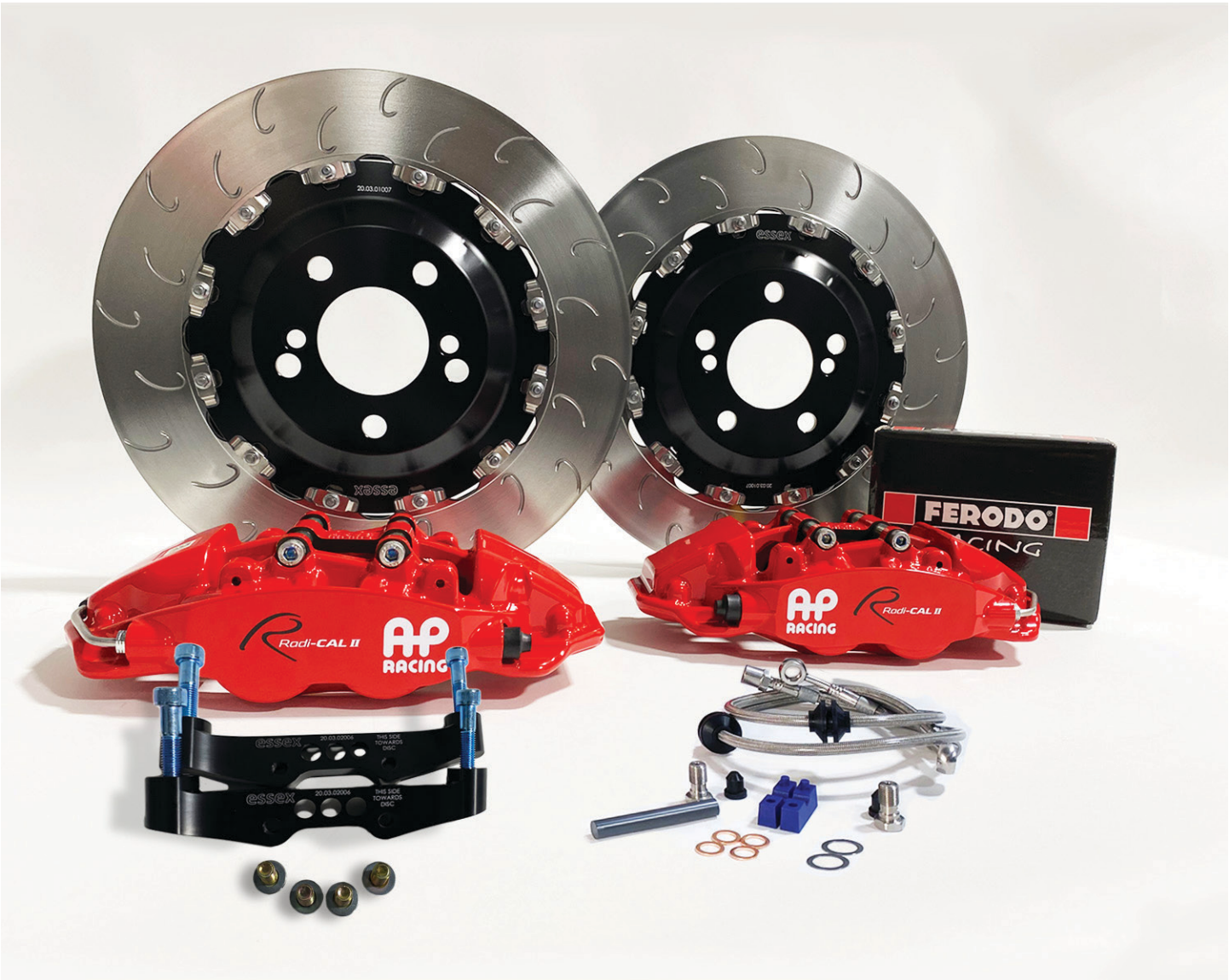
essex

"Race Parts For Your Car"

World Radi-CAL II™ Rear Brake System Installation Guide: 2014-2018 BMW M3/4 (F80/82/83)



20.99.00011

Version 1.0

Warning: Essex brake systems are for *off-road use only*. The components in these systems are not designed for use on public roads.

