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Installation of a Rear Big Brake Kit on an E39 BMW

Introduction

Much of the difficulty associated with the installation of this Mov'it rear brake kit has to do with the small rotor size (322mm) resulting in the positioning of the Porsche caliper very close to the hub. This requires [grinding of mounting ears, lower control arm, and knuckle](#) as well as [modification of the parking brake mechanism](#).

The Brembo and StopTech rear brake kits for the E39 use much larger rear rotors (345mm and 355mm respectively) and require no grinding. The installation of Brembo and StopTech rear kits is only slightly more complicated than changing pads and rotors and can be done by a reasonably skilled person in about two or three hours. Do not let these complicated Mov'it instructions scare you away from a Brembo or StopTech rear kit! **StopTech and Brembo brake kit installation is much easier.**



The Mov'it rear brake kit for the E39 is one of the more challenging to install. This is not for the beginner! Plan on an entire weekend to install both sides.

To retain the parking brake function inside the rear rotor, some part swapping and machining is done by Mov'it. The E39 parking brake shoes are too big to fit inside the tiny Porsche 993 TT rear rotors, so the smaller E38 750iL parking brakes are supplied.

Safety Warning:

Working on your own car can be dangerous. Even quality jack stands can collapse if not positioned properly, and a floor jack can fail suddenly and without warning. You can be seriously injured or even killed if you do not follow proper safety procedures. Please use both a floor jack and a good pair of jack stands to support your car so that a failure of any single support is less likely to result in the car falling on top of you! Zeckhausen Racing LLC assumes no liability expressed or implied for the improper installation or use of these components.

Installation Instructions



Place a floor jack underneath the differential. Jack stands go under the plastic jacking points located along the bottom of the frame rails. Lower the car onto the jack stands allowing most of the weight to rest on the stands, but leave the floor jack in place as a safety measure. Place chocks around the front wheel to keep the car from rolling in either direction.



Remove the rear wheels using a 17mm 6-point socket.

A quality air wrench makes the job go much faster. I use a powerful, but lightweight and compact air wrench made by Ingersoll-Rand. It's the Model 2121 Heavy Duty series and it's a joy to use. Because it is so tiny, I can use it in places where a normal sized air wrench simply wouldn't fit.



Shown is the stock 540i rear brake. Note the backing plate that extends from behind the rotor. We'll be cutting that plate to make room for the larger rotor and calipers.



On the passenger side is a wire harness with a sensor attached to one of the brake pads. When the pad wears out, a wire is cut and a warning appears on your dash. We will disable this warning function.

StopTech rear brake kits do not require these steps, since the pad wear sensor function is retained.

Pull the sensor wire from the brake pad with your fingers. If it doesn't pull straight out, try a pair of needle nose pliers.

Follow the sensor wire back behind the inner fender liner to where it



enters a small plastic holder. Both brake pad wear sensor and ABS sensor harnesses terminate here. Disconnect the brake pad wear sensor connector by squeezing the retaining tabs on the male end and pulling it straight out.

The photo shows the brake pad wear sensor harness removed, with the male end of the plug remaining behind. The blue cylinder to the left is the ABS sensor harness connector.



Cut the harness about 3 inches from the connector. Strip the wires and twist the bare ends together. Solder the ends and cover with electrical tape or heat shrink tubing. Then reattach the connector to the base inside the plastic holder behind the inner fender liner. Be careful to orient it properly by observing how the pins line up.

Turn your ignition key to the run position and verify there are no warning messages about worn brake pads. If you see a warning, it means you didn't properly connect the harness. Pull it apart again, double check the alignment, then push it back on and recheck the dash warning. To reset the warning, you will need to turn the key to the run position, but do not start the car. After 45 seconds, the warning light should reset.



Remove the spring steel clip from the caliper.

An easy method is to squeeze the clip with a large pair of needle nose pliers. Or you can compress it with a large screwdriver or a small pry bar. Then use your fingers to pull the clip forward away from the rotor. It should pop right off. You don't need to force it.



