

Hit the brakes!

HERE'S WHAT TO LOOK FOR IN BRAKE PADS—AND HOW TO TELL WHEN YOU NEED A BRAKE JOB.

Sooner or later, the brake pads or brake shoes in your car will wear and need replacing. When that happens, you can ask the mechanic to install either the automaker's OEM (original-equipment-manufacturer) brake pads or a specific aftermarket brand.

Then again, like most people, you can leave that decision to the mechanic. According to a recent survey of 130,000 households conducted for the auto industry by Industrial Marketing Research of Clarendon Hills, Ill., only 5 percent could name the brand of replacement brake pads or shoes in their car.

Should you specify the brand you want?

Do some brake pads stop better than others? To see whether we could find significant differences in braking performance among models, we bought samples of OEM brake pads for a 1993 Ford Taurus and a 1993 Honda Accord. We also bought seven aftermarket brands for the Taurus and seven for the Accord. We tested only the front brake pads, since they work much harder than the rear ones and wear out more quickly.

Picking the pads

A small survey of major brake-repair chain shops in our area indicated that most don't have their own branded brake

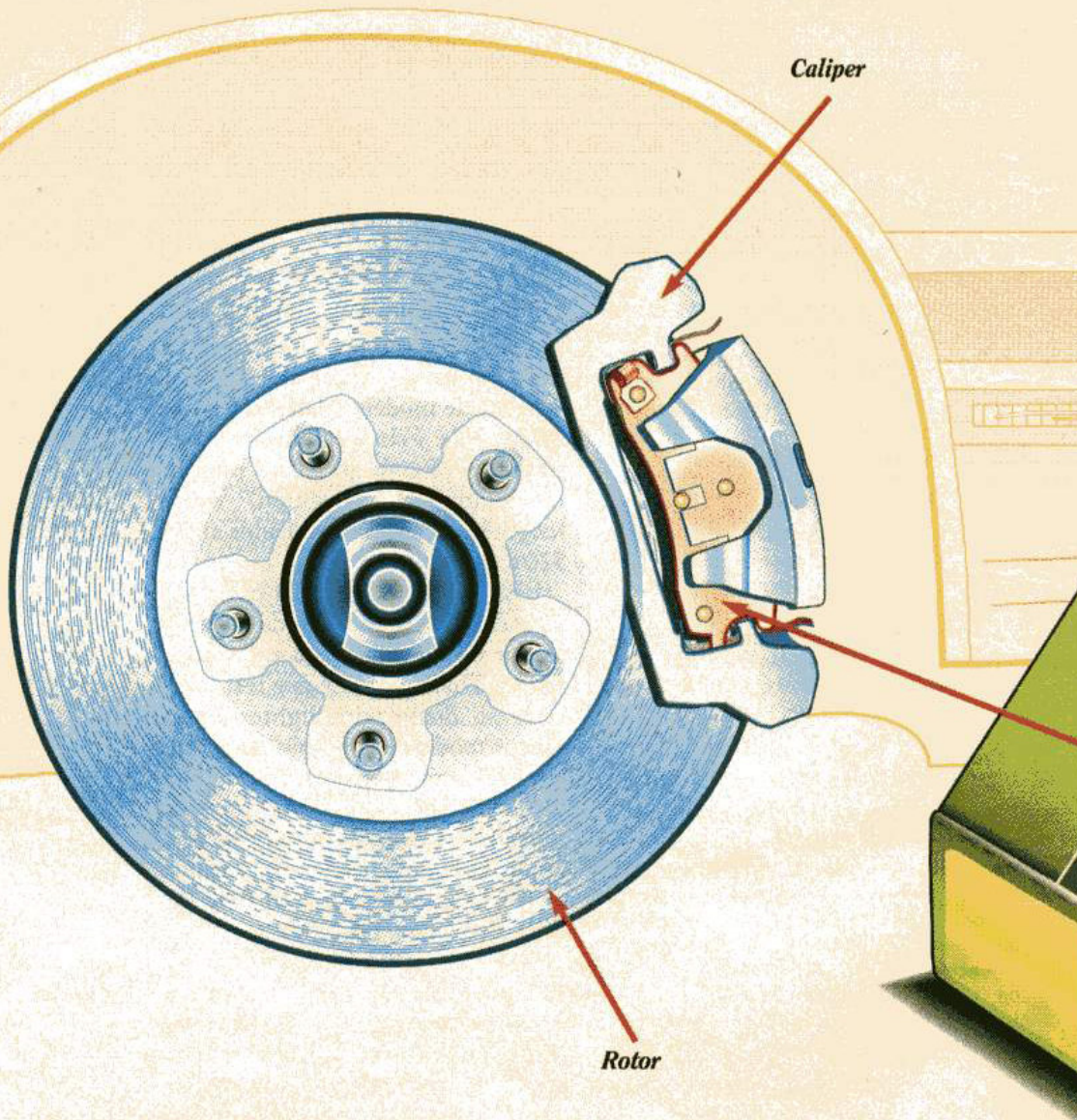
How brakes work

Cars and trucks come with two types of brakes: disc and drum. Disc brakes are more effective, and all modern cars and light trucks use them on the front wheels. Some vehicles still use drum brakes on the rear wheels because they're cheaper to manufacture, but more and more have disc brakes front and rear.

Disc brakes (shown at right) use a pair of "pads"—flat pieces of brake-lining material bonded or riveted to a metal backing. A piston in the caliper squeezes the pads against each side of a metal disc, or rotor, whose hub attaches to the car's wheel. The pads slow the car by pinching the rotor, much as a bicycle's caliper and pads pinch the bike's wheel.

Drum brakes have "shoes"—a pair of curved pieces of metal covered with brake-lining material—inside a round metal drum, which also attaches to the wheel. The shoes expand outward against the inside of the drum to slow the vehicle.

