor

The G-sensors are used only on the AWD vehicles. The rear is mounted in the trunk under the floor mat while the front sensor is under the console assembly. The sensor transmits acceleration and deceleration information to the anti-lock control unit. This data is used in conjunction with individual wheel speed and engine data, allowing the controller to determine the approximate road friction. This friction factor is then used to compute the proper control of the solenoid valves.

REMOVAL & INSTALLATION

♦ See Figure 134

1. For the front sensor, remove the console assembly.

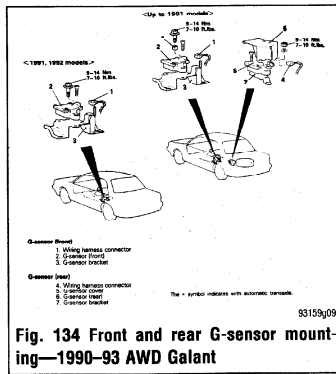


Fig. 134 Front and rear G-sensor mounting—1990–93 AWD Galant

2. For the rear sensor, remove the trunk floor mat.
3. Disconnect the G-sensor wiring harness.
4. Remove the cover from the rear sensor. Remove the sensor from the bracket. Remove the bracket if desired.

To install:

5. Reinstall the bracket if it was removed.
6. Install the G-sensor and connect the wiring harness. Tighten the retaining bolts to 8 ft. lbs. (11 Nm).
7. Install the cover on the rear G-sensor.
8. Install the console and/or the trunk floor mat or carpet.

Tone (Exciter) Ring

REMOVAL & INSTALLATION

Front

1. Raise and safely support the vehicle.
2. Remove the wheel and tire.
3. Remove the wheel speed sensor and disconnect sufficient harness clips to allow the sensor and wiring to be moved out of the work area.

➤ **The speed sensor has a pole piece projecting from it. This exposed tip must be protected from impact or scratches. Do not allow the pole piece to contact the toothed wheel during removal or installation.**

4. Remove the front hub and knuckle assembly.
5. Remove the hub from the knuckle.
6. Support the hub in a vise with protected jaws.
7. Remove the retaining bolts from the toothed wheel and remove the toothed wheel.

To install:

8. Fit the new toothed wheel onto the hub and tighten the retaining bolts to 7 ft. lbs. (10 Nm).
9. Assemble the hub to the knuckle
10. Install the hub and knuckle assembly to the vehicle.
11. Install the wheel speed sensor.
12. Install the wheel and tire.
13. Lower the vehicle to the ground.

Rear

EXCEPT AWD GALANT

1. Raise and safely support the vehicle.
2. Remove the wheel and tire.
3. Remove the wheel speed sensor and disconnect sufficient harness clips to allow the sensor and wiring to be moved out of the work area.

➤ **The speed sensor has a pole piece projecting from it. This exposed tip must be protected from impact or scratches. Do not allow the pole piece to contact the toothed wheel during removal or installation.**

4. Remove the hub assembly.
5. Support the hub in a vise with protected jaws.
6. Remove the retaining bolts from the toothed wheel and remove the toothed wheel.

To install:

7. Fit the new toothed wheel onto the hub and tighten the retaining bolts to 7 ft. lbs. (10 Nm).
8. Install the hub assembly to the vehicle. The center hub nut is not reusable. The new nut must be

tightened to 144–188 ft. lbs. (200–260 Nm). After the nut is tightened, align the nut with the spindle indentation and crimp the nut in place.

9. Install the wheel speed sensor.
10. Install the wheel and tire.
11. Lower the vehicle to the ground.

AWD GALANT

1. Raise and safely support the vehicle.
2. Remove the wheel and tire.
3. Disconnect the parking brake cable from the caliper.
4. Remove the speed sensor and its O-ring. Disconnect sufficient clamps and wire ties to allow the sensor to be moved well out of the work area.

