



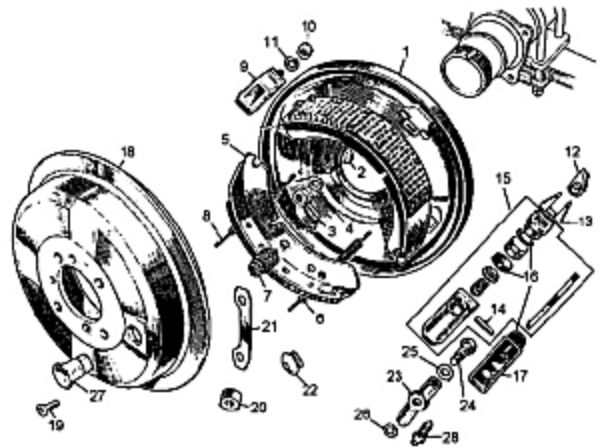
Gimme a Brake - Part 1

by Jim Lunson

One of the big questions I am always getting is: what brake pads are the best to buy for the MG? There are a multitude of types available and each has its own merits and drawbacks. I don't make a strong recommendation because the choice is dependent on your own individual driving and investment criteria.

The basic type brake pads available are:

Organic - these are the least expensive pad types you can buy. For the MGB, they run about \$15-20 for a set of pads. The pad material is made of natural fibers and minerals (but no longer asbestos) and are mixed with a small percentage of metal flakes (usually iron) mixed in. They provide adequate stopping power for normal street applications, but have a relatively low coefficient of friction, meaning they won't bite very well into the rotor or drum they push against. This requires more pressure on the pedal to make a stop and they will tend to fade (slip) at higher temperatures. The low metal content means they will not last too long either, and they tend to produce a lot of brake dust as they wear. But they will stop the car, wear fairly well if you don't add a lot of mileage or do a lot of hard braking such as in racing.



Semi-Metallic - These type pads are an improvement over the organic in several ways. They usually have much more metal particles in the pad mix, often the metal is brass or bronze which has better gripping ability, and they use a better mix of compound filler materials, meaning they will last longer. They run about \$40-50 for a set for the MGB.

Exotic Materials - These are another step up in performance. They are similar to the semi-metallic noted above, but use a different compound (usually Kevlar (the green stuff)) as the binder. This material simply does more of what I described above; better bite like the semi-metallic, better wear than the semi-metallic, and a much better resistance to heat which eliminates fading. These come into play in more severe conditions like racing, or auto-crossing where these traits are

important. These run around \$70 for the MGB and will give you excellent braking for a long time no matter how you drive.

Ceramic - This brake pad material is the newest innovation in brake technology. This is a special heat resistant compound used for the pad material and it is mixed with or faced with copper. These tend to wear forever, will never squeal, produce no brake dust and provide the best braking power at virtually all temperatures. They usually run about \$100 a set for the MGB.

The dilemma becomes what kind of driving are you going to do the most, how often do you mind changing the pads (the labor is exactly the same for all types) and do you need to clean the brake dust off the wheels frequently or do you not care if they get a little dirty (wire wheels definitely enter into this factor). My recommendation is that unless you do severe driving with your MG such as racing, go for the higher quality pads as your pocketbook can handle. Most MGs are not driven that much so whichever pads installed will usually last a long time spreading the cost over many years, but stopping power is important for safety. You can't decide to change the pad material when you suddenly have to slam on the brakes to avoid a serious accident so think ahead. And the infernal dusting of lower priced materials is a real hassle, especially on wire wheels. So look at the various options in the parts catalogues and stores, read the fine print as to what they describe the pad material as made of, and compare the prices. A decision then will be fairly obvious. I run Kevlar on my MG, ceramic on the big family car and semi-metallic on the old clunker station wagon. I try to match the pad to the type driving done by each car and found this combination works fairly well for me.

The other element in braking is the rotor used on disc brakes (MGB front brakes). This is the surface that the pads squeeze against to make the stop. There are several options available for these as well. I will try to cover the options and pitfalls of this element of braking next month.



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Gimme a Brake - Part 2

by Jim Lunson

I wrote last month about the various options for brake pads available for the MG. The other face of the braking system is the rotor or drum that the brakes push against to make the car stop. Here again, there are several options to consider, at least for the MGB which has disc brakes in the front. Other MGs have the older drum and shoe brake system (unless they have been upgraded), and here there is little choice of drum material beyond the cast iron.

