

# Flyin' Miata

## NC Little Big Brake Kit 14-16XXX



Congrats on purchasing our NC little big brake kit! These brakes have many benefits over stock, not least of which are weight loss and improved pedal feel. These instructions cover the front and rear kits. If you're installing the front or rear kits (not both), only follow the relevant instructions for your parts. Please call or email us if you have installation questions. Our phone number and email are below.

**WARNING: Not everyone can perform every installation. It is critical that you be honest with yourself, in regards to your ability. We're more than happy to help, but there are only so many things we can do from the other end of a phone / computer. If in doubt, discuss the install with us before you dive in. Improper installation could cause injury and / or death!**

#### Required tools:

- Standard tool kit: sockets, Allens, screwdrivers, razor blade, etc.
- 10mm flare wrench
- Torque wrench
- Blue Loctite
- Jack and jackstands or a lift
- Pneumatic hack saw / aviation shear
- Angle grinder / pneumatic cut-off wheel
- Thread sealant (NAPA's BK 7652648)

#### Torque Specs for front and rear:

- Caliper to purple bracket 33 ft-lb
- Purple bracket to knuckle 33 ft-lb
- Stock brake line fitting 10-16 ft-lb

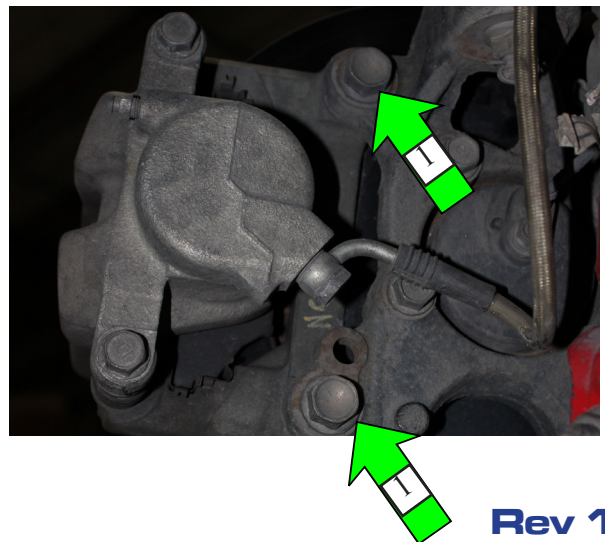
#### Acronyms

- PPF - Power Plant Frame, connects the transmission to the differential

1. The first step is to get the car in the air. Be sure that the car is appropriately supported - never get underneath a car supported only by a jack, either use jackstands or a lift. Remove the necessary wheels and set them aside.



2. We'll start at the front - unbolt the caliper bracket from the upright (1) and remove the caliper and bracket assembly. You won't reuse the brake line, but try not to put too much strain on it. Don't disconnect the brake line yet.



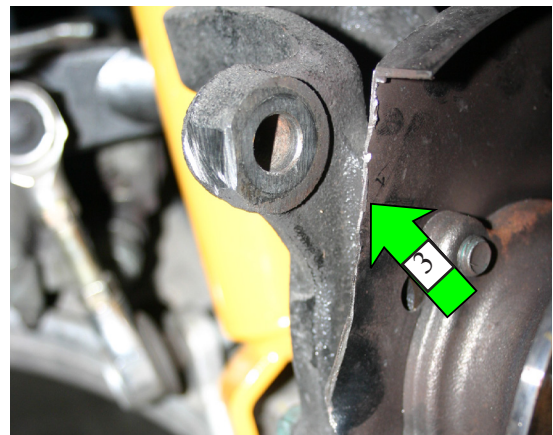
3. **If you're not replacing the front rotors, skip this step.** Remove the screws holding the rotor on if necessary. If your rotor won't come off, thread an M8x1.25 bolt into the threaded hole on the face of the rotor. It should pop off of the hub once you thread it in a little way. Be sure to use brake cleaner to thoroughly clean your new rotors - any oil can destroy brake pads quickly.



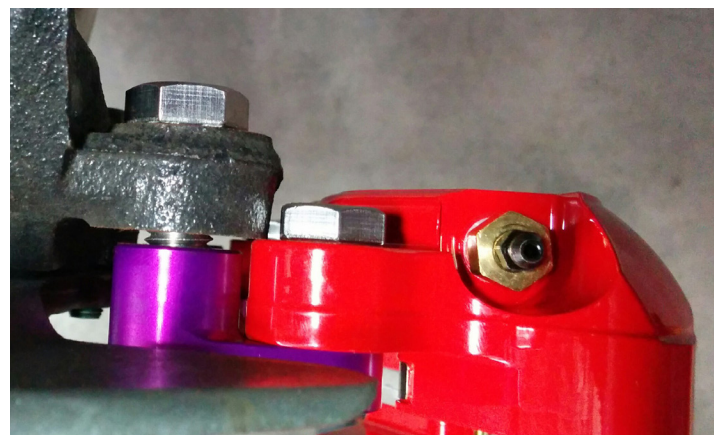
4. Put a few drops of blue Loctite on the 30mm long bolts (36-10438), and use a 10mm washer (36-30140) to bolt the purple (silver in this picture) front bracket (14-56370) onto the caliper, as shown (2) - "Flyin' Miata" must be visible from the inside (car side) not outside (wheel side). Both purple brackets are identical, but the rears are different - be sure you're using one of the fronts. Tighten these to 33 ft-lb. Sorry, the custom lettering isn't available..