➔ **The speed sensor has a pole piece projecting from it. This exposed tip must be protected from impact or scratches. Do not allow the pole piece to contact the toothed wheel during removal or installation.**

5. Remove the brake caliper and brake disc.
6. Remove the 3 retaining nuts and bolts holding the outer end of the driveshaft to the companion flange.
7. Swing the axle shaft away and support it with stiff wire. Do not overextend the joint in the axle; do not allow it to hang unsupported.
8. Remove the retaining nut and washer on the back of the driveshaft. Use special tool MB 9g67 or equivalent to counterhold the hub.
9. Remove the companion flange from the knuckle.
10. Using an axle puller which bolts to the wheel lugs, remove the axle shaft assembly.
11. Fit the shaft assembly in a press with the toothed wheel completely supported by a bearing plate such as special tool MB 9e60 or its equivalent.
12. Press the toothed wheel off the axle shaft.

To install:

13. Press the new toothed wheel onto the shaft with the groove facing the axle shaft flange.

14. Install the axle shaft to the knuckle and fit the companion flange in place.

15. Install the lock washer and a new self-locking nut on the axle shaft. Tighten the nut to 116–159 ft. lbs. (160–220 Nm).

16. Swing the axle assembly into place and install the 3 nuts and bolts. Tighten each to 45 ft. lbs. (61 Nm).

17. Install the brake disc and caliper.
18. Install the wheel speed sensor. Always use a new O-ring.
19. Connect the parking brake cable to the caliper.
20. Install the wheel and tire; lower the vehicle to the ground.

Bleeding the ABS System

There is no special procedure to bleed the ABS system. Proceed with the normal brake bleeding procedure located earlier in this section.