Disclaimer of Warranty

By purchasing this product and opening this box, purchaser expressly acknowledges, understands and agrees that they take, select and purchase this brake system, parts, and equipment from Essex Parts Services, Inc., its affiliates, suppliers, distributors, and agents (collectively, "Essex") "as is" and "with all faults." The entire risk as to the quality and performance of this brake system, parts, or equipment is with the purchaser. Should the goods prove defective following their purchase, the purchaser assumes the entire cost for all necessary servicing or repair or any resulting liability. Essex is not responsible for any damage, consequential or otherwise, for equipment failure or mal-performance after installation.

Essex makes no warranties whatsoever, expressed or implied, oral or written, to purchasers or any users of these products. Essex expressly disclaims any implied warranty of merchantability or warranty of fitness for a particular purpose, including fitness of these systems, parts or equipment for racing or road use. No warranty or representation is made to the product's ability to protect the user from injury or death. The user assumes all risk.

By purchasing this product and opening this box, purchaser expressly affirms that they are relying upon their own skill and judgment in selecting and purchasing these goods as suitable for purchasers' intended use. Purchaser understands and agrees that no officer, director, salesman, distributor, or agent of Essex has any authority to make any statement contrary to the terms of this disclaimer and agreement. On the contrary, Essex disavows any statement contrary to what is written above.

Installation

The brake system on any vehicle is a safety device. It is strongly recommended that any personnel performing brake-related replacement or maintenance operations should be competent and certified, using proper tools and equipment.

Brake to Wheel Clearance

This brake system is compact but the high offset design of some factory wheels prohibits their use without aftermarket wheel spacers and extended wheel studs/bolts. Some aftermarket wheels may fit over the brake kit without spacers but it is up to the consumer to verify that his or her wheels will work with the kit. Essex has wheel templates available for download at www.essexparts.com. ***The customer is solely responsible for verifying wheel fitment.***

Brake Noise, Vibration, and Harshness (NVH)

Brake noise can be caused by many factors. Following the bed-in procedures outlined in this manual will help reduce brake noise to the extent possible, but keep in mind that high performance brake pads do tend to make more noise than typical OEM pads. The customer is solely responsible for any NVH related problems with the brake system (squealing, scraping, vibration, judder, etc.).

Caliper, Bracket, and Hat Finish

Some components of this system are anodized aluminum, and as such are subject to corrosion when introduced to corrosive agents such as brake fluid, road salt, wheel cleaners, certain soaps, etc. Use caution when cleaning and servicing the system components.

What's in the Boxes?

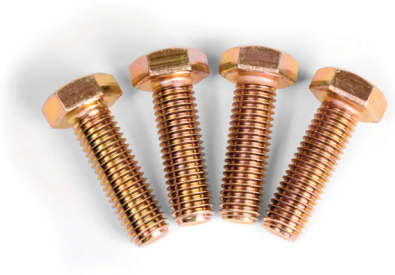
Your brake system is packaged in two separate boxes. With the exception of attachment hardware, driver (left) and passenger (right) components have been intentionally separated for ease of installation:

Box One (Left/Driver) :

(1) Caliper (Essex #; AP#): CP9541-9SO
(1) Disc assembly: 20.04.20008; CP5914-485GA disc with 20.03.01007 hat
(1) Bracket: 20.03.02008

Hardware:

(4) M12x1.75x70mm socket head screws (10.02.00069)(caliper to bracket)
(4) M12x1.75x40mm hex head bolts (10.02.00017) (caliper bracket to upright)
(4) M12 washers (10 10156) (caliper bracket to upright)
(1) Tube of Loctite 271 (red)
(1) Spiegler Stainless Steel Brake line kit (#13.02.06800, left and right side lines are identical)



Box Two (Right/Passenger):

(1) Caliper (Essex#;AP#): CP9541-8SO
(1) Disc assembly: 20.04.10008; CP5914-484GA disc with 20.03.01007 hat
(1) Bracket: 13.03.02008

Required tools

Torque wrenches capable of 150lbs-in to 90 lbs-ft.
Breaker bar- OEM caliper bolt and wheel removal
Punch-Pad retaining pins
16mm box wrench-OE caliper carrier
6mm allen/hex socket/key-disc retaining bolts, AP caliper bridge bolt
19mm box wrenches and/or sockets/ratchet-caliper to spindle bolts
11mm, 14mm, 17mm, flare wrenches-brake line removal/installation
17mm socket- Wheel lug nuts
10mm allen socket- Caliper to bracket socket head screws
7/16”/11 box end wrench- Caliper bleed screw
Rags- Brake fluid
Scotchbrite or small wire brush-cleaning hub faces
Brake fluid cleaning solution
Small Funnel- Brake fluid
Eye protection
Gloves
2 or 3 500ml bottles of brake fluid- Essex recommends AP Racing DOT5.1 fluid
Pair of jack stands- If you can’t figure this out, drop the other tools and walk away!