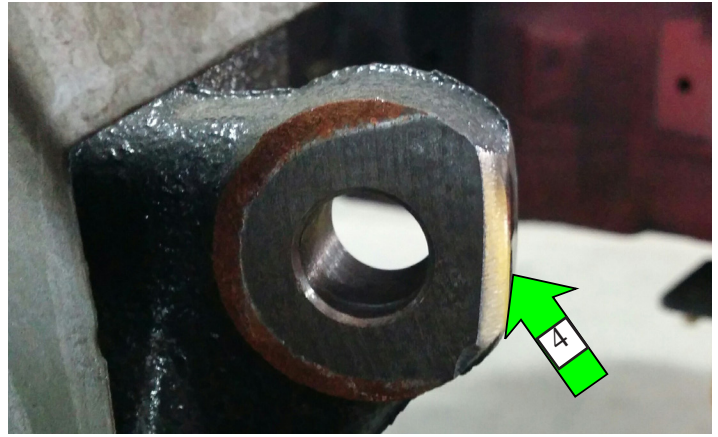
5. The calipers are a bit of a tight fit, so some trimming will be necessary. First, use a hack saw or aviation shears to cut a vertical line in the dust shield, as shown (3). (Our brake duct kit is shown, stock dust shields may need different trimming.) Test-fit the caliper / bracket assembly as needed, bearing in mind that modification of the upright itself is necessary (covered in the next step).



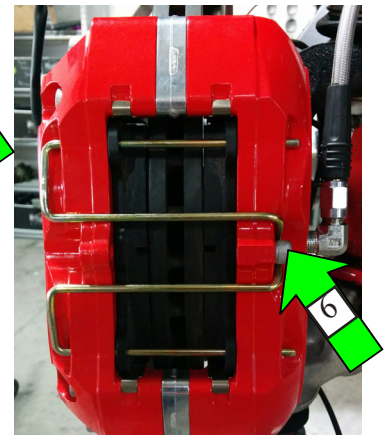
6. Most cars will have uprights that are a little too big, and need to be trimmed to create clearance for the calipers. The easiest method is to temporarily bolt (36-10449) the caliper assembly to the upright. Once it's snug (it won't sit flush), scribe a line on the upper and lower mounting points indicating the material to be removed. This will tell you how much material will need to be removed in a radial direction (towards...



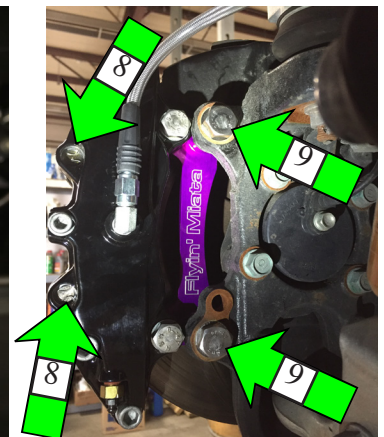
the center of the hub). Then remove the caliper assembly. In the axial direction (towards the center of the car), you'll need to take about 1/8" (3mm) off, as shown (4). It's typically easiest to do this with a cutoff wheel (which are often about 1/8" thick). A hacksaw or grinder could also be used. Some trial and error may be required, but with some patience and the right tools, it's not too hard.



7. (4-piston only) Install the rotor (it's clean, right?) and use the 40mm bolts (36-10449) to bolt the purple bracket to the upright, as shown (5) - be sure to use blue Loctite. The front calipers are identical, so grab whichever is closest. Torque these to 33 lb-ft. The bolt on the back of the caliper (6) needs to be removed then remove the pin. Install the pads and reinstall the pin and bolt.



8. (6-piston only) Install the rotor (it's clean, right?). The calipers are left/right specific. When installed "Wilwood" will be on the outside and the arrow (7) will be pointing up. Remove pad retaining clips and pins (8). Install the pads in the caliper then reinstall the pins and retaining clips. Install the caliper and bracket assembly over the rotor and bolt it to the upright using the 40mm bolts (36-10449) be sure to use blue Loctite (9). Torque to 33 lb-ft.