Last month I described how the stopping power of the various brake materials depends on the bite of the material. In actuality, this bite by the brake pad is against the drum or rotor surface and the wear is not totally on the pad, but also bites into and eventually grinds down the metal thickness of the rotor or drum. So even with super pad materials, there is going to be wearing on the rotors or drums as well and that means they will have to be replaced also. They are all steel or iron and last much longer than the pads, but not forever. As they slowly wear down, they reach the minimum thickness they need to withstand the heat generated during the stopping. Then they start to warp. Then when you hit the brakes, you feel a pulsing sensation in the pedal. That is the sign the rotors or drums have warped and are no longer perfectly true. It is time to replace the rotors or drums as well as the pads or shoes that work against them. In order to keep weight down, especially in the unsprung area of the wheel system, manufacturers keep the thickness of the drums and rotors pretty close the minimum they need to stay true. There is not much thickness to play with

Drums and rotor wear get another boost when brake shops change the pads or shoes and grind down the rotors or drums to provide a new clean smooth surface for the new pads to work against. This step is necessary if the wear has reached the steel backing of the shoes or pads and has scored into the drum or disc. I have a running debate with the guy who does my service as to the pros and cons of resurfacing these brake rotors and drums when there has been no scoring. He claims that the wear from the pads and shoes makes the metal surface uneven, even if you are careful and replace the pads long before they wear down to where metal scratches against metal. By resurfacing the face, it assures that the new pads or shoes will wear evenly and allow them get their maximum life. I argue that the rotors and drums are heavy and therefore made to nearly the absolute minimum thickness required to work properly. Shaving metal off them to get a new smooth surface only

shortens their lifespan that much more. To my thinking, having to replace the pads and shoes a little more often is a lot easier and cheaper than speeding up the wear on the rotors and drums too. There is no right answer.

There are not a lot of options for replacing the drums on the brake systems. They are made of heavy cast iron to withstand the pressure of shoes forced outward against them and the heat generated by the braking process. As for rotors on the front of MGBs, there are several options available:

Standard steel - this is the normal rotor found on the car when it left the factory and provides a suitable replacement. They run about \$30 a pair. If you can find them, some manufacturers offer a higher grade steel rotor that lasts longer, but costs about twice as much. Still this is not a great expense and will provide a much longer lifespan than the factory original. Look for brand name rotors.



Slotted steel - this is an upgrade that is similar to the standard rotor with the exception that it is scored with 5-6 slots radiating out from the center to the edge. The slot is there to help shed water in wet conditions and to dissipate heat buildup by providing ventilation. These run about \$100 a pair. They provide much better stopping ability, especially when wet and are not a bad upgrade. Heat dissipation is minimally improved.



Slotted and cross-drilled - this is the ultimate brake rotor. It has the same slots to improve the performance as noted above, but also have about 40 holes drilled in them. These holes really reduce the heat buildup as they allow for a great deal of air circulation through to the pads. They run about \$200 a pair. They are usually made of a much higher quality of steel also.



I feel either the upgraded standard rotors or the slotted steel ones are the way to go. Either will give good service, and with a more limited usage than a daily driver car, should last as long as needed for the MG. The slotted ones do offer better performance in wet conditions, but I try not to drive my MG in wet conditions anyway, so this is not a big factor for me. Consider your personal driving conditions. I have heard questions about the cross-drilled rotors. Yes, they run cooler in theory because of the air holes, but due to these holes, they have a reduced surface area for the pads to grab against, requiring more pressure to get the same braking effect. And with less surface area, they tend to wear much faster than standard rotors, even in spite of the higher grade steel used. I have no experience with these, only the comments heard by various owners.

Another option available is the conversion of front drum brakes to disc/rotor systems. Disc brake systems came into widespread use during the 1970s. They provide a more sure braking system as the calipers allow the pads to pinch together against the rotors rather than expanding outward against drums. There is less distortion, better gripping, and the pad replacement effort is much easier than with drum type systems. The calipers provide a better system of movement providing a better seal of the brake fluid and less potential for leakage. It is a better system all around. It is one of the amazing positives MG did when they introduced the MGB in 1962 was making the switch to front disc brakes. They were ahead of their time on this item. So conversion of the front brakes for MGAs and T series are something to consider if braking power is critical in your mind and originality is secondary. Kits are available to do this change without a great deal of modifications to the cars. Again, this conversion is really dictated by your own personal driving habits.

I don't have space to go into the possible conversion of the rear braking systems to disc type function. I will leave it to say that kits are available and provide some braking advantage, although with about 80-90% of the braking effort done by the front brakes; I question the need for this change. And these conversions are not cheap, as it requires a considerable modification to the axles, and gets further complicated by the emergency brake system which uses a cable in lieu of the fluid system to engage the brakes. Happy stopping your MG.



Gimme a Brake - Part 3

by Jim Lunson

One last thing on brakes - changing the fluid. I said earlier that DOT 3 and 4 fluids need to be changed every few years because they absorb moisture that can rust and corrode the insides of brake cylinders, calipers, and lines. This periodic bleeding is important, especially with a timeless car like our MGs where years of ownership slip by very rapidly as there is little attention paid to the age or model year and the driven mileage is usually low. And rust and corrosion creep up very slowly and are rarely noticeable until a disaster strikes. The way to do this fluid change is to bleed out the system, slowly replacing all the existing fluid with new.