Remove the caliper from the frame by using a 7mm Allen bit to unscrew the two slide pins. The slide pins are hidden beneath plastic caps which may be pried off with your fingers. In order to get clearance for your ratchet while removing the lower caliper slide pin, you may need to jack the suspension up by placing a floor jack under the knuckle, just behind the rotor.



Wiggle the caliper until it pulls off the rotor. The outer pad will remain behind on the frame, while the inner pad will stay clipped to the caliper. Don't force anything. It should come off after a bit of wiggling.

Normally, it is not a good idea to dangle a caliper by the brake line. But in this case, the brake line fitting screws straight into the lightweight caliper. It is fine to just let it hang. You won't hurt anything.



Use a 16mm socket to remove the two bolts holding the caliper frame.

The lower bolt will be partially obstructed by the aluminum control arm. It helps if you use a floor jack to raise the suspension to it's highest point so that the control arm is nearly parallel to the floor. This gives you easier access to that lower bolt. Be careful not to lift the car off the jack stands.



Use a 6mm Allen bit to remove the rotor retaining screw. Save this screw since you will reuse it later.



Check that the parking brake is **not** engaged.

Make sure the wheel installation guide tool you used earlier is still attached so that the rotor doesn't fall off and land on your foot. Use a dead blow hammer with a rubber or plastic face and strike the rotor until it becomes loose. You may need to hit it hard and often if your car is older.

If it still does not come off, go back and check again to make sure the parking brake is **really** disengaged!



Now you can see the parking brake assembly. Study it closely so that you understand how it functions and how the parts go back together.

At this point, you may want to take a sharp object and use it to scribe a line in the backing plate around the parking brake shoes. This will give you an approximate idea of where to cut the backing plate in a later step.



Remove the upper and lower parking brake return springs.

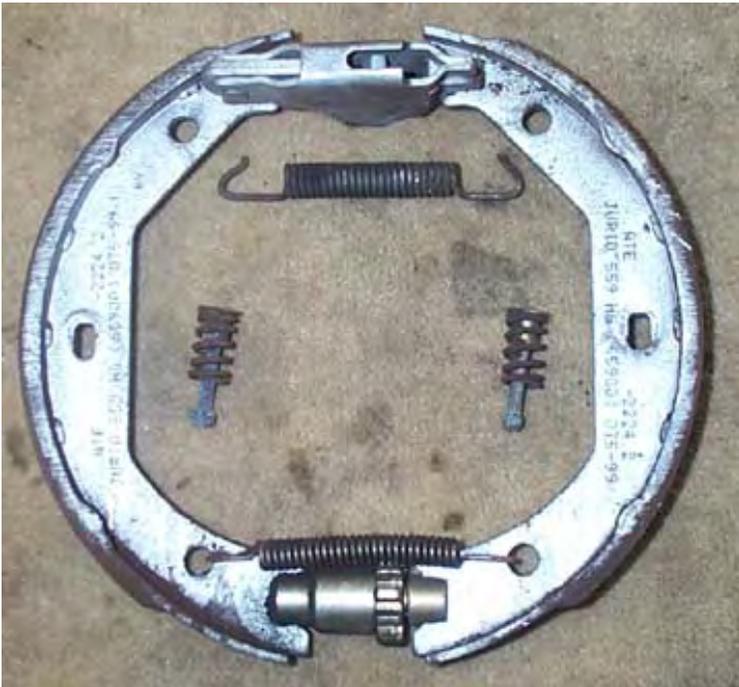
You will need brake spring pliers to remove and reinstall the two springs in the parking brake assembly. This task is nearly impossible without this tool. Trust me on this one!





You will need to use a special BMW parking brake tool for removing and installing the brake shoe retainer pins.