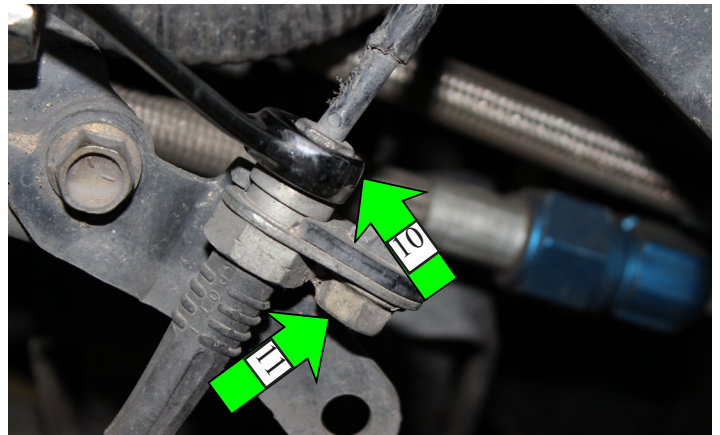
9. Smear a little thread sealant on the fitting (included with 14-66110) that threads into the caliper (don't get any on the first two threads). Thread the fitting into the caliper until it's finger tight, then go 1.5 - 3 turns farther. These are tapered threads, so don't expect it to visibly bottom out on anything (the fitting in the picture is tight). Don't over torque!



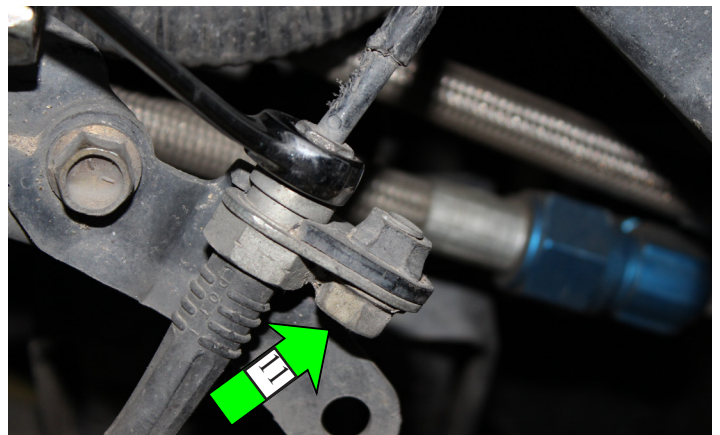
10. Thread the brake line (14-66110) onto the fitting installed in step 8. Orient it so that the natural curve of the brake line orients it nicely with the stock hard line, then get the fitting finger tight. Use a wrench to turn it a 1/4 turn farther. Temporarily install the wheel and check to make sure that the brake line can't contact the wheel at any steering angle.



11. Using a 10mm flare wrench, loosen the fitting on the stock hard line where it attaches to the stock rubber soft line (10). Be very careful not to strip the hex on the fitting - this is especially true if you're not using a flare wrench. This junction will drip brake fluid, but it won't pour out. Remove the bolt (11), then slip the rubber hose out.



12. Slip the new hose into the bracket, and line it up with the fitting. Get the stock fitting threaded finger-tight (or something close), then reinstall the bolt (11). Tighten the stock fitting to 10 - 16 ft-lb.

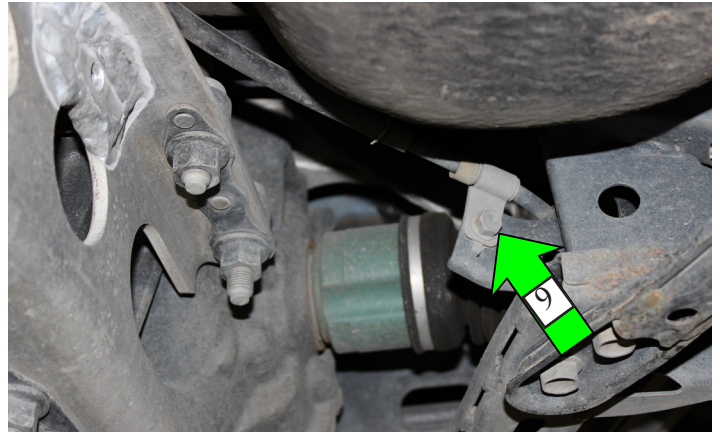


13. Repeat for the other side. Once that's done, the fronts are done. If that's all you're doing, you can move on to the bleeding instructions. If you're doing the rears as well (good call!), move on to step 14.