BRAKE SPECIFICATIONS

All measurements in inches unless noted

Year	Model		Brake Disc			Brake Drum Diameter			Minimum Lining Thickness		Brake Caliper	
			Original Thickness	Minimum Thickness	Maximum Runout	Original Inside Diameter	Max. Wear Limit	Maximum Machine Diameter	Front	Rear	Bracket Bolts (ft. lbs.)	Mounting Bolts (ft. lbs.)
1990	Galant	F	0.940	0.882	0.003	—	—	—	0.080	—	58-72	16-23
		R	—	—	—	8.000	—	8.100	—	0.080	—	—
	Galant w/rear disc	F	0.940	0.882	0.003	—	—	—	0.080	—	58-72	16-23
		R	0.390	0.331	0.003	—	—	—	—	0.080	36-43	16-23
	Mirage	F	0.510	0.449	0.006	—	—	—	0.080	—	58-72	16-23
		R	—	—	—	7.100	—	7.200	—	0.040	—	—
	Mirage w/rear disc	F	0.940	0.882	0.003	—	—	—	0.080	—	58-72	46-62
		R	0.390	0.331	0.003	—	—	—	—	0.080	58-72	16-23
1991	Galant	F	0.940	0.882	0.003	—	—	—	0.080	—	58-72	46-62
		R	—	—	—	8.000	—	8.100	—	0.080	—	—
	Galant w/rear disc	F	0.940	0.882	0.003	—	—	—	0.080	—	58-72	46-62
		R	0.390	0.331	0.003	—	—	—	—	0.080	36-43	16-23
	Mirage	F	0.510	0.449	0.006	—	—	—	0.080	—	58-72	①
		R	—	—	—	7.100	—	7.200	—	0.040	—	—
	Mirage w/vented rotor	F	0.710	0.646	0.006	—	—	—	0.080	—	58-72	27-36
		R	—	—	—	7.100	—	7.200	—	0.040	—	—
	Mirage w/rear disc	F	0.940	0.882	0.006	—	—	—	0.080	—	58-72	46-62
		R	0.390	0.331	0.006	—	—	—	—	0.080	36-43	16-23
1992	Diamante	F	0.940	0.882	0.003	—	—	—	0.080	—	65	54
		R	0.710	0.646	0.003	—	—	—	—	0.080	36-43	20
	Diamante Wagon	F	0.940	0.882	0.003	—	—	—	0.080	—	65	54
		R	NA	0.720	0.003	—	—	—	—	0.080	36-43	20
	Galant	F	0.940	0.882	0.003	—	—	—	0.080	—	58-72	46-62
		R	—	—	—	8.000	—	8.100	—	0.040	—	—
	Galant w/rear disc	F	0.940	0.882	0.003	—	—	—	0.080	—	58-72	46-62
		R	0.390	0.331	0.003	—	—	—	—	0.080	36-43	16-23
	Mirage w/solid rotor	F	0.510	0.449	0.006	—	—	—	0.080	—	58-72	①
		R	—	—	—	7.100	—	7.200	—	0.040	—	—
	Mirage w/vented rotor	F	0.710	0.646	0.006	—	—	—	0.080	—	58-72	27-36
		R	—	—	—	7.100	—	7.200	—	0.040	—	—
	Mirage w/rear disc	F	0.940	0.882	0.006	—	—	—	0.080	—	58-72	46-62
		R	0.390	0.331	0.006	—	—	—	—	0.080	36-43	16-23
1993	Diamante	F	0.940	0.882	0.003	—	—	—	0.080	—	65	54
		R	0.710	0.646	0.003	—	—	—	—	0.080	36-43	20
	Diamante Wagon	F	0.940	0.882	0.003	—	—	—	0.080	—	65	54
		R	NA	0.720	0.003	—	—	—	—	0.080	36-43	20
	Galant	F	0.940	0.882	0.003	—	—	—	0.080	—	58-72	46-62
		R	—	—	—	8.000	—	8.100	—	0.040	—	—
	Galant w/rear disc	F	0.940	0.882	0.003	—	—	—	0.080	—	58-72	46-62
		R	0.390	0.331	0.003	—	—	—	—	0.080	36-43	16-23
	Mirage w/solid rotor	F	0.510	0.449	0.006	—	—	—	0.080	—	58-72	①
		R	—	—	—	7.100	—	7.200	—	0.040	—	—
	Mirage w/vented rotor	F	0.710	0.646	0.006	—	—	—	0.080	—	58-72	①
		R	—	—	—	8.000	—	8.100	—	0.040	—	—
	Mirage w/rear disc	F	0.710	0.646	0.006	—	—	—	0.080	—	58-72	①
		R	0.390	0.331	0.006	—	—	—	—	0.080	36-43	16-23
1994	Diamante	F	0.940	0.882	0.003	—	—	—	0.080	—	65	54
		R	0.710	0.646	0.003	—	—	—	—	0.080	36-43	20
	Diamante Wagon	F	0.940	0.882	0.003	—	—	—	0.080	—	65	54
		R	NA	0.720	0.003	—	—	—	—	0.080	36-43	20
	Galant	F	0.940	0.882	0.003	—	—	—	0.080	—	65	54
		R	—	—	—	8.976	—	9.078	—	0.040	—	—
	Galant w/rear disc	F	0.940	0.882	0.003	—	—	—	0.080	—	65	54
		R	0.390	0.331	0.003	—	—	—	—	0.080	36-43	54
	Mirage w/solid rotor	F	0.510	0.449	0.006	—	—	—	0.080	—	58-72	①
		R	—	—	—	7.100	—	7.200	—	0.040	—	—
	Mirage w/vented rotor	F	0.710	0.646	0.006	—	—	—	0.080	—	58-72	①
		R	—	—	—	8.000	—	8.100	—	0.040	—	—
Mirage w/rear disc	F	0.710	0.646	0.006	—	—	—	0.080	—	58-72	①	
	R	0.390	0.331	0.006	—	—	—	—	0.080	36-43	16-23	