Use the tool to press down on the retaining pin, then turn it 1/4 turn in either direction. It should pop right out and the brake shoe will fall into your hand. (Or onto the floor, if you weren't ready for it!)



This photo should help you understand the proper orientation of all the parts.

The two springs are not the same size. The larger one goes on top.

The cylinder on the bottom with the raised teeth is an adjustment device which is turned clockwise or counterclockwise with a screwdriver tip in order to make it wider or narrower. This is how you adjust the parking brake.

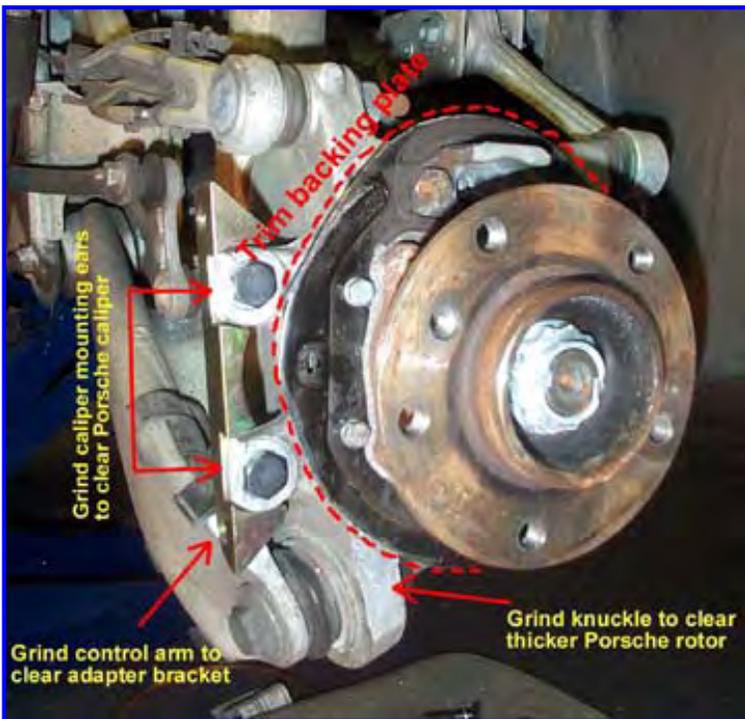


Using a 16mm offset wrench, remove the two bolts shown and pull out the upper support. Also pull out the rubber gasket that goes around the upper support. Note the orientation of the gasket. The depression faces out, as shown in the photo. It won't fit properly if you try to install it backwards in a later step.

You can see the tip of the parking brake cable directly to the right of the wrench. Push the cable back into the hole so that it is out of the way for the next step.



The upper support you just removed will be replaced with a new one that mov'it has machined to fit within the Porsche rotor hat. The old piece is shown on the left. The new one is on the right. (Don't install this yet.)



This photo shows a summary of the next phase of the installation. Click on the image for a full-sized photo. **Remember:** none of this grinding is required for StopTech or Brembo kits.

We will trim the metal backing plate with tin snips, then remove a small amount of material from the aluminum knuckle and control arm to provide clearance for the caliper, rotor, and adapter bracket. And finally, we'll grind flat the mounting ears for the stock caliper so they fit flush with the new caliper adapter bracket.

Remove the four 10mm bolts holding the backing plate to the knuckle. Pull the backing plate forward and rotate so you may easily cut it with tin snips. The object is to remove enough material so the backing plate can fit **inside** the rotor, but not too much that the parking brake shoes are not



properly supported. You should cut the plate right at the point where it starts to bend, just slightly inside the score mark you made in an earlier step. Remember, the E38 750iL parking brakes you will install in a later step are slightly SMALLER than the 540i parking brakes.

The photo shows the material removed from the backing plate. This outer piece may be discarded.

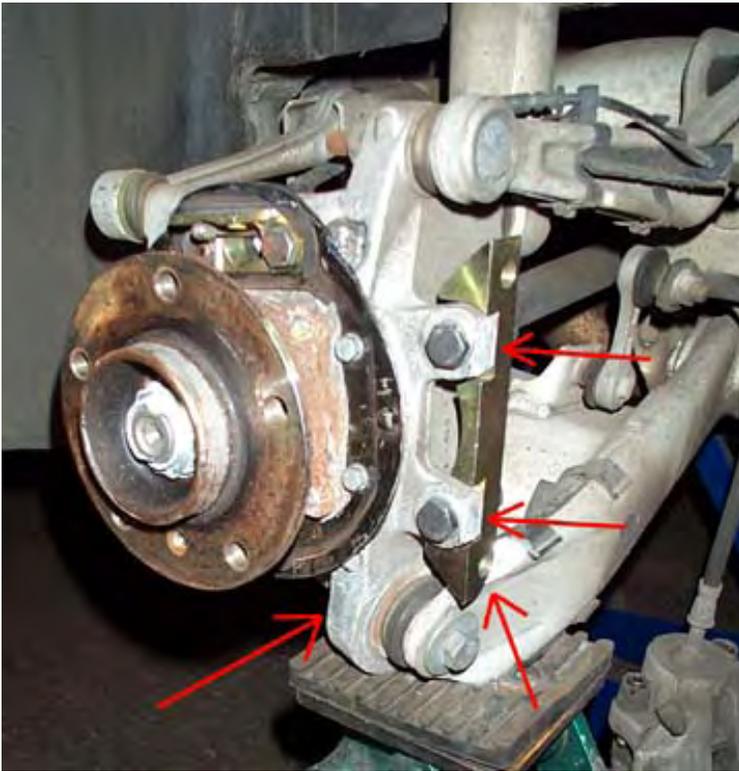


Reattach the backing plate with the four 10mm bolts. Install the modified support bracket with two 16mm bolts. Reinstall the rubber gasket.

Test fit the rotor over the hub and turn it. If there is no interference, you are all set. But it's possible you will hear a scraping sound when you rotate the rotor. To help determine where you need to remove more material, put electrical tape around the edges of the backing plate, then reinstall the rotor and rotate it. The electrical tape will become worn where there is interference. Use a course file to remove more material and then repeat the process until the rotor no longer scrapes the backing plate.



For the next few steps, you'll need an angle grinder such as the 4 1/2" Sears model shown here. It will be used to remove material from the control arm and knuckle.



Next, we will use the grinder to remove material from all the locations shown by the red arrows.



Compress the suspension with a floor jack, but stop raising it BEFORE the car lifts off the jack stands..

Install the bracket temporarily on the mounting ears. It will be immediately obvious that the control arm interferes with the bracket, especially when the suspension is lowered. Use a laundry marking pen to mark the control arm, then remove the bracket. Grind off enough material from the control arm so that the bracket clears it. Now lower the jack and make sure the bracket still clears the control arm, even when the suspension is fully lowered.

Caution: Before you grind the control arm, install the protection hose clamp as described in the next two steps.



Right next to the part of the control arm you are about to grind is a rubber boot. It is very easy to nick this boot with the angle grinder. You don't want to do this, since taking that part of the suspension apart in order to install a replacement boot is not easy. So how do we protect the boot?



I just happened to have some hose clamps on my shelf that were the right size. Open the clamp entirely and thread the metal band around the rubber boot. Then screw it down snug enough so that the boot is compressed down out of the way and completely shielded from any careless grinder accidents.

Now you can grind away to your heart's content.

Grind off the mounting ears so that they are just below the level of the caliper mounting surface on the bracket. You will need to keep placing the bracket on the ears to check your progress, then remove more material, then repeat until done. You can't put material back, so be patient and just remove a little bit at a time.

Once you have removed enough material from the ears, you will be ready to attach the caliper bracket.



Two different thickness shims were included in the kit to move the bracket slightly toward the center of the car. At this time, you should use the thicker shims, placing one between each aluminum ear and the bracket before installing the nuts.

(Warning: the shims will stick out above the bracket. Use a file to flatten one edge of the shims so that they are flush with the bracket.)

If you cut a cross section of what you just installed, you would see the following parts in order: Bolt, washer, aluminum ear, shim, caliper bracket, washer, nut. Tighten the nuts just enough to hold the bracket firmly in place. You will be removing it in a later step, so do not torque all the way at this time.



Now it's time to assemble the parking brake. Extend the end of the parking brake cable with a pair of needle nosed pliers. (You had pushed it into the hole earlier, prior to cutting the backing plate.)

Using the new parking brake hardware, hook the end of the cable into the metal piece. (I haven't a clue what BMW calls this part!)



Using the special tool, attach the new parking brake shoes to what remains of the backing plate by inserting the spring loaded pins and rotating them 1/4 turn. The pins go through a hole in the shoe and then through a slot in the backing plate. If you use a flashlight from behind, it's easier to line up the pins properly.



Slip the adjusting wheel into place at the bottom, between the two shoes. Then, use the brake spring pliers to reinstall the two springs. Remember, larger spring goes on top.

Use a small piece of metal or wood between the friction surface of the parking brake shoe and the sharp point of the spring pliers in order to avoid damaging the brake shoe. I've also found a leather work glove works well because it doesn't slip.

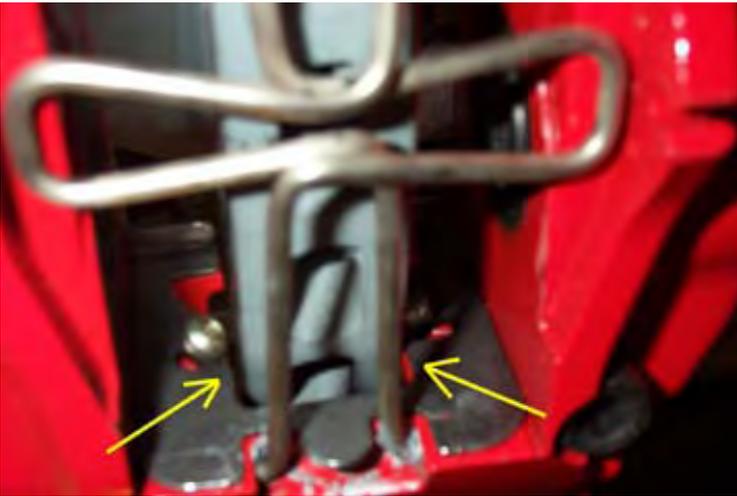


Slip the rotor over the parking brake/hub assembly and rotate it. If there are no scraping sounds, remove the rotor and turn the adjusting wheel with the tip of a screwdriver a couple turns to push the brake shoes apart. Then test fit the rotor again. Keep doing this until the shoes just barely touch the rotor. Then back off by 1/4" turn.

You want to perform these adjustments with the parking brake lever **DOWN!**



The next step is to make sure the caliper is properly centered about the rotor. Make sure there are no brake pads mounted in the caliper. Bolt the caliper to the adapter bracket using the two large allen bolts. You'll need a 10mm allen bit for your ratchet. Tighten the bolts snug enough to hold the caliper firmly in position but do not torque at this time. You will disassemble this again later.



Look into the caliper and observe the gap on either side of the rotor as shown by the yellow arrows. The spacing should be the same on either side. If not, the caliper must be moved out or in. To move it out (away from the center of the car) you will replace the thick shims with thin ones. To move it in, you will add shims. Remove caliper and bracket, replace shims, and try again. Repeat until the caliper is centered about the rotor. Then remove the caliper and set it aside. Tighten the nuts on the bracket to 50 lb-ft. Use Loctite thread locking compound on the bolts.



Place a pan beneath the caliper to catch dripping brake fluid.

An open end wrench is used to stabilize the brake line fitting from below while an 11mm flare wrench is used to loosen the nut from above. You **MUST** use a flare wrench or else you will strip the nut!

Once the nut is loose, unscrew it the rest of the way with a stubby open end wrench.



In this photo, I have pulled the hard line up and out of the bracket and rubber grommet and snapped a rubber cap on the end to stop brake fluid from leaking out. I highly recommend that you pick up such a cap at the auto parts store before removing the brake line. It prevents all the brake fluid from draining while the line is disconnected.



There may be a red plastic cap and rubber washer on the Porsche caliper designed to keep out moisture during shipping. If so, remove and discard the cap and washer.

Use a 14mm flare wrench to install the brake line on the Porsche caliper. Tighten firmly. Unlike the front brakes, there are no crush washers or banjo fittings used. The brake line screws straight into the caliper.

Attach the caliper to the mounting bracket with the two large allen bolts. You will need a 10mm bit for your ratchet. Tighten firmly. We will torque these bolts later.

Unsnap the rubber cap from the hard brake line and place it in the rubber grommet. Run the flexible brake line through the rubber grommet from



below, making sure that you reuse the original washers on either side of the grommet. Use your fingers to thread the nut properly into the fitting on the end of the flexible brake line. Tighten as far as possible with your fingers, then continue to tighten with a stubby 11mm open end wrench. At this point, you should stabilize the fitting on the flexible line with a 17mm flare wrench.

When the 11mm open end wrench becomes hard to turn, finish tightening the nut with an 11mm flare wrench.

Wipe all surfaces dry with a paper towel.



Open the pad retainer by squeezing the center together with pliers while pulling up on the end to free it from the lip that holds it down.



Insert new brake pads. They should slide right in.



When you insert both pads, they should align fairly closely to the curvature of the rotor as shown here.

Close the pad retainer by squeezing it in the center, as before, with a pair of pliers while pushing the end under the lip to hold it in place. This is easier to do if someone else pushes on the retainer while you squeeze the pliers, but it can be done by one person.



Torque the two caliper bolts to 60 Lb-ft. It's a good idea to put a small amount of blue Loctite on the bolts.



Bleeding the brakes comes next. Shown is a pressure bleeder with an adjustable pressure regulator and a built-in pressure gauge. It's possible to do this without the pressure bleeder, but this makes it easier to get a good bleed.

The brake fluid reservoir is hidden beneath the driver's side microfilter housing. Make sure the reservoir is filled to the top. Connect the pressure bleeder to the reservoir, attach compressed air fitting, and adjust to about 20 psi.



Place an 11mm 6-point box end wrench over the outer bleed screw. Attach the hose from the brake fluid catch bottle to the nipple on the end of the bleeder screw and crack open the screw about 1/4 turn. If you are using the pressure bleeder, leave the screw open until the large air bubbles stop coming out and mostly fluid is visible through the clear hose. Tighten bleeder screw and repeat process on the inner bleed screw.



Have your assistant sit in the driver's seat and press the brake pedal on your command. After the brake pedal is depressed, open the bleeder screw quickly and then close it before the brake pedal sinks all the way to the floor. Repeat this a few times until there are no longer ANY air bubbles visible in the clear plastic hose.

It is important to check the level of brake fluid in the reservoir and add more as necessary. You do not want to get any air into the master cylinder. Check around the brake line fittings for any leaks before declaring success and reinstalling the wheels. Torque wheel bolts to 88 Lb-ft.

You may click on the next 3 images
to see full sized photos



On your first test drive, brake normally and listen for any unusual noises. A slight scraping sound when you apply the brakes is normal for the first few miles until the pads and rotors bed in properly. After you have convinced yourself that everything is OK, follow my [brake bedding instructions](#).

Now, step back and admire your work.



Pedal feel should be improved over the front-only installation with just a fraction of an inch of pedal travel before braking begins to occur.