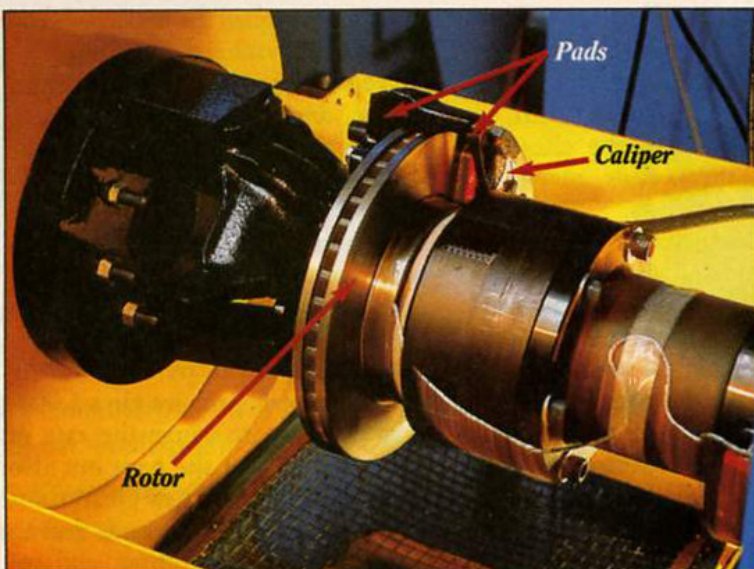
The hydraulic brake system consists of a network of tubing with brake fluid inside. The fluid transmits the force from your foot on the brake pedal to the pads or shoes, pressing them against the rotors or drums.



pads. They buy from local suppliers. The pads we tested carry store brand names such as *AutoZone*, *Car Quest*, *NAPA*, and *Pep Boys*, but they're made by other companies. The *AutoZone* pads for the Taurus, for example, were made by Performance Friction Corp.; those for the Accord, by Albany Brake Shoe Corp. The *NAPA* pads were made by United Brake Parts. And the *Pep Boys* pads were made by Raybestos. We also tested pads carrying the *Bendix* and *Raybestos* brand names.

We weren't able to determine the maker of the *Car Quest* pads. Midas uses its own branded brake parts; the local Midas shops we visited wouldn't sell us any brake pads unless they were installed by Midas, so we didn't include them in our tests.

OEM pads usually come in just one quality level, but aftermarket pads



Measuring "whoa"
The dynamometer's electric motor spins a shaft on which the brake rotor is mounted, and weights on the shaft simulate a fully loaded car in motion. Sensors monitor deceleration rate, temperature, and brake-line pressure; the lower the pressure, for a given rate of deceleration, the greater the pads' gripping ability.

Give your brakes a break

How long your brake pads last depends on what you drive and how you drive. Some vehicles wear out their brakes faster than others. Stop-and-go driving is tougher on brakes than highway driving at steady speeds. Hard stops wear the pads quickly. Towing a trailer or driving on mountain roads means more-frequent brake jobs.

The front pads generally last anywhere from 15,000 miles on up, while the rears often last twice as long. That's because the front brakes are designed to do about 80 percent or more of the braking to compensate for the car's weight being transferred toward the front wheels when you brake.