BRAKE SPECIFICATIONS

All measurements in inches unless noted

Year	Model		Brake Disc			Brake Drum Diameter			Minimum Lining Thickness		Brake Caliper	
			Original Thickness	Minimum Thickness	Maximum Runout	Original Inside Diameter	Max. Wear Limit	Maximum Machine Diameter	Front	Rear	Bracket Bolts (ft. lbs.)	Mounting Bolts (ft. lbs.)
1995	Diamante	F	0.940	0.882	0.003	—	—	—	0.080	—	65	54
		R	0.710	0.646	0.003	—	—	—	—	0.080	36-43	20
	Diamante Wagon	F	0.940	0.882	0.003	—	—	—	0.080	—	65	54
		R	NA	0.720	0.003	—	—	—	—	0.080	36-43	20
	Galant	F	0.940	0.882	0.003	—	—	—	0.080	—	65	54
		R	—	—	—	8.976	—	9.078	—	0.040	—	—
	Galant w/rear disc	F	0.940	0.882	0.003	—	—	—	0.080	—	65	54
		R	0.390	0.331	0.003	—	—	—	—	0.080	36-43	54
	Mirage w/solid rotor	F	0.510	0.449	0.006	—	—	—	0.080	—	58-72	①
		R	—	—	—	7.100	—	7.200	—	0.040	—	—
	Mirage w/vented rotor	F	0.710	0.646	0.006	—	—	—	0.080	—	58-72	①
		R	—	—	—	8.000	—	8.100	—	0.040	—	—
Mirage w/rear disc	F	0.710	0.646	0.006	—	—	—	0.080	—	58-72	①	
	R	0.390	0.331	0.006	—	—	—	—	0.080	36-43	16-23	
1996	Diamante	F	0.940	0.882	0.003	—	—	—	0.080	—	65	54
		R	0.710	0.646	0.003	—	—	—	—	0.080	36-43	20
	Galant	F	0.940	0.882	0.003	—	—	—	0.080	—	65	54
		R	—	—	—	8.976	—	9.078	—	0.040	—	—
	Galant w/rear disc	F	0.940	0.882	0.003	—	—	—	0.080	—	65	54
		R	0.390	0.331	0.003	—	—	—	—	0.080	36-43	54
	Mirage w/solid rotor	F	0.510	0.449	0.006	—	—	—	0.080	—	58-72	①
		R	—	—	—	7.100	—	7.200	—	0.040	—	—
	Mirage w/vented rotor	F	0.710	0.646	0.006	—	—	—	0.080	—	58-72	①
		R	—	—	—	8.000	—	8.100	—	0.040	—	—
	Mirage w/rear disc	F	0.710	0.646	0.006	—	—	—	0.080	—	58-72	①
		R	0.390	0.331	0.006	—	—	—	—	0.080	36-43	16-23
1997	Diamante	F	0.940	0.882	0.003	—	—	—	0.080	—	65	54
		R	0.390	0.331	0.003	—	—	—	—	0.080	36-43	20
	Galant	F	0.940	0.882	0.003	—	—	—	0.080	—	65	54
		R	—	—	—	8.976	—	9.078	—	0.040	—	—
	Mirage	F	0.710	0.646	0.006	—	—	—	0.080	—	67-81	①
		R	—	—	—	8.000	—	8.100	—	0.040	—	—
1998	Diamante	F	0.940	0.880	0.002	—	—	—	0.080	—	54	65
		R	0.410	0.330	0.0023	—	—	—	—	0.039	24	36-43
	Galant	F	0.940	0.880	0.0031	—	—	—	0.080	—	54	65
		R	—	—	—	8.976	9.078	9.078	—	0.040	—	—
	Mirage	F	0.710	0.650	0.0024	—	—	—	0.080	—	36	67-81
		R	—	—	—	8.00	8.10	8.10	—	0.039	—	—
1999	Diamante	F	0.940	0.880	0.002	—	—	—	0.080	—	54	65
		R	0.410	0.330	0.0023	—	—	—	—	0.039	24	36-43
	Galant	F	0.940	0.880	0.0031	—	—	—	0.080	—	54	65
		R	—	—	—	8.976	9.078	9.078	—	0.040	—	—
	Mirage	F	0.710	0.650	0.0024	—	—	—	0.080	—	36	67-81
		R	—	—	—	8.00	8.10	8.10	—	0.039	—	—
2000	Diamante	F	0.940	0.880	0.002	—	—	—	0.080	—	54	65
		R	0.410	0.330	0.0023	—	—	—	—	0.039	24	36-43
	Galant	F	0.940	0.880	0.0031	—	—	—	0.080	—	54	65
		R	—	—	—	8.976	9.078	9.078	—	0.040	—	—
	Mirage	F	0.710	0.650	0.0024	—	—	—	0.080	—	36	67-81
		R	—	—	—	8.00	8.10	8.10	—	0.039	—	—

NA - Not Available

F - Front

R - Rear

① Upper: 39 ft. lbs.

Lower: 65 ft. lbs.