# Rear brake Installation

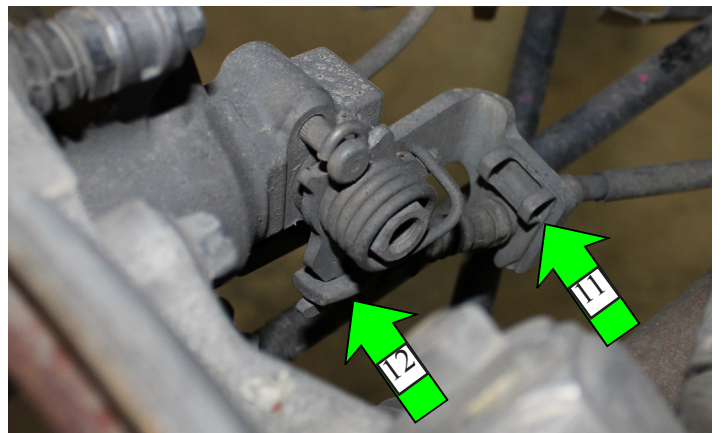
14. If they aren't already, get the rear wheels in the air and remove them. Release the parking brake (from inside the car), then unbolt the bracket that holds the parking brake cable to the subframe (9). The driver's side is shown, the passenger's side is similar. These brackets should be removed by prying them apart, but it may be easier to do once the cable has been released from the caliper.



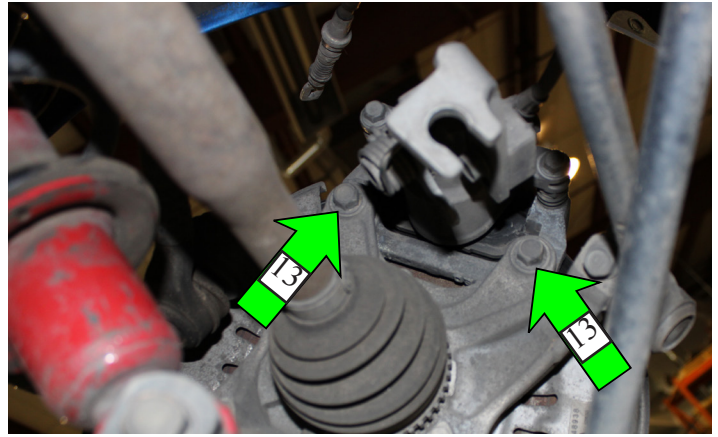
15. Release the cables from the white plastic clip shown in the picture. You'll need to gently pry the lid off (as shown, 10), then pop both cables out. This is to allow re-routing later. This bracket won't be reused, but doesn't necessarily need to be removed.



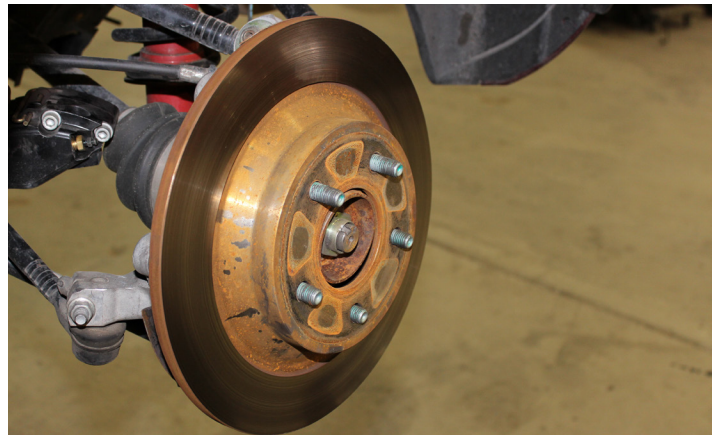
16. Remove the parking brake cable from the the backside of the caliper. Remove the metal clip (11), then pull the housing away from the caliper to disengage it from its hole. Then, pull the cable toward the caliper and rotate it down to unhook the cable end (12) from the caliper. Pull the cable out so that it hangs underneath the fuel tank. Leave it here for the time being.



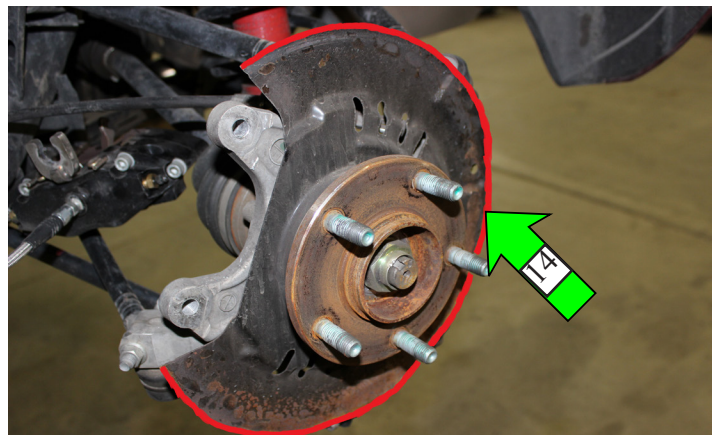
17. Remove the rear calipers by unbolting them (13). As with the fronts, don't disconnect the hose yet, but do set the caliper in a way that won't put any stress on the hose.