This process is a fairly easy step to do, but takes a little time, patience and willingness to reach up under the car. The process begins by bleeding out the system from the brake farthest from the master cylinder - the right rear brake (unless your car has right-hand drive in which case it's the left rear). Start by filling the master cylinder with new, clean fluid, and begin by bleeding the system at this first bleed screw until the fluid comes out clear. This is best done by using a 3/16" clear plastic hose so you can easily see that the fluid coming out has no bubbles and can tell when it changes from a rust colored brown to clear. This first brake usually takes significant fluid to change as it is flushing all the old fluid from the master cylinder, most of the pipes and the brake at hand. These rear brake bleed screws are also the ones hard to reach as they are inside the rear tires and getting to them involves obstacles like the rear axle, emergency brake cable, and exhaust pipes. It takes a little stretching to get back there.

Once, the fluid running out clear from this brake you are well on your way to flushing out the entire system. Tighten up this bleed screw and move to the next farthest brake and repeat the process. This time it is amazing how little fluid needs to be removed before clear material flows out. Then on the next farthest brake and again, only after few bleeds, you will be done. And finally, the fourth and closest brake is last. Once this one is done, the job is complete and ready for another 3-5 years of safe stopping.

To assist the process, there are several brake bleeding systems available for purchase. They are designed to facilitate the process by being able to accomplish the job with only person, but still involve the same operation. They work by using air pressure to force new fluid through the system and out the open bleed screw. I have used both a system that works off the air pressure in the tires attached to a special

cap on the master cylinder, and a system that has a hand pump at the bleed spot to induce a vacuum in the system, sucking out old fluid. There are several variations on these mechanisms available. They work, but I have found them be usually be more trouble than they are worth to set up. Plus they also require maintenance when they are only used every 3-5 years or greater. What they do, when they work properly, is to allow one person to reach under the car at the brake to be bled, open the screw and let the fluid flow out until it is clear and contains no bubbles and shut the system when complete. You still have to hit all four brakes to get the job done.

I personally prefer the old tried and true brake bleeding system of using two people, in my case, my trusty mate, Ann. A child, mother, neighbor or any assistant also works well as the task required by this person is not real complicated, consisting of sitting in the driver's seat, stepping on the brake pedal when requested and then releasing it, also when requested. I do the hard part, including the reaching up under the wheels.

This system works like this: attach the clear plastic hose to the brake to be bled. Insert the end of the hose into a jar with about one inch of old fluid in it, making sure the hose end is submerged in the fluid. Then open the brake bleed screw about 1/2 turn. Then ask the trusty assistant to slowly step on the brake pedal until it goes all the way to the floor. Observe the fluid that flows out the tube into the jar. When the pedal reaches the floor, the fluid stops flowing, then tighten up the bleed screw as it was before starting. Then have the assistant release the brake pedal. Repeat this operation until the fluid in the tube runs clear. The only change to this cycle is that after about 5 repetitions, you need to get out from under the car and make sure the master cylinder remains full of fluid or refill it as necessary. If the fluid level here gets too low, air bubbles will get sucked into the system, and additional bleeding will be required until they are flushed out. Usually 3 to 4 pumps are sufficient to flush even the farthest brake, and the closer ones only usually take about two pumps to finish. Not too complicated and lasts for several years.

The only two possible complications occur in that the brake pedal probably has not gone all the way to the floor in a long time. Note I say to push it in SLOWLY, especially the first time. Often the hinges, and pivots in the pedal mechanism may be stiff from non-use to their maximum range and could break if forced too suddenly. Also, the master cylinder piston has probably not gone its full travel length for some time either and if forced too suddenly, can break the seals on it. So proceed slowly with that first brake pump. The other complication occurs if the bleed screws have not been opened for a long time and may have frozen. Sometimes, a penetrant will free one to turn; otherwise, it is likely to break off when a wrench is applied. This will open the system immediately and all the fluid will drain out. So if you have trouble

turning a screw, make sure you have another large jar ready to catch a lot of fluid coming out. Plus then you have to remove the broken bleed screw and replace it with a new one; a much more complicated task. A test of whether the screws can be loosened is advisable before the process is begun. Then you will be ready without this one surprise. One last note, brake fluid is hard on car paint finishes, so be careful when filling the master cylinder not to spill any, or cover the fender to protect it from damage.

I have discussed flushing the brake system as a maintenance step, but the brakes also need bleeding if there is a problem and air has entered the system. This can occur either due to a leak somewhere, or if the fluid level in the master cylinder gets too low. This bleeding step is the same as outlined above, and should be done if the brake pedal feels spongy, or gets soft after being applied during a prolonged stop. So check your brakes again, find out when the last time you changed out the fluid, and spend some time keeping the car running (and stopping) in tip top shape. Again, this is a step that is easy to ignore, but is crucial to maintaining our MGs. Plus it is a step that most shops charge up to \$150 to accomplish (takes two people, remember.) So this winter, find an assistant and get busy on those brakes.