



THREE MORE BRAKE UPGRADES TO MAKE YOUR CAR QUICK ON THE PEDAL

By Matt Richter
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At the risk of seeming to have put the cart before the horse, there are three more brake upgrades that we believe most Mini drivers should consider for their cars. In addition to replacing your original equipment brake pads, as we showed you how to do last issue, we also recommend replacement of the OEM brake lines, brake caliper bushing guides, and brake fluid with higher quality components.

The cart and horse issue is simply because one can replace the pads and other components all at the same time, which is what we did on our project car last week. The total job requires little mechanical aptitude, only simple tools and takes about four hours.

The net results are brakes that are quick to respond to the pedal and give a firm response that we believe is superior to the original equipment.

This improvement comes from the woven steel brake lines that don't expand or stretch as brake fluid is forced through them, the metal caliper guides that maintain alignment as the calipers press on the pads and – though we haven't put it to the test yet – the higher-quality brake fluid that will stand up to continuous usage at higher temperatures than the stock fluid.

Parts and Tools Required

1. For the upgrades, we ordered the Stage 1 Brake Upgrade Kit from MiniMania, which includes woven steel brake lines for front and rear brakes, as well as EBC Green Stuff front and rear brake pads, for \$335, plus a Brake Caliper Bushing Stiffening Kit made by BMW, which was on sale for \$129.95. We replaced the fluid with a quart of GT-LMA brake fluid from Castrol, which exceeds DOT3 and DOT4 specifications, from our local auto store.

For the job, we needed the same tools we used for the brake pad repair, plus an 11mm “flare nut” wrench, and a brake caliper compressor from the auto parts store for about \$10, a drip pan, and a plastic hose and jar to catch brake fluid and bleed the brakes.

Getting Up and Under

2. To do the job both ends, placing jack stands at the inner pivot points of the rear trailing arms. Then you can remove all four wheels at the same time. Raise the front of the car first, and brace it on jack stands, as we did for the brake pad replacement job in last issue. Then place the rear jack stands. Give the car a couple of good shoves to make sure it is absolutely secure and doesn't rock at all. Make sure the parking brake is off.

3. You may find, as we did, that the wheels will be hard to remove, generally because light rust has developed between the wheels and hubs.

If that's a problem, a couple of taps with a shop hammer will break the wheel loose. We'll take care of the rust at the end of the job.

4. Starting with the front brake calipers, remove the calipers following the instructions in the last issue. (Briefly, a 7mm Allen wrench is used to remove the caliper guides, which releases the calipers. Then the pads can easily be removed.)

Now remove the rubber caliper guide bushing from the caliper, using a pair of pliers to yank the rubber bushing out. No need to be gentle; this piece is now rubbish.



Do It Yourself



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Replacing the Guide Bushings

5. Shown here are the bronze replacement bushings (a BMW product) above, compared to the OEM products below.

6. The bronze bushing is slid into the brake caliper from the rotor side, and is secured with the circlip provided so that if the circlip fails, the bushing won't fall out. A circlip pliers makes this job easier, but it can be done with a small needle-nose.

7. With both bushings in place on the calipers, we can move on to replacement of the brake lines.



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Replacing the Front Brake Lines

8. Positioning a drip pan underneath the brake line, we start by unfastening the brake line from the solid line in the fender well.

9. Next the line can be removed from the brake caliper itself.

10. To install the new brake lines, start by fastening the new line to the brake caliper.

11. Then the flexible brake line can be fastened to the solid brake line in the fender well. Make sure the brake lines aren't twisted or kinked.

12. With the brake line securely fastened to the solid line, it can be clipped under the fastening bracket.

13. Before re-assembling the brakes, we'll put anti-seize lubricant on the clips under which the brake pads slide back and forth. Be sure not to get any anti-seize on the rotors!

14. We'll also put anti-seize lubricant on the shafts of the brake caliper guides so that they can move easily in the bushings, and so there's no chance they might rust and seize up.