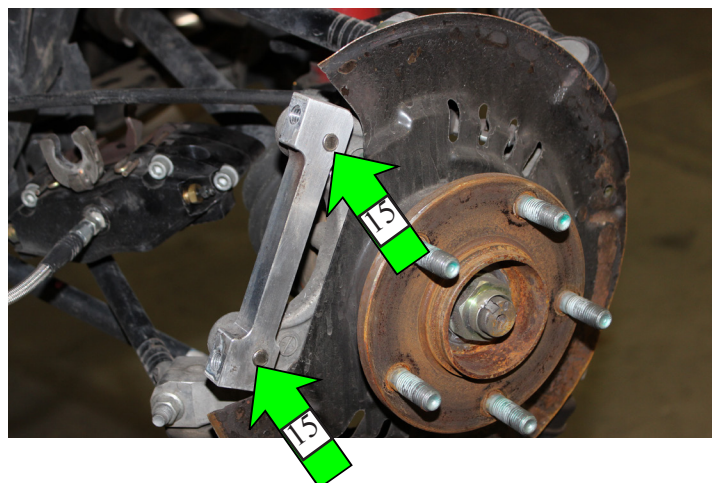
18. Remove the rotor. If the rotor won't just come off, thread an M8x1.25 bolt into the threaded hole until the rotor pops off. The stock rotor won't be reused.



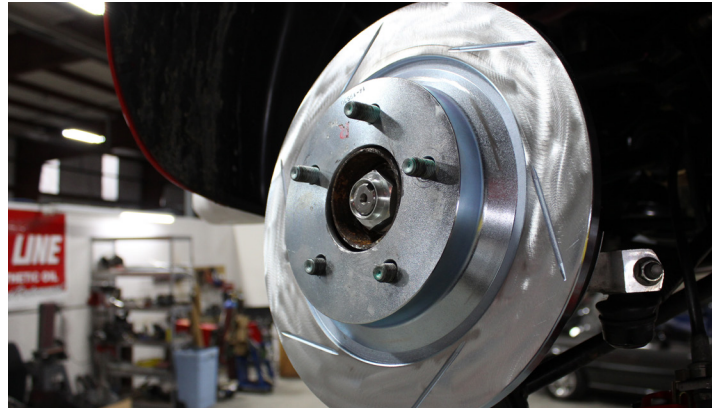
19. The new rear rotors are slightly bigger in diameter, so the dust shield will need to be trimmed - it's best to follow the red line in the picture (14), which removes the axial face of the dust shield. Pneumatic hack saws work best, but aviation shears can also work.



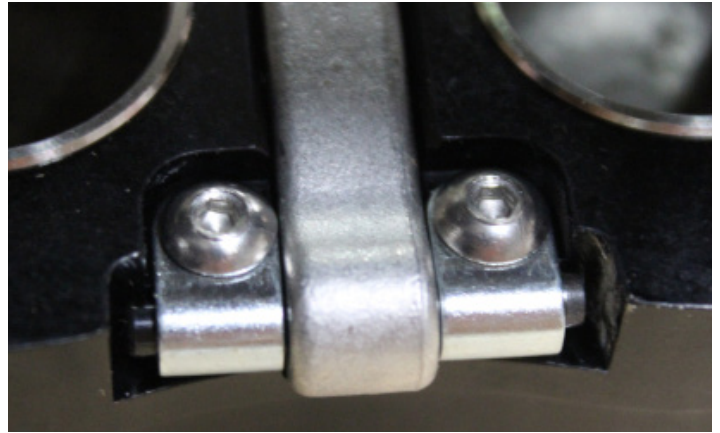
20. Bolt the purple brackets (silver in this picture) (14-56250) into place using the hex head bolts (36-10442), as shown (15). Use blue Loctite and torque them to 33 ft-lb. The rear brackets are identical from side to side, but make sure they're installed as shown. "Flyin' Miata" should be visible from the inside, as with the fronts.



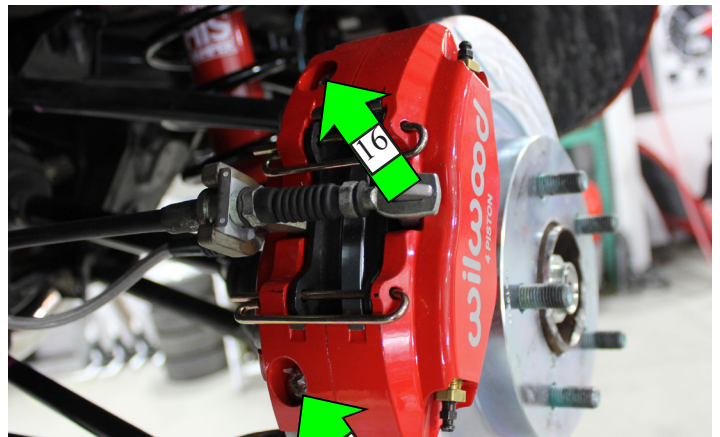
21. Thoroughly clean the new rotors (14-19530), then slip it over the studs. They are marked left and right. Our rotors have a zinc coating to protect them from rusting during storage that will be noisy until it wears off. You can remove the coating from the surface that will contact the pads with an angle/die grinder with a surface prep pad.