Watch for danger signs

Most states don't have a periodic safety-inspection program that covers all cars and that includes the brakes, so it's up to you to make sure your brakes are safe. For most drivers, a yearly brake inspection may be sufficient. But if you pile up lots of miles each year or if your last inspection revealed that the brake pads didn't have far to go, then more-frequent inspections are in order.

Strange noises during braking may be a telltale sign of a problem. For example:

- High-pitched metallic screeching when the brakes aren't being applied. In some vehicles, a wear indicator—a small piece of metal alongside the pad—can make that kind of noise. As the pad wears out, the wear indicator touches the spinning rotor and vibrates, warning that the end of the brake pad's life is near.

- Persistent grinding. Probably the pad's lining is worn down to the metal surface, which is gouging the metal rotor. At this point, you may have to replace not only the pads but the rotors as well, an expensive proposition. (Grinding that disappears after the first few stops may simply be the result

of brakes that haven't warmed up yet.)

- High-pitched squealing or squeaking, usually at the end of a stop. This may not be cause for alarm, though it's annoying. Metallic particles in so-called semimetallic brake pads may be the culprit. Pads made of asbestos or of nonasbestos organic material tend to stop more quietly. But the use of asbestos in brake pads has decreased in recent years (asbestos dust can be hazardous to mechanics and to factory workers who manufacture the parts). Using antiseize compound and, where applicable, the correct shims on the back of the pads can usually reduce brake noise.

Other symptoms that call for immediate attention include:

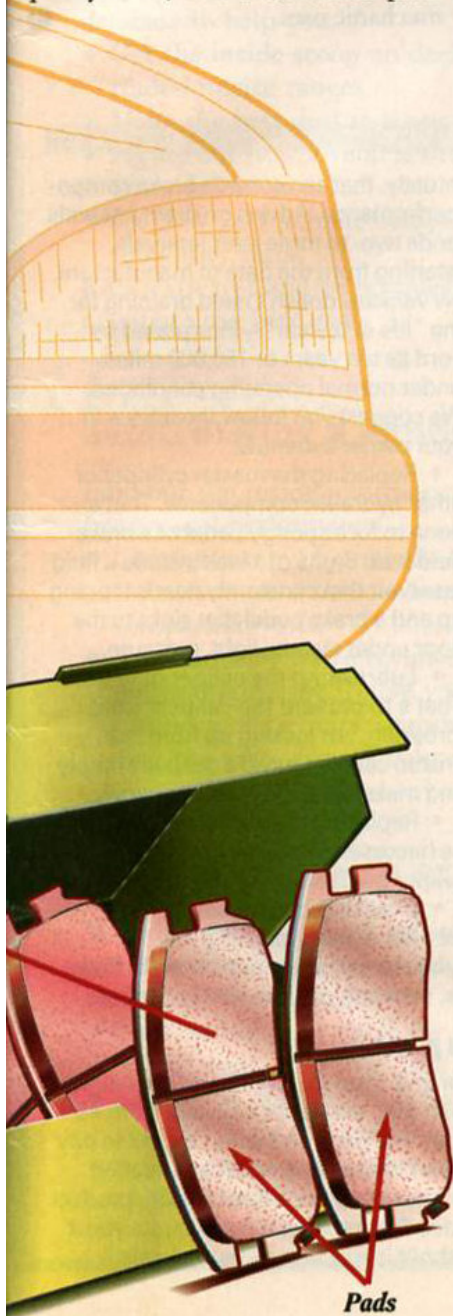
- Grabbing or pulling to one side during braking. Brake fluid or grease may have contaminated the pads, or a brake caliper may be "frozen" from corrosion.

- A pulsating pedal during braking. A rotor may be warped—which means the rotors should be turned or replaced. But in cars with an antilock brake system, a very rapid vibration in the brake pedal on a slick surface or during a hard stop may simply mean the ABS has been activated. Don't be alarmed—and don't let up on the brakes.

- The brake pedal feels spongy or sinks to the floor under steady, light pressure (as when you stop at a light). That indicates air in the brake lines, from a faulty brake job or a leak in the brake hydraulic system.

- The brakes require very high effort. The pads may have worn out or become glazed from overheating, or the power-assist system on power brakes may have failed.

- The "check brakes" dash indicator goes on. The brake-fluid level in the reservoir is low, usually indicating a leak. Don't just top it up—check for a leak or for excessively worn pads or shoes.



typically come in at least two. For our lab tests, we chose each brand's most expensive (premium-quality) pad to see how it compared with OEM. In addition, we bought the cheapest (standard-quality) pads made by Raybestos for both cars.