Note on brake ducts

Essex cannot verify fitment or compatibility of our system with third-party brake duct systems, so please fit and use them at your own risk. If you do plan to use brake ducts in conjunction with our system, ***do not bolt anything between the caliper bracket and the upright***. The caliper bracket was precisely designed to bolt directly against the upright without any shims, spacers, etc.

Installation procedure

Step 1-Wash both brake discs with soap and water

The discs in our system are coated with a water soluble rust inhibitor that must be removed prior to use. Use soap and water to clean them. Dish detergent works well. The discs will start to rust immediately (as they do when you wash your car), so please don’t be alarmed when that occurs.

Step 2-Lift and secure vehicle, remove wheel(s)

- Apply the parking brake and chock the front wheels.
- Put a shop towel under your driver windshield wiper. Don’t remove it until the job is done and you’ve torqued your wheels properly.
- Put on your gloves and eye protection.
- Slightly loosen front wheel lug nuts, but do not remove.
- Lift the rear of the car on a flat, clean, and stable surface per manufacturer recommendations.
- Secure the vehicle on two jack stands, or one if you’d like to install one side at a time.

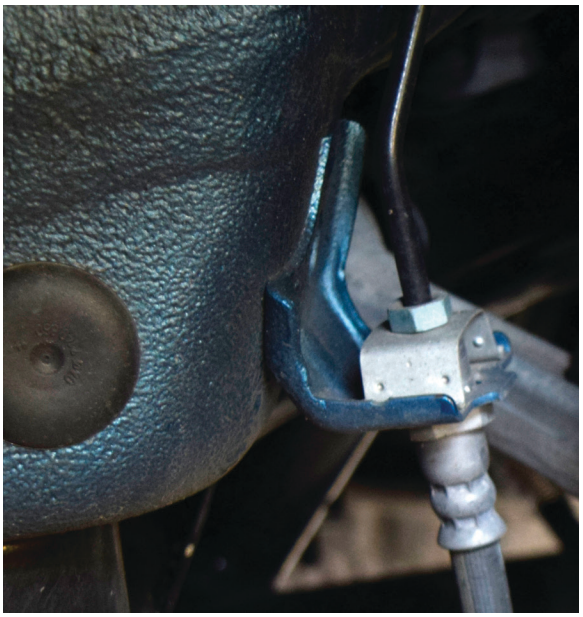
Never leave your vehicle supported with only a floor jack. ALWAYS USE JACK STANDS.

- Remove rear wheel(s).

Step 3-Detach hard line brake connection

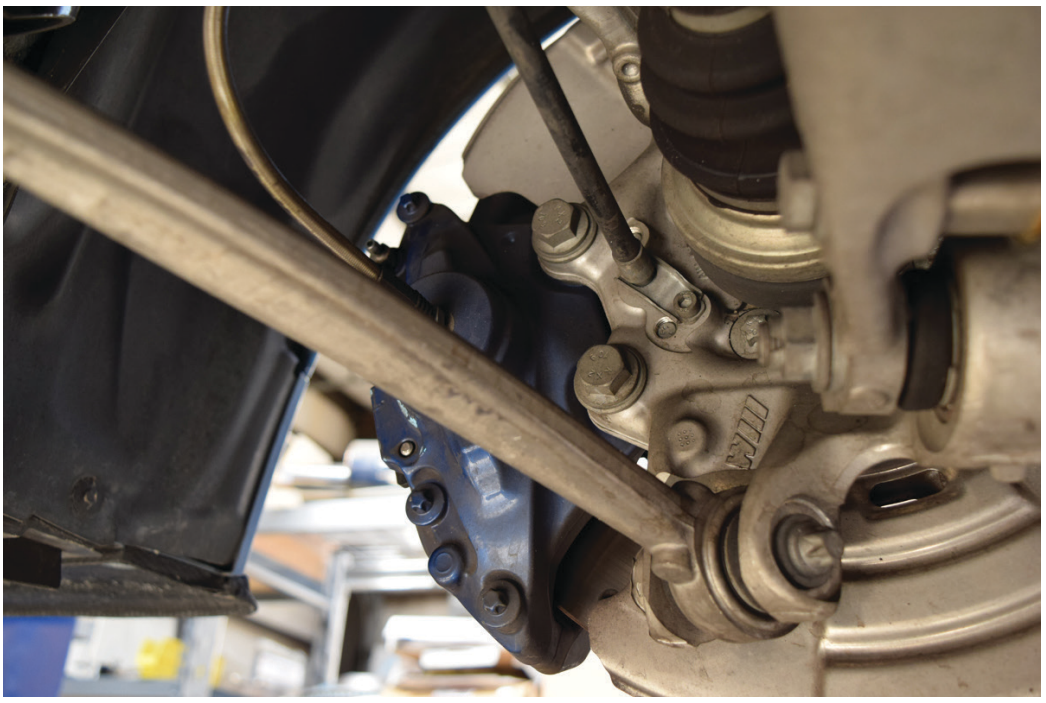
Warning- Brake fluid is corrosive, flammable, and will damage painted and anodized finishes. Clean up all spills immediately.