22. Install the parking brake arms using the included parts (14-49000). The arm with the hook goes on the outside (towards the wheel), the large U-shaped arm goes on the inside of the caliper. Slip the pin through the arm, slip the silver pieces over the pin, then bolt them into the caliper. Use blue Loctite on the bolts and be careful tightening them - it's easy to strip the heads.



23. Bolt the calipers into place, using the rounded-head (36-10780) Allen key bolts (16). Again, use blue Loctite and tighten to 33 lb-ft.

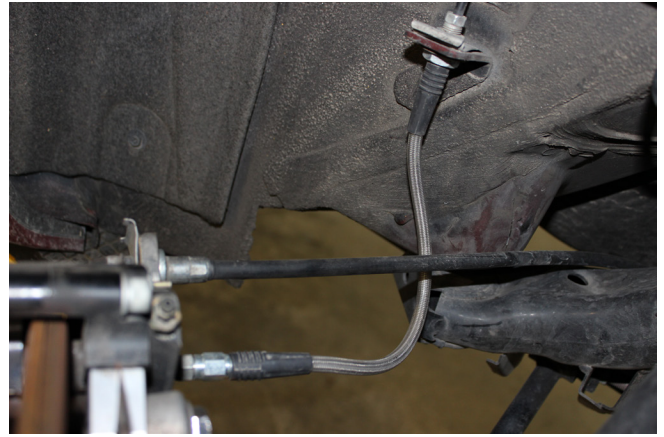


24. Smear a little thread sealant on the fitting that threads into the caliper (don't get any on the first two threads). Thread the fitting (included with 14-66220) into the caliper until it's finger tight, then go 1.5 - 3 turns farther. These are tapered threads, so don't expect it to visibly bottom out on anything (the fitting in the picture is tight). Don't overtorque! (The brake line shouldn't be installed yet.)





25. Thread the brake line (14-66220) onto the fitting installed in step 20. No thread sealant should be used here. Orient it so that the natural curve of the line lines it up nicely with the stock hard line, then get the fitting finger tight. Then use a wrench to turn it a 1/4 turn farther. (The hose shouldn't be connected to the stock hard line yet, nor should the parking brake cable be installed.)



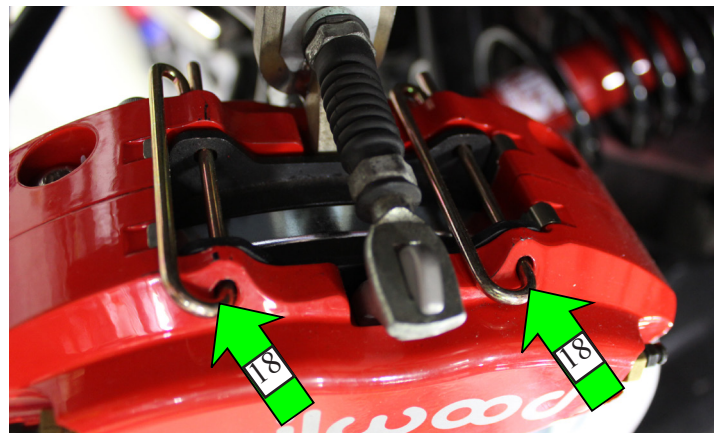
26. Using a 10mm flare wrench, loosen the fitting on the stock hard line where it attaches to the stock rubber soft line. Be very careful not to strip the hex on the fitting - this is especially true if you're not using a flare wrench. This junction will drip brake fluid, but it won't pour out. Remove the metal clip, then slip the rubber hose out.



