essex

"Race Parts For Your Car"

Radi-CAL™ Rear Competition Brake System Installation Guide: McLaren MP4-12C, 650S, 720S

13.99.00068

Version 1.0

Warning: Essex Competition kits 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 plated steel, 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?

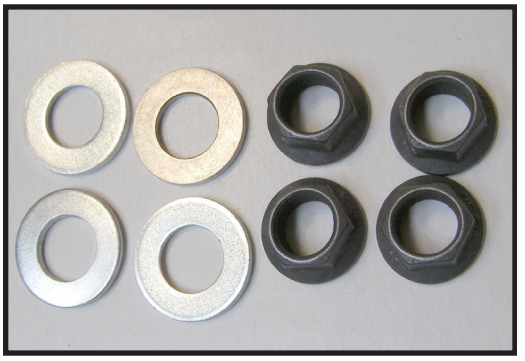
Your brake system is packaged in two separate boxes. With the exception of attachment hardware, driver (left) and passenger (right) components have been intentionally separated for ease of installation:

Box One (Left/Driver) :

(1) CP9449 Caliper (Essex#;AP#): 13.05.20051; CP9449-3S4L
(1) Disc assembly: 13.04.20085; CP5772-1017GA disc with 13.03.01087 hat
(1) Caliper Bracket: 13.03.02065 with attached studs

Hardware:

(4) M10 washers (#10 10154)
(4) M10 jet nuts (#10.02.00001)
(4) M12x45mm hex head bolts (#10.02.00039)
(4) M12 flat washers (#10 10156)
(4) Parking brake pad shims
(1) Tube of Loctite 271 (red)
(1) Tube of Loctite 596 Hi-Temp RTV



Box Two (Right/Passenger):

(**1) CP9449 Caliper (Essex#;AP#):** 13.05.20050; CP9449-2S4L with clearance cut.
(1) Disc assembly: 13.04.10085; CP5772-1016GA disc with 13.03.01087 hat
(1) Caliper Bracket: 13.03.02065 with attached studs

Required tools

Torque wrenches capable of 150in/lbs
Breaker bar- OE caliper bolt
12mm socket - OE wear sensor bracket
E14 female torx key socket - OE caliper bolts
15mm socket/wrench - OE parking caliper bolts
7mm socket - brake duct retaining screws
T30 torx bit - disc retaining screws
19mm socket w/ratchet - bolt bracket to upright
6mm hex key wrench/socket- Caliper bridge bolt
Small saw/dremel - trim OE brake duct
12mm socket- Caliper stud nuts
14mm socket- Banjo Bolt
7/16”/11mm box end wrench- Caliper bleed screw
Bungee/rope/hanger - hang OE caliper out of the way
Rags- Brake fluid
Brake fluid cleaning solution
Small Funnel- Brake fluid
Eye protection
Gloves
2 or 3 500ml bottles of brake fluid- Essex recommends AP Racing R3 or R4 brake 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, please ***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. If you are bolting a brake duct to the upright, please attach it on the back side of the upright. Also, please make sure that you are maintaining enough thread engagement on the bolts holding the caliper bracket to the upright.

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)

- 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 rear wheel lug nuts, but do not remove.
- Lift the rear of the car on a flat, clean, and stable surface per manufacturer recommendations. Be mindful of the front overhang.
- Secure the vehicle on two jack stands, or one if you’d like to install one side at a time.

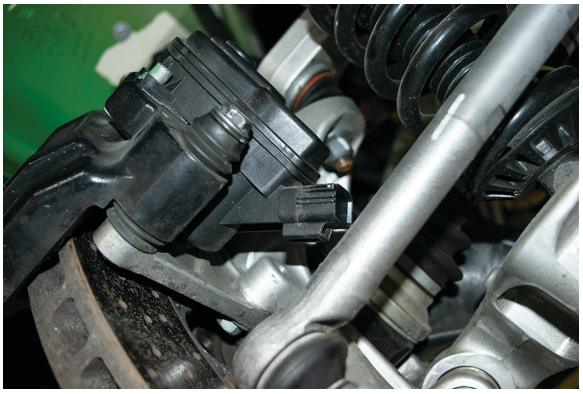
Never leave your vehicle supported with only a floor jack. ALWAYS USE JACK STANDS.

- Remove rear wheel(s).

Step 3 - Remove OE caliper

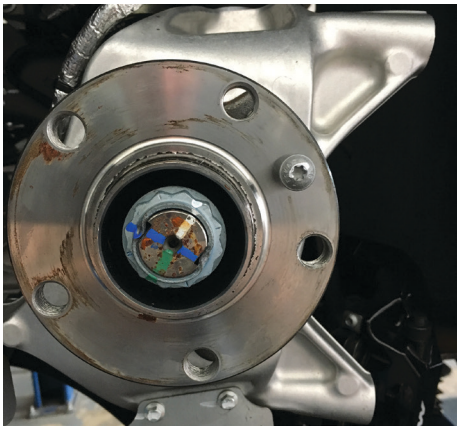
- Using a punch, remove the pad retaining pins (tap outside-in-side), and pad rattle clip.
- Unclip brake pad wear sensor at the bracket. Using a 12mm socket unbolt the wire clamp from the back of the caliper. Sensor will need to tied out of the way.
- Remove pads from the caliper and set aside.
- Using 7mm socket, remove the duct screw from the back of the caliper
- Using the E14 torx bit, loosen the caliper bolts and remove lift the OE caliper off the disc.
- Using a bungee, rope, coat hanger, etc, hang the caliper inside the wheel well for now being sure not to put stress on the line.

