essex

"Race Parts For Your Car"

Radi-Cal™ Competition Brake System Installation Guide: VW GTi

13.99.00041

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.

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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

The 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):

MKVI GTi

13.01.10052 Kit CP9660 with 355mm disc
(1) Caliper (Essex #; AP#): 13.05.20057; CP9660-3S4L
(1) Disc assembly: 13.04.20055; CP5773-103GA disc with 13.03.01056 hat
(1) Bracket: 13.03.02034 with attached studs

MKVII GTi

13.01.10056 Kit CP9660 with 355mm disc
(1) Caliper (Essex#;AP#): 13.05.20033; CP9660-3S4L
(1) Disc assembly: 13.04.20055; CP5773-103GA disc with 13.03.01049 hat
(1) Bracket: 13.03.02034 with attached studs

13.01.10057 Kit CP9668 with 355mm disc
(1) Caliper (Essex#;AP#): 13.05.20037; CP9668-3S7L
(1) Disc assembly: 13.04.20055; CP5773-103GA disc with 13.03.01049 hat
(1) Bracket: 13.03.02034 with attached studs

Box Two (Right/Passenger):

MKVI GTi

13.01.10052 Kit CP9660 with 355mm disc
(1) Caliper (Essex#;AP#): 13.05.20056; CP9660-2S4L
(1) Disc assembly: 13.04.10055; CP5773-102GA disc with 13.03.01056 hat
(1) Bracket: 13.03.02034 with attached studs

MKVII GTi

13.01.10056 Kit CP9660 with 355mm disc
(1) Caliper (Essex#;AP#): 13.05.20032; CP9660-2S4L
(1) Disc assembly: 13.04.10055; CP5773-102GA disc with 13.03.01049 hat
(1) Bracket: 13.03.02034 with attached studs

13.01.10057 Kit CP9668 with 355mm disc
(1) Caliper (Essex#;AP#): 13.05.20036; CP9668-2S7L
(1) Disc assembly: 13.04.10055; CP5773-102GA disc with 13.03.01049 hat
(1) Bracket: 13.03.02034 with attached studs

Hardware:

(4) M12 small OD washers (#10.02.00009)
(4) M12 jet nuts (#10.02.00008)
(4) M14 hex head bolts (#10.02.00014, **40MM long for MkVI**) or (10.02.00040, **55MM long for MKVII**)
(4) M12 flat washers (#10 10156)
(1) Tube of Loctite 271 (red)
(1) Spiegler Stainless Steel Brake lines (#13.02.8300, MKVI, 13.02.8400, MK VII, left and right side lines are identical)

Required tools

Torque wrench capable of 10-105 lb.-ft.
Breaker bar- OEM caliper bolt and wheel removal
Med-large flat head screwdriver – pad rattle clips (if applicable)
19mm socket - Wheel lugs
T30 Torx key/socket – Disc retaining screws
13mm socket/wrench-Caliper guide pins
21mm wrench/socket- OEM caliper bracket bolt removal
6mm hex key wrench/socket- Caliper bridge bolt
14mm socket- Caliper stud nuts
19mm wrench/socket- Bolt, caliper bracket to upright
7/16”/11mm box end wrench- Caliper bleed screw
14mm, 17mm and 11mm line wrench- Brake line at fender attachment and caliper attachment
Rags- Brake fluid
Brake fluid cleaning solution
Funnel- Brake fluid
Eye protection
Gloves
2 or 3 500ml bottles of brake fluid- Essex recommends AP Racing Super 600 or AP PRF
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 (part#10 10155).

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 rear 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 front 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.

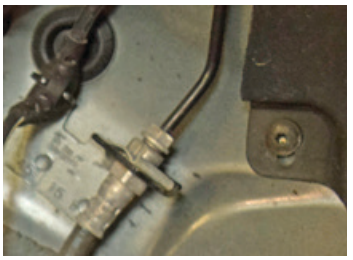
Never leave your vehicle supported with only a floor jack. ALWAYS USE JACK STANDS.

- Remove front wheel(s).