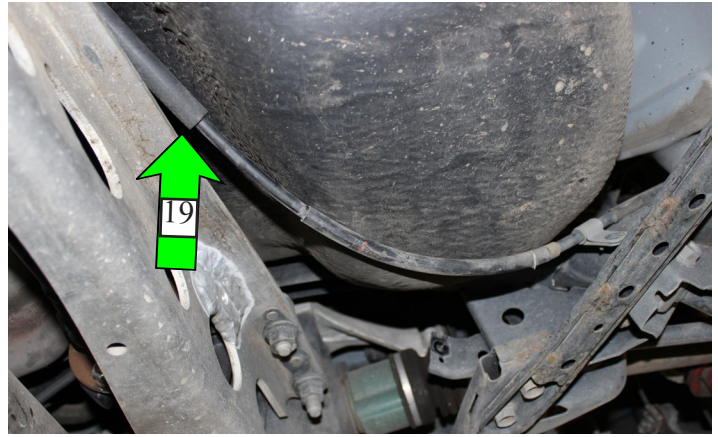
27. Slip the new hose into the bracket, and line it up with the fitting. Get the stock fitting threaded finger-tight (or something close), then reinstall the metal clip. Make sure the large hex in the new line is seated into the cutout on the bottom of the bracket. One corner on both the nut and the receiver in the chassis are rounded, be sure to orient them correctly (17). Tighten the stock fitting to 10 - 16 lb-ft.



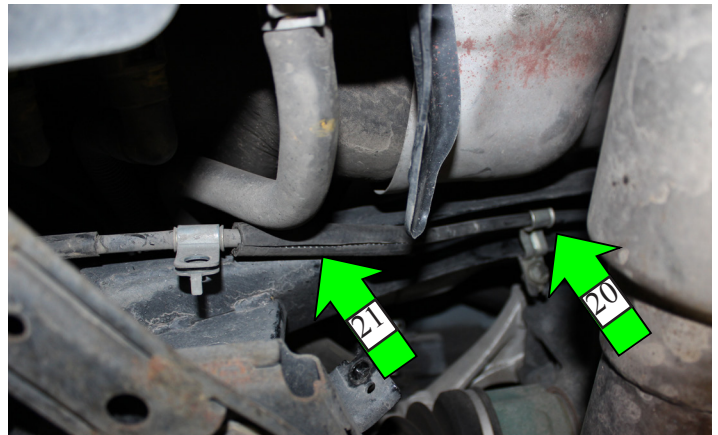
28. Check once more to make sure that no oil / brake fluid / contaminants have gotten onto the rotor. If it's clean, first install the extra brake pad shims. The caliper has one shim pre-installed at each end of each pad slot, but we've found that it's best if you install an extra shim on one end of each pad - i.e., there will be three shims for each pad. Finally, remove the pins in the caliper (18), install the pads, and reinstall the pins.



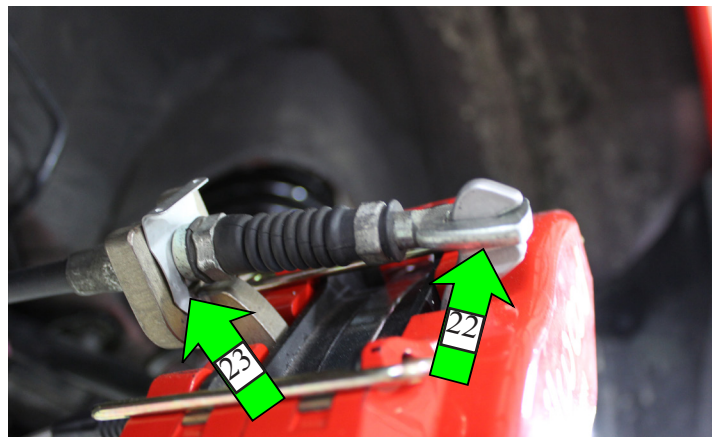
29. Route the driver's side parking brake cleanly up to the caliper - this is the one place where the instructions differ for the two sides. It will need to go over the power plant frame (PPF), under the fuel tank, and in front of the subframe (as shown). Be sure to slit a piece of the 3/8" hose lengthwise and slip it over the parking brake cable (19), where it sits on the edge of the PPF. Zip-tie the hose in place.



30. The passenger's side cable needs to run in front of the subframe as well. Route it as shown, bearing in mind that you'll probably have to pull the cable through the silver retainer (20). Buffer the cable at the subframe, as with the other side, as shown (21). If the evap hose touches the cable, remove it from the charcoal canister, shorten it, and reinstall (not shown).



31. Slip the cable end over the hook (22), then pull the housing out and slip it into the other arm on the caliper (23). Use the new metal clip (14-66310) to hold it in place (23) - don't use the original one, as it's too big. If the new one contacts the wheel, do NOT bend the tab down. That will change the shape of the clip, decreasing its effectiveness. If the clip is too tall, cut off the interfering portion.