- Place a tray and/or rags below the brake hard line connection on inner fender well.
- Before removing the OEM brake line, take careful note (or a picture if necessary) of the routing. The Spiegler brake line included with our system will be installed in the exact same orientation.
- Using your line/flare wrench, disconnect factory brake line from hard line connection.
- Immediately cover the hard line attachment point with the provided black rubber caps to halt brake fluid loss.
- Use a small screwdriver, pliers or awl to pry off the clip holding the brake line to the bracket
- Cap the end of the OEM brake line to prevent brake fluid spillage with the supplied rubber line cap.



Step 4 - Remove OE caliper

- Remove brake pad wear sensor (if applicable).
- Use a punch and remove the two pad retaining pins and anti-rattle clip.
- Remove the brake pads.
- Locate and remove the two caliper bolts attached to spindle and using a 16mm wrench/socket remove carrier.
- Remove the caliper and set it aside.
- Remove pads

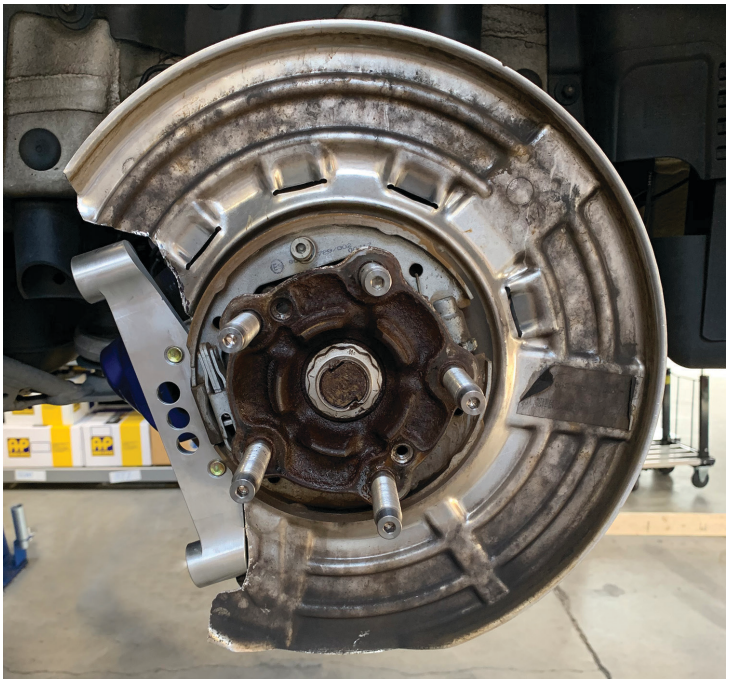


Step 5 - Remove OE brake disc

- Remove disc retaining bolts with 6mm allen. Tip: Use penetrating oil and tap the hex into the bolt to make sure its completely seated.
- Remove OEM disc from hub.
- Using some scotch brite, cleaner (WD-40 works well) and rags, clean the hub face and flange to remove any rust and provide a nice clean and flat surface for your new discs to seat.