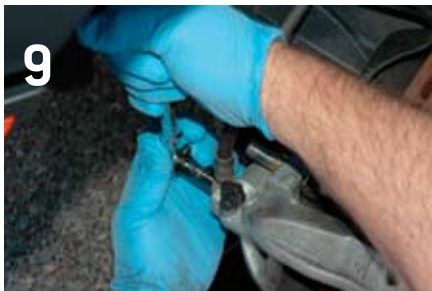
With this done, the front brake calipers can be reassembled just the same way we did them in the previous issue (or just put them back together in the reverse you took them apart but because the new brake pads are thicker than the used pads, the caliper needs to be compressed before it can be put back over the brake rotor.)



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Doing the Rear Lines and Pads

15. The rear pads and lines are done in pretty much the same way as the front pads, with one difference that we'll discuss. The job starts by using your 7mm Allen wrench to remove the brake caliper guide. The brake caliper guides will be replaced, just as they were on the front, making sure to insert the bushings from the rotor side before fastening the circlip.

16. If the brake pads haven't been replaced for awhile, you may find that a ridge has formed on the rotor, so a little force may be required to remove the calipers.

Once the old pads have been removed from the calipers, we're ready to install the new pads. However, to do this we have to retract the brake piston. The rear calipers have an extra fixture for the parking brake, so the pistons have to be rotated as they're compressed, which requires a special tool.



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17. Your dealer has a special tool that rotates the piston as it is pressed in, but you don't need one of those. You will need a brake caliper press, but these cost less than \$10 at your local auto parts emporium.



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18. The trick is to use a channel-lock pliers to gently rotate the piston a quarter turn at a time, as you press it in with the tool.



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19. Once that's done, it's a simple job to slide the rear brake pad in, with the clip on the pad sliding over the channel in the piston.



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20. Now it's a simple matter to slide on the pads, using a little anti-seize lubricant.



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21. Don't forget to re-install the rear brake pad thickness sensor.



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22. With the wheel off, this is a good time to remove the screw that secures the rotor in place and put anti-seize lubricant on it as well, to make sure you'll be able to remove it later.



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23. With the pads and calipers back in place, you can remove the old brake lines and replace them with the woven steel lines. Start by unclipping the line that shares the brake line clip, to get at the brake line.



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24. Now the old brake line can be removed from the solid line, and the new one attached.



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25. Likewise the old line can be detached from the brake caliper, and the new one fastened on.

Replacing Fluid and Bleed Brakes

26. With that work done on all four wheels, you're ready to replace the brake fluid and bleed the brake lines. To do this without introducing air into the brake lines, you'll need a short piece of plastic hose with a 3/8 inch inside diameter that will slide over the brake bleed screw. The other end of the hose is immersed in brake fluid in a jar with a screw-on lid through which you've drilled a hole for the hose. More sophisticated versions of this tool are available from auto parts stores, but this will work fine.



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Start by topping up the brake reservoir in the engine compartment with new fluid. Then you force fluid through the system with the help of an assistant. You release the bleeder screw, then tell your assistant to "press" the pedal to the floor. Then you tighten the screw so the fluid won't be sucked back and tell your assistant to "release."

You will repeat this process, topping up the brake fluid reservoir with new fluid after every 15 or 20 pumps. This presses new fluid through the brake lines, pushing out the old brake fluid plus any air that got in when you replaced the line. Keep it up until the fluid coming into the jar is the color of the new fluid.

With just a little patience, bleeding the brakes can done in 20 minutes or so. If the pedal is firm when you've completed all four wheels, you're all set. If not, bleed all four corners again, but just a few pumps per caliper.

The first wheel will take the longest, because you're pushing all the old fluid out of the car, but the other three wheels will be easier. As you do each wheel, when you first start pumping, you'll see air bubbles come through. Continue pumping until no more bubbles come out. Tapping the calipers with a screwdriver can help release the bubbles.

Now, put the wheels back on, first brushing off that old hub rust and putting a light coat of anti-seize on the hubs. Now follow the instructions on bedding in the brake pads that came with the pads and you'll be all set; Another good job done and a safer, better-handling car as the well-earned result.

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