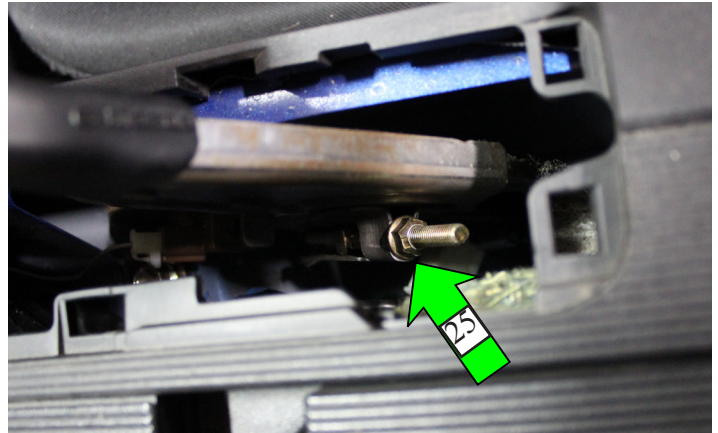
32. Repeat steps 12-26 for the other rear wheel.



33. The parking brake cables should be relatively loose when the brake is released, and the lever should move up about 5 clicks (with moderate force) when you set the brake. If it's too tight or loose, you'll need to adjust the cable. To do this, you must first remove the boot on the parking brake handle. Grasp the rear of the boot and pull straight up. Once the rear pops loose, slide the front of the boot rearward, and pull the boot out of the way.



34. Using a 10mm wrench, spin the nut (25) and experiment until the parking brake is appropriately set (as described in step 33). Once that's set, you're almost done. Be sure nothing will prevent the lever from going all the way down - there isn't much tension on the cables anymore, so it's more likely that your brake light will come on.



Bleeding hints (read these even if you already know how to bleed brakes):

First, a word of caution - **FREQUENTLY CHECK THE FLUID LEVEL IN THE MASTER CYLINDER AS YOU'RE BLEEDING THE SYSTEM TO ENSURE YOU DON'T RUN IT DRY!!** If you introduce air bubbles at the master cylinder, bleeding will become much more complicated. Now that we have that out of the way.. Even if you've only replaced calipers at one end, it's safest to rebleed all four brakes. Start with the right rear wheel, then bleed the left rear, right front, and finally left front (all left / right labels are from the driver's perspective) - you start with the caliper farthest (by measure of brake line length) from the master cylinder and move to the closest. Bleed the inside (the side closest to the chassis / farthest from the spokes of the wheel) of each caliper, then bleed the outside, then move on to the next caliper. You'll never use the lower bleed screws, only the upper screws. You'll have to make a couple of laps of the car. If the pedal feels soft after bleeding, keep bleeding. If the pedal feels soft after a drive, bleed again - sometimes it can be challenging to get all of the air bubbles out. The specific bleeding process is described on the next page.

## How to bleed:

Find a friend and your brake fluid, and make sure all of the wheels are off of the car. Find something to hold brake fluid - preferably clear and easy to fill with brake fluid. It's also easiest if there's a provision for holding a small vacuum hose in place. Put about an inch of fluid in the bottom of the bottle, then push the included hose into the bottle so that the end of the hose is under the level of the brake fluid. Be sure the master cylinder reservoir is full of fluid, and have a friend sit in the driver's seat. Have them pump the pedal 3± times, then hold the pedal down. Starting at the right rear wheel, push the hose onto the top bleeder screw on the inside of the caliper, then open the bleeder (unscrew it roughly a half-turn). Let the air / fluid come out of the caliper until it stops, then close the bleeder. The brake pedal should slowly push down to the end of its travel, and at that point, your friend should hold the pedal down. Once the bleeder is closed, have your friend pump the pedal a few more times, then hold it down. Repeat this process until the fluid flows with no bubbles. Again, frequently check to ensure that you don't fully drain the master cylinder reservoir. Once that's done, move to the outside of the caliper and repeat. Do this for all four wheels, in the sequence described in bleeding hints, then go around again. You want to be as thorough as possible, so run too much fluid as opposed to too little.

## Bedding the pads:

First things first - make sure the wheels have been torqued to 65 - 87 ft-lb. If there's any question at all as to whether this has been done, check all nuts on all wheels. Wheels falling off isn't fun. Once you're driving, do six - ten moderate stops from 30 - 35 mph to warm up the rotors, then do at least two to three fairly hard stops from 50-55 mph. Be sure that you do not let the car come to a complete stop while applying the brakes. If you do, the pads can stick to the rotor and warp it. Do this until the brakes actually fade somewhat - the idea is to get the pads hot and keep them hot for a bit. Once you can smell hot brakes, drive back, letting the brakes cool off, and park the car **WITH THE HANDBRAKE OFF**, for an hour or so.

That's it, you're done! Bear in mind that while this kit does have a parking brake, it's not the strongest thing ever. Park intelligently (leave the car in gear, turn the wheels toward the curb, etc) as conditions dictate. Brake fluid should be changed annually, although different qualities / brands of fluid and different usage may have different service intervals. Follow the recommended interval on the bottle you used, but modify for your usage (e.g., frequent tracking requires more frequent brake fluid changes). If your fluid ever gets dark (assuming you're not starting with ATE Superblue or something similar), it's time to change it. Otherwise, drive the car and have fun!