Quality designations vary from brand to brand and may not be listed on the packaging. Premium pads generally come with a lifetime warranty, but don't take that too seriously. The warranty covers the cost of the pads but not their installation, which is generally far more expensive than the pads themselves.

Testing in the lab

We hired a contract lab to conduct standard industry tests on a dynamometer, a device that measures the torque applied by brake components to simulate stopping a moving car. Before and after the lab tests, we mea-

sured and weighed the brake pads and rotors to determine their wear.

We simulated 300 stops at various speeds, temperatures, and stopping rates to gauge the pads' friction characteristics—how hard they gripped—when new, partly broken in, and fully broken in, and when cold and when heated up from use.

We also measured resistance to "fade" (a temporary loss of effectiveness due to heat buildup during repeated stops). And we ran a 1,000-stop sequence to gauge the rate of wear, not only of the pads but also the rotor. We used a new OEM rotor for each pair of brake pads during our dynamometer testing, and we tested two sample sets of nearly all of the models.

Testing on the track


We then mounted the OEM pads and one set of non-OEM pads on

both the Taurus and Accord to see how closely their on-the-road performance correlated with the results of our lab tests.

We installed new OEM calipers on each car, and we replaced the rotors with each set of pads we tested. After breaking in the pads, we measured minimum stopping distance and pedal effort from 60 mph.

Conclusions

Our lab tests and limited braking tests at our track indicate that most popular name-brand pads should perform competently. Even the inexpensive standard-quality Raybestos pads for the Taurus stopped as well as the premium pads.

All in all, making sure the mechanic does a thorough and complete brake job may be a far more important issue than the brand of brake pads the mechanic uses. 

How to get a good brake job

Whether you go to a dealer, brake-repair chain, or independent garage, here are some tips to improve your odds:

- Ask for recommendations from people you trust.
- Phone some shops and compare prices, service, and warranties.

- Check whether your local consumer agency or Better Business Bureau has a record of complaints about a particular shop.

- Look for certifications such as an Automotive Service Excellence (ASE) seal. They indicate that some or all of the mechanics meet basic standards in specific technical areas, though they don't guarantee competence or honesty.

What is a brake job?

Replacing the pads or shoes is the most common brake repair. But a proper job should include a full inspection of all brake parts. The mechanic may also recommend the following:

- Installing new pad holders or shoe springs. That's inexpensive—and important to reduce noise during braking.
- "Turning" the rotors or drums. A lathe smooths their surface to eliminate grooves. Your mechanic may push this, but it's not necessary unless the surface is deeply scored; deep grooves in the rotors or drums reduce brake performance. All rotors have the minimum recommended thickness imprinted on them. Have your mechanic measure the rotor before turning it.
- Replacing the rotors or drums. If the vehicle shudders during braking, the rotors or drums may be warped. If so, they should be replaced.
- Flushing the brake system. Brake fluid gradually absorbs

moisture from the air. Eventually, that can corrode brake components and reduce braking performance. Advice on drain intervals varies: Mercedes recommends two- to three-year intervals. BMW specifies two years, starting from the date of manufacture. Ford says the fluid in its new vehicles doesn't need draining for

the "life of the car"—interpreted by Ford as ten years or 150,000 miles—under normal operating conditions. We suggest you follow the advice in your owner's manual.

- Replacing the master cylinder or other hydraulic components. That's done to fix a spongy pedal or a brake-fluid leak. Signs of a leak include a fluid reservoir that constantly needs topping up and a brake pedal that sinks to the floor under steady, light pressure.
- Lubricating the caliper guides. That's to prevent the calipers from "freezing," or locking up from rust. Frozen calipers make a car pull sharply and make the pads wear unevenly.
- Replacing the calipers. This may be necessary if you haven't had the caliper guides lubricated regularly.
- Checking and adjusting the

parking brake. That's a must after a brake job.

After the job is finished, you should break in the brakes. Brake gently for the first 200 miles, avoiding panic stops if possible.

How much should you pay?

Prices vary from car to car and shop to shop. Front pads alone range from \$15 to more than \$50, and labor can take from 45 minutes to more than an hour. For parts and labor, expect to pay \$80 on up per set (front or rear), depending on what's needed.

"Beware of inexpensive brake jobs," says Tom Harkin, product marketing manager at Bendix. "No repair shop can quote you a low price for a brake job without inspecting all four wheels."

