



JWest Engineering “Perfect Balance” Brake System

Installation Instructions

jwestengineering.com

3.5 Inch Front Caliper Mount Bolt Spacing

WARNING

IT IS THE RESPONSIBILITY OF THE PERSON INSTALLING ANY BRAKE COMPONENT OR KIT TO DETERMINE THE SUITABILITY OF THE COMPONENT OR KIT FOR THAT PARTICULAR APPLICATION. IF YOU ARE NOT SURE HOW TO SAFELY USE THIS BRAKE COMPONENT OR KIT, YOU SHOULD NOT INSTALL OR USE IT. DO NOT ASSUME ANYTHING. IMPROPERLY INSTALLED OR MAINTAINED BRAKES ARE DANGEROUS. YOU, OR THE PERSON WHO DOES THE INSTALLATION, MUST KNOW HOW TO PROPERLY USE THIS PRODUCT. IT IS NOT POSSIBLE FOR REMOTE TECHNICAL HELP TO UNDERSTAND OR FORESEE ALL THE ISSUES THAT MIGHT ARISE IN YOUR INSTALLATION. RACING EQUIPMENT AND BRAKES MUST BE MAINTAINED AND SHOULD BE CHECKED REGULARLY FOR FATIGUE, DAMAGE, AND WEAR. THIS KIT HAS NOT OBTAINED APPROVAL AND/OR CERTIFICATION IN ANY REGIONS AND COUNTRIES, THEREFORE ANY LOCAL RESTRICTIONS AFFECTING THE SYSTEMS MODIFIED WILL BE ASSUMED TO RENDER THE VEHICLE OPERABLE FOR OFF-ROAD USE ONLY.

CAUTION – Skill Level Expectation

It is assumed that the installer has a basic understanding of automotive brake and suspension systems and has the ability to perform all repair procedures on the stock components (that is, the user could rebuild the factory brake system without help from JWest Engineering instructions). We include some basic how-to to clarify the order of operations, but this does not imply that a novice should attempt this installation.