Step 4 - Remove OE parking brake caliper



- Using a small screwdriver, remove the two R-clips holding the pad retaining pins.
- Slide the pins out while holding the anti-rattle clip (clip will be under tension).
- Remove the pads.
- Unplug electrical connector from the back of the caliper. Using the 15mm socket/wrench, loosen the parking brake caliper bolts and remove the caliper.
- Set the parking brake caliper aside for now.

Step 5 - Remove OE brake disc



- Use T30 Torx bit to remove disc retaining screws.
- Remove OEM disc from hub.
- Using some scotch brite, cleaner (WD-40 works well) and rags, clean the hub face, flange and caliper mounting surfaces to remove any dirt or rust and provide a nice clean and flat surface for your new discs and calipers to seat.

Step 6 - Trim brake duct

- The section of the OE brake duct that connects to the OE caliper may need to be trimmed away to allow the Pro5000R caliper to sit down on the bracket.

Step 7 - Install Essex caliper bracket

- Apply one small drop of red Loctite™ 271 (red) to the threads of the bolts included with our system (#10.02.00039). Please be aware that excessive use of red loctite will make removal extremely difficult.
- With the 12mm flat washers (10 10156) under the bolt heads and hand thread into the spindle securing the bracket to the spindle
- Make sure that the bracket sits flat against the machined face of the spindle. **Torque to 65lb.-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 disc assembly with the OE retaining screws.

Ex: Driver side/left hand brake disc:

Ex: Passenger side/right hand brake disc:

Step 9 - Install AP Racing CP9449 rear brake caliper

- Verify that you are putting the proper caliper on the correct side of the car. The smallest piston should be the first piston in the direction of forward disc rotation. There is an arrow on the inboard side of the caliper that indicates forward disc rotation.
- Using a 6mm hex wrench, remove the pad tension bolt from the top of the caliper.
- Slide caliper onto bracket studs making sure it seats flat onto bracket.
- Using a 12mm socket and the supplied washers (#10 10154), secure the caliper to the caliper bracket with the jet nuts (#10.02.00008). **Torque to 23lb-ft.**

Step 10 - Attach brake line

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

- Using a 14mm box/line wrench, unbolt the banjo on the back of the OE caliper.
- Use a new a copper crush washer on both sides of the line banjo fitting.
- Hand-thread the bolt into the inlet port on the caliper. Make sure the line does not contact any suspension or driveline components. Tighten enough to stop any leakage. Clean up any spilled brake fluid.
- Make 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.
- Torque the banjo bolt with a 14mm socket to **18-22ft.-lbs.**

Step 11 - Install brake pads (DO NOT SKIP THIS STEP)

- Slide brake pads into the calipers.
- Due to the very tight tolerances it may be necessary to slightly loosen the caliper nuts when installing new pads on new discs. Be sure to retorque the caliper to 23 ftlbs.
- Make sure the pads sit flush or very slightly above the top edge of the disc and do not over hang by a large amount or sit low on the face. See picture to the right of properly aligned pads in the caliper.
- If you do not install your pads during this step, you will potentially have a big mess on your hands when you attempt to bleed your brakes!
- Using a 6mm hex wrench, reinstall the pad retention blocks and bolt removed in Step 8 above. **Torque to 115 in-lb (13.1 Nm)**

Step 12 - Install Parking brake caliper

- Re-install the OE parking brake caliper without pads. Torque to factory specs.
- Out of an abundance of caution, Essex supplies brake pad shims for the rear parking brake pads due to our disc being 2mm narrower than the OE carbon-ceramic disc.
- Using the provided high temperature RTV silicone, apply a few small dabs to the pad bakcing plate and attach the shim to the back of the OE parking brake pad. Follow RTV instructions for set time.
- Reinstall the OE parking brake pads with shims along with the pad retention pins and anti-rattle clips.
- Reattach the R-clips into the pad retaining pins.

Step 13 - Repeat steps 3 thru 11 on the other side of the vehicle

Step 13 - Bleed the brake system

For use with our system, Essex recommends AP Racing R3 brake fluid or AP Racing R4 brake fluid. We recommend purchasing three bottles (standard 500ml size) of your preferred fluid to complete the installation. Do not mix Castrol SRF with any other brake fluids.

The goal of bleeding the brakes is to remove all of the old fluid from the system, replacing it with fresh 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: Generally Passenger rear, driver rear, passenger front, driver front, but a quick glance at the hard lines will tell you for certain. The proper bleeding sequence is the lower bleed screw, followed by the upper bleed screw. Use a 7/16"/11mm box end wrench on the caliper bleed screws, and an appropriate bleeder bottle (available through Essex). When loosening and 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 150 lb-in.**

- Make sure brake pads are secured in all 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 or cardboard below the caliper you are bleeding
- Position your box end wrench over the lower bleed screw on the furthest caliper away from the master cylinder), 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 pedal a few times slowly and then hold pressure on the brake pedal. 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. Do not allow your friend to lift the pedal until the bleed screw is closed. Repeat this process a few times 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 this procedure on the upper bleed screw on the passenger rear.
- 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.
- Due to the internal fluid passages in the Radi-CAL™ calipers, air can sometimes get trapped inside the caliper. We recommend doing a quick re-bleed of the calipers after the intial test drive to be sure all of the air is bled out.

Please note: After bleeding the system, there will remain a small amount of residual brake fluid 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 150 in/lbs.

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 previous 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 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 Mon-Fri 8am-5pm, or email support@essexparts.com