Step 3-Detach hard line brake connection

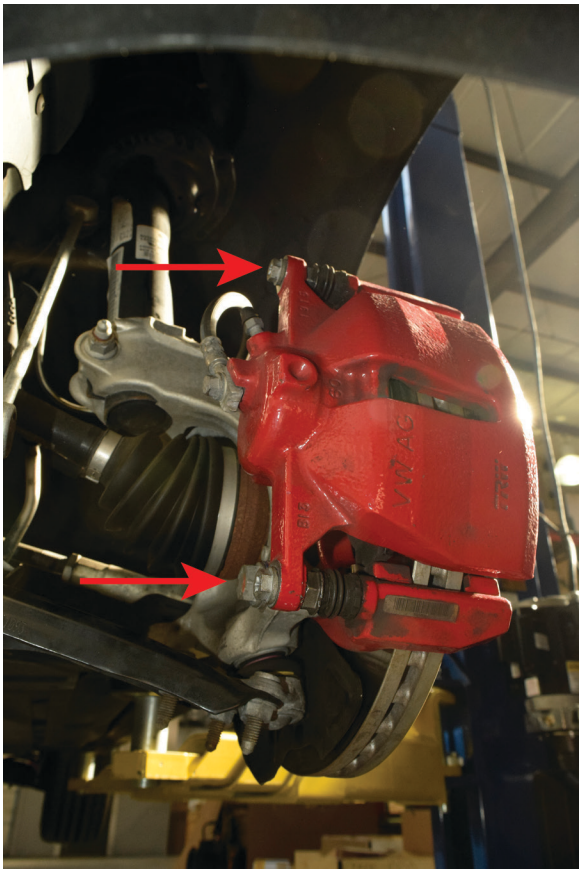
Warning- Brake fluid is corrosive, flammable, and will damage painted and anodized finishes. Clean up all spills immediately.

- 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 or awl to pry off the clip holding the brake line to the bracket
- Plug the end of the OEM brake line to prevent brake fluid spillage with the supplied rubber line cap.



Step 4 - Remove OE caliper

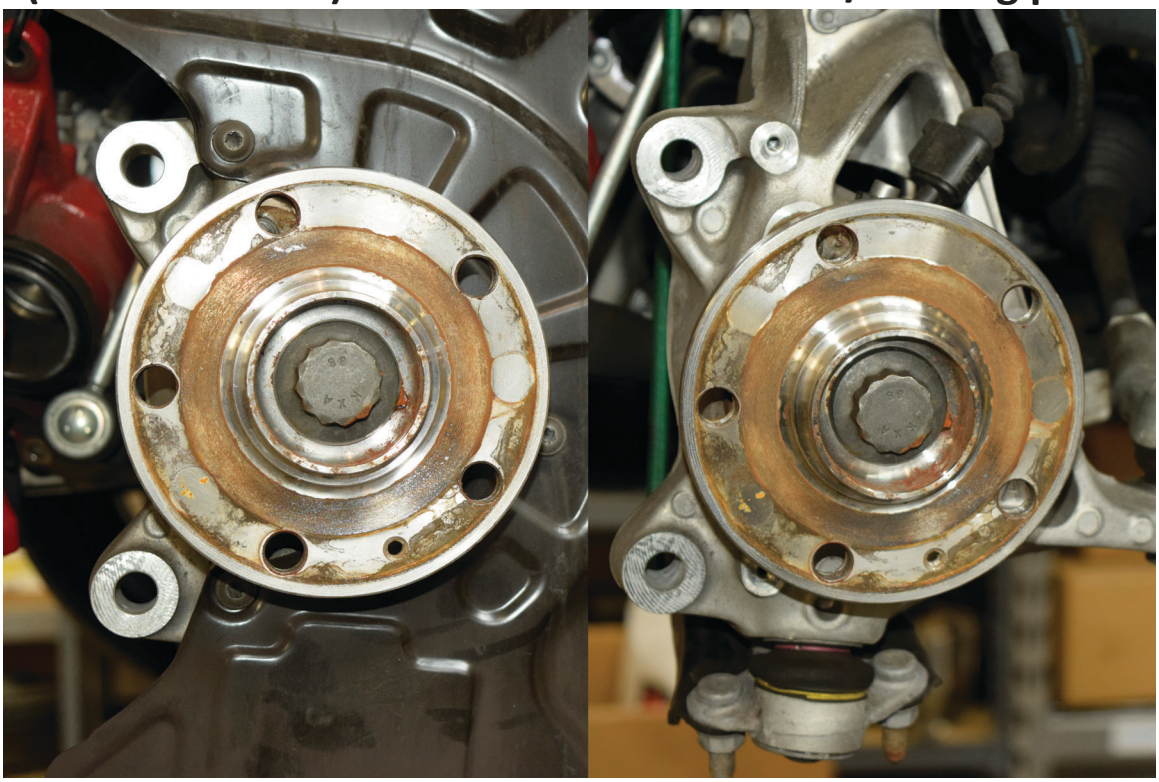
- Remove brake pad wear sensor (if applicable).
- Using a flat head screw driver, carefully remove the pad rattle clip (if applicable).
- Locate and remove the two caliper pins holding the caliper to the carrier with 13mm socket/wrench. You will have to hold the inner hex with a narrow wrench or needle nose pliers.
- Lift the caliper off the disc and set it aside.
- Remove two bolts holding caliper carrier with 18mm wrench/socket
- Remove caliper carrier



Step 5 - Remove OE brake disc

- Remove disc retaining screws with T30 Torx. Be carefull not to strip them. Some penetrating oil and a few taps with a hammer will help
- Remove OEM disc from hub.
- Using a wire brush, 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.