Step 6 - Trim backing plate

- The disc backing plate will need to be trimmed in order to fit the bracket and larger rear caliper. Refer to the picture to see minimum amount needed to fit the system
- A set of metal shears or cutting wheel works well.
- Use a hand file or some sand paper to dull the sharp cut edges.



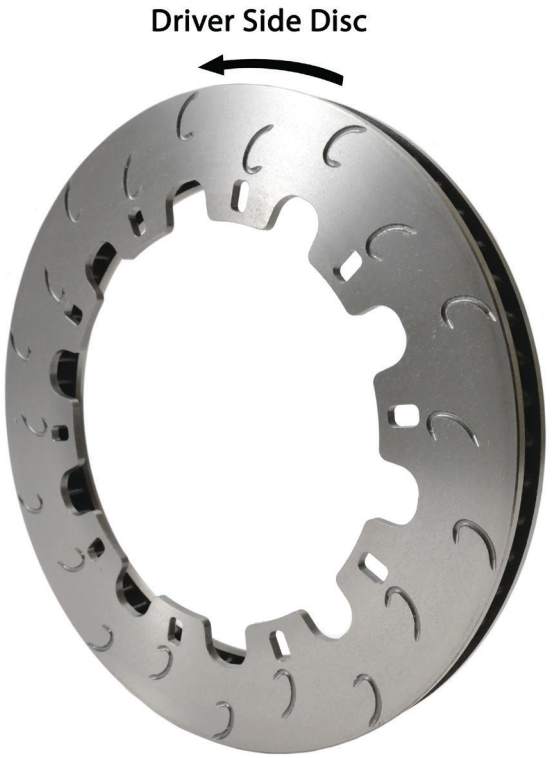
Step 7 - Install caliper bracket

- Apply one small drop of red Loctite™ 271 (red) to the threads of the hex head bolts included with our system (#10.02.00017). Please be aware that excessive use of red loctite will make removal extremely difficult.
- Using a 19mm wrench and the supplied washers (#10 10156), attach the caliper bracket to upright in the orientation indicated on the bracket. The left and right caliper brackets are identical for this application. Make sure that the bracket sits flat against the machined face of the spindle. **Torque to 60lb-ft.**

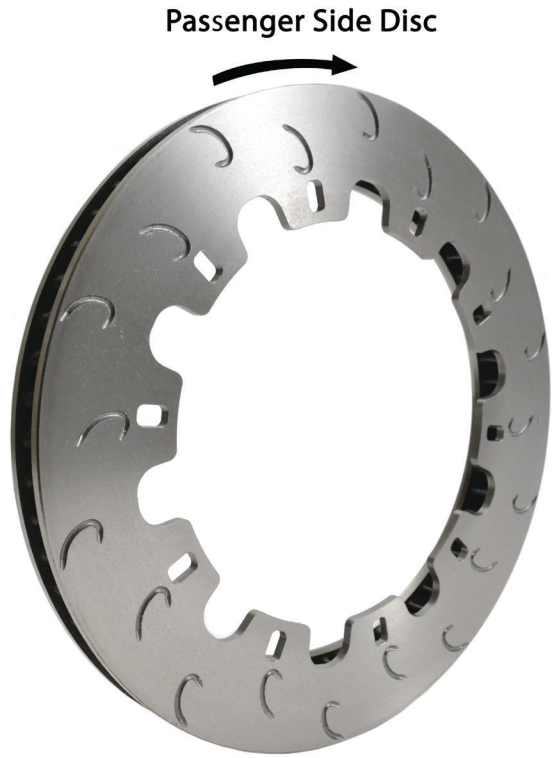
Step 8 - Install AP Racing J Hook racing brake disc

- Install the AP Racing Heavy Duty J Hook 2-piece disc over the hub. To ensure proper airflow and cooling, make sure the discs are on the proper side of the car per the pics below. The J Hook slot pattern and internal vane design can both be used as reference points. Secure with the OE disc retaining screws.

Ex: Driver side/left hand brake disc:

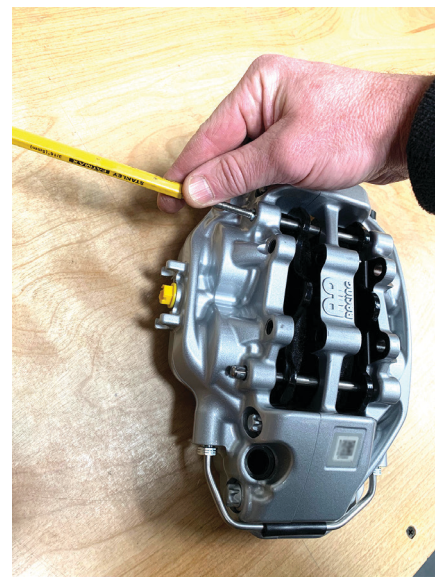


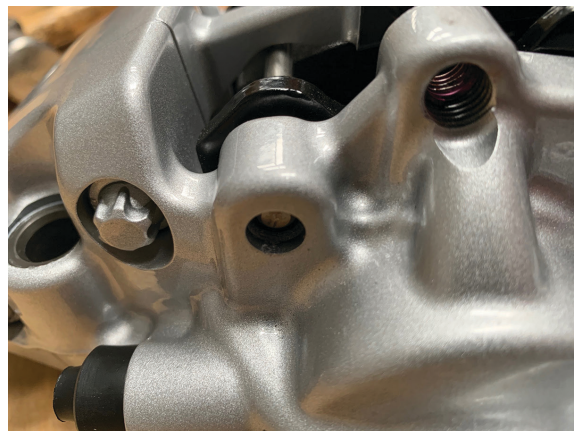
Ex: Passenger side/right hand brake disc:



Step 9 - Install brake pads

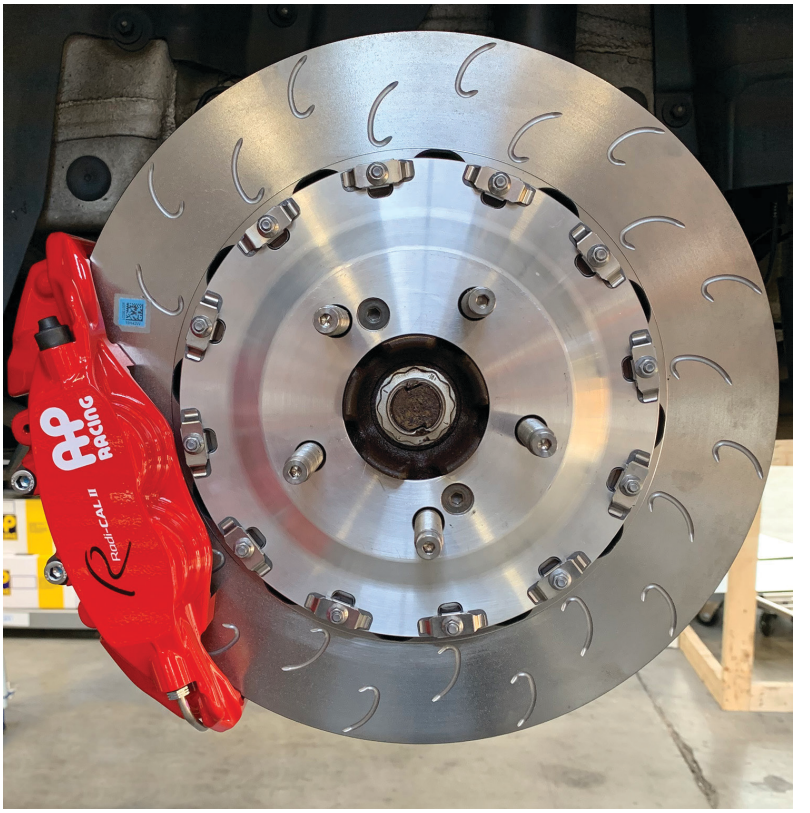
- Due to space constraints on the inboard side of the caliper, its easier to install the pads and pins prior to installing the caliper onto the disc.
- Using a 6mm hex wrench, remove the two caliper bridge bolts and tubes from the top of the caliper.
- Set the included AP Racing brake pads into the calipers with the friction material facing away from the caliper pistons. Installing the pads incorrectly will cause significant damage to the discs and possibly calipers.
- Using a punch and hammer, tap the pad pins into the caliper from the inboard side. You should feel a hard stop as the pins set fully into the caliper.





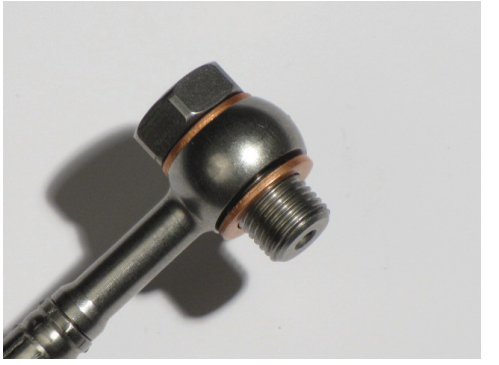
Step 10 - Install AP Racing CP9541 brake caliper

- Verify that you are putting the proper caliper on the correct side of the car. There is an arrow next to the caliper part number that indicates forward disc rotation.
- Seperate the pads in the caliper so that they are up against the pistons.
- Slide the caliper over the disc and using a 10mm allen socket, secure the caliper to the caliper bracket. **Torque to 40lbs-ft (54Nm).**
- Verify that the disc is centered in the caliper pathway and its not contacting the caliper anywhere.
- Make sure the pads sit flush with the top edge of the disc and do not hang over or sit low on the disc face.
- Using a 6mm hex wrench, reinstall the caliper bridge bolts/tubes removed in Step 9 above along with the pad anti-rattle clip. The arrow indicates forward disc rotation. **Torque to 14lbs-ft (19Nm)**



Step 11 - Install Spiegler Stainless brake line

- Install the banjo bolt on the end of the brake line with a copper crush washer on both sides of the line banjo fitting. Hand-thread the bolt into the inlet port on the caliper. We recommend the banjo fitting is pointed down and slightly inboard toward the rear suspension. Torque the banjo bolt with a 14mm socket to **18lbs-ft (25Nm).**



- Remove the rubber cap from the hard line on the car, and insert the brake line into the bracket with the OE tension clip. Hand-tighten the hard line fitting into the Spiegler line. Use a line wrench and 17mm box wrench to tighten the connection. Do not overtighten. Just make sure the connection is snug and leak free.
- Make sure the brake line is not touching anything, binding, or rubbing. If necessary, slightly loosen the banjo bolt at the caliper, and adjust the routing of the line until there is no interference and line has enough slack.
- If line seems twisted, use the supplied plastic blocks and a pair of pliers to twist fitting so that the line is not overly twisted. See brake line packaging for instructions.

Step 12 - Repeat steps 3 thru 10 on the other side of the vehicle

Step 13 - Bleed the brake system

For general use with our system, Essex recommends AP Racing DOT 5.1 brake fluid. For track use Essex recommends R2 or higher racing fluild. All are always in stock and available through Essex and our distributors. We recommend purchasing two to three bottles (standard 500ml size) of your preferred fluid to complete the installation.

The goal of bleeding the brakes is to remove all of the old fluid from the system, replacing it with your new fluid. With a single brake fluid reservoir (which your car has), fluid in the front and the rear of the car will mix. You therefore need to bleed all four corners of the car. The caliper bleeding sequence is to start with the corner of the car furthest from the master cylinder (mc), and work your way closer to the mc: Typically passenger rear, driver rear, passenger front, driver front. For fixed calipers with two bleed screws, the proper bleeding sequence is the outer bleed screw, followed by the inboard bleed screw and then the outer bleed screw one more time. Use a 7/16”/11mm box end wrench on the caliper bleed screws, and an appropriate bleeder bottle (available through Essex).

When tightening the bleed screws during this process, just snug them and do not over-tighten. The final torque value on your last tightening of the bleed screw should be **150lbs-in (17Nm).** An easy rule of thumb is that you should never apply more pressure than you could exert with one finger.

- Make sure brake pads are secured in both calipers.
- Open the top of your brake fluid reservoir, and make sure it is mostly full. At no point during the bleeding process should you allow the level of brake fluid to go below the minimum level marking.
- Have some rags and brake cleaner handy, and place a drip pan, absorbant mat or cardboard below the caliper you are bleeding
- Removed the rubber caps and position your 7/16”/11mm box end over the bleed screw on the passenger rear caliper, followed by the hose from your bleeder bottle.
- With a friend behind the wheel and working the brake pedal, loosen the bleed screw and have your friend pump the brakes to the floor 5 or 6 times to flow some of the old brake fluid out of the system
- You should see some air bubbles flowing through the bleeder hose. Have your friend hold the brake pedal to the floor, and snug the bleed screw back up.
- Check the fluid in your reservoir, and refill to the max line if necessary.
- Tell your friend, “pressure.” S/he will pump the brake pedal slowly 3-4 times and hold down on the last one. Loosen the bleed screw. The pedal will slowly drop to the floor as fluid flows out of the bleed screw. When the pedal hits the floor your friend holds it there, and tells you, “down.” Tighten the bleed screw. Repeat this process until no more air bubbles are flowing out of the caliper. On your friend’s final press, close the bleed screw when his foot is half way to the floor.
- Check the fluid in your reservoir, and refill to the max line if necessary.
- Repeat the pressure procedure on the inside bleed screw on the passenger rear (if applicable) and then the outside one more time.
- Repeat the above procedure in the prescribed caliper order, continually checking the fluid level in your reservoir. It will drain quickly, so keep a close eye on it.
- When you are done bleeding, wipe up any brake fluid on the calipers, lines, etc. with brake clean and rags. It will destroy the finish of any painted surface it touches.
- Fill your fluid reservoir to the max line and tighten the cap.
- Have your friend apply pressure to the brake pedal, while you examine the connections at all corners of the car for leaks.

Please note: After bleeding the system, a small amount of residual brake fluid can reside inside the bleed screws and/or around the threads. As the calipers heat up, this fluid will force its way out and may look like the calipers are leaking. This is perfectly normal and will go away after a short time. If you experience a spongy pedal or continue to see fluid leaking after a day or so then re-torque the bleed screws to the proper 150lbs-in (17Nm).

Step 14 - Install wheels

Check wheel clearance before tightening. At times adhesive wheel weights inside the wheel barrel could potentially come into contact with your calipers.
Torque your wheels to manufacturer's recommendation.

Step 15 - Safety check

Drive the car at low speeds in a safe location to ensure proper functioning of the brakes.

Step 16 - Bedding and preparation

Properly preparing your new brake pads before heavy use is extremely important. Please visit www.essex-parts.com/learning-center for detailed bedding information in both written and video format.
The goal of bedding-in your brake pads and discs is to mate them together properly and prepare them for heavy use. When prepared properly, or bed-in, your pads will transfer a thin layer of material to the disc face (transfer layer). The pads in your caliper will then actually ride on that thin layer of pad material you've put down on the rotor, rather than rubbing directly on the iron rotor face. A good transfer layer is going to give you superior brake pedal feel, less noise, superior pad wear, and lower the chances of cracking your discs.

Important Notes- PLEASE READ!

First, make sure you have a safe location to perform a proper bed-in. You need a stretch of asphalt with long straights, good visibility, and no potential obstructions. Make sure you are in a position to safely, legally, and repeatedly hit the necessary speeds to perform the bed-in procedure. A controlled racetrack is the best place to perform this procedure. AP Racing and Essex in no way suggest or condone speeding or breaking the law in your car, nor do we take responsibility for any damage or injury that occurs as a result of using our product or these procedures. You are performing the bed-in procedure at your own risk. For complete details, please read the Disclaimer of Warranty located on the first page of this document.

Bed-in Procedure:

During these procedures, it's critical that you never come to a complete stop with your foot on the brake pedal. If you have brake ducts on your car, you may want to block them off to allow your brake system to heat up easily.
The procedure outlined below is a generic procedure for most types of mild race pad. Please check your pad manufacturer's recommended bed-in procedure.

1. Accelerate to approximately 60mph and then decelerate down to 5 mph. If your car has ABS, you should try to hold the brakes at a point just before ABS intervention.
2. Once the car slows to 5mph, immediately accelerate back up to about 60mph, and brake again to roughly 5mph.
3. Repeat this series of stopping and accelerating 8 to 10 times. Again, do not come to a complete stop with your foot on the brake pedal.
4. Cool the brake system down by cruising at 45mph+ for 5 to 10 minutes.
5. Visually inspect your discs. They should be a blue/grey color (instead of shiny silver), and have an even layer of pad material across and around the entire rotor face.
6. If the pads don't have a layer of pad material on them, perform another series of stops in the manner outlined above.

For more details, photos, theory discussion, and video instruction on bedding-in brakes, please visit www.essexparts.com/learning-center

Notes:

Thank you again for choosing Essex and AP Racing. If you need any assistance, please call customer support at 704-824-6030 or email: support@essexparts.com.