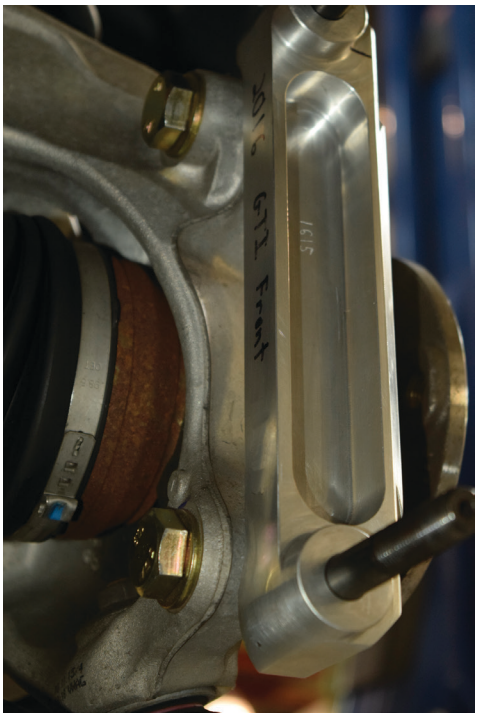
Step 6 (recommended) – Remove OE dust shield/backing plate



- Essex recommends removal of the factory backing plate behind the OE disc. This plate significantly reduces the airflow into the disc center. Using a T30 torx socket, remove the 3 small screws holding the plate to the upright.
- If you choose not to remove the backing plate, you must bend or remove the ears of the plate near the caliper mounting ears for the AP Racing caliper to fit. You may also need to bend the plate slightly inward near the lower ball joint and tie rod end to clear the disc.

Step 7 - Install Essex 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/socket and the supplied washers (#10 10156), attach the caliper bracket to upright in the orientation shown (Driver/Left side shown). 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 100 lb-ft.**



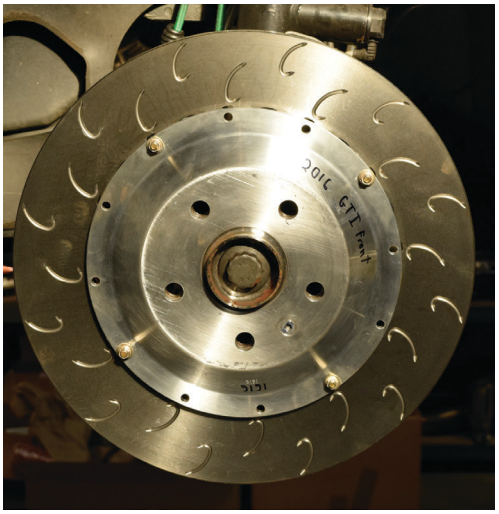
Step 8 - Install AP Racing J Hook racing brake disc

- Install the AP Racing Heavy Duty J Hook 2-piece disc over the wheel studs. 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.

Ex: Driver side/left hand brake disc:

Ex: Passenger side/right hand brake disc:

Driver side shown installed:



Step 9 - Install AP Racing brake caliper

- Verify that you are putting the proper caliper on the correct side of the car. The smallest pistons will be on the leading side in the standard forward rotation of the disc.
- Using a 6mm hex wrench, remove the two pad retention bolts from the top of the caliper.
- Slide caliper onto bracket studs making sure it seats flat onto bracket.
- Using a 14mm socket and the supplied washers (#10.02.00009), secure the caliper to the caliper bracket with the jet nuts (#10.02.00008). **Torque to 40 lb-ft**.

Step 10 - 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. Torque the banjo bolt with a 14mm socket to **18-22 lb-ft**.
- Remove the rubber cap from the hard line on the car, and insert the brake line into the bracket. Hand-tighten the hard line fitting into the Spiegler line. Use the 13mm line wrench and 14mm box wrench to tighten the connection. Do not overtighten. Just make sure the connection is snug and leak free. Install retaining clip.
- Turn the steering wheel lock-to-lock, and 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.
- 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 11 - Install brake pads (DO NOT SKIP THIS STEP)

- Slide the brake pads into the calipers. Make sure the pads sit flush with the edge of the disc and do not over hang or sit low on the disc face. 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 bolt removed in Step 7 above. **Torque to 9.7 lb-ft (13Nm)**

Step 12 - Repeat steps 3 thru 10 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. Both are always in stock and available through Essex and our distributors. We recommend purchasing 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: Passenger rear, driver rear, passenger front, driver front. 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 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 apply pressure to 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. 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 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 115 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 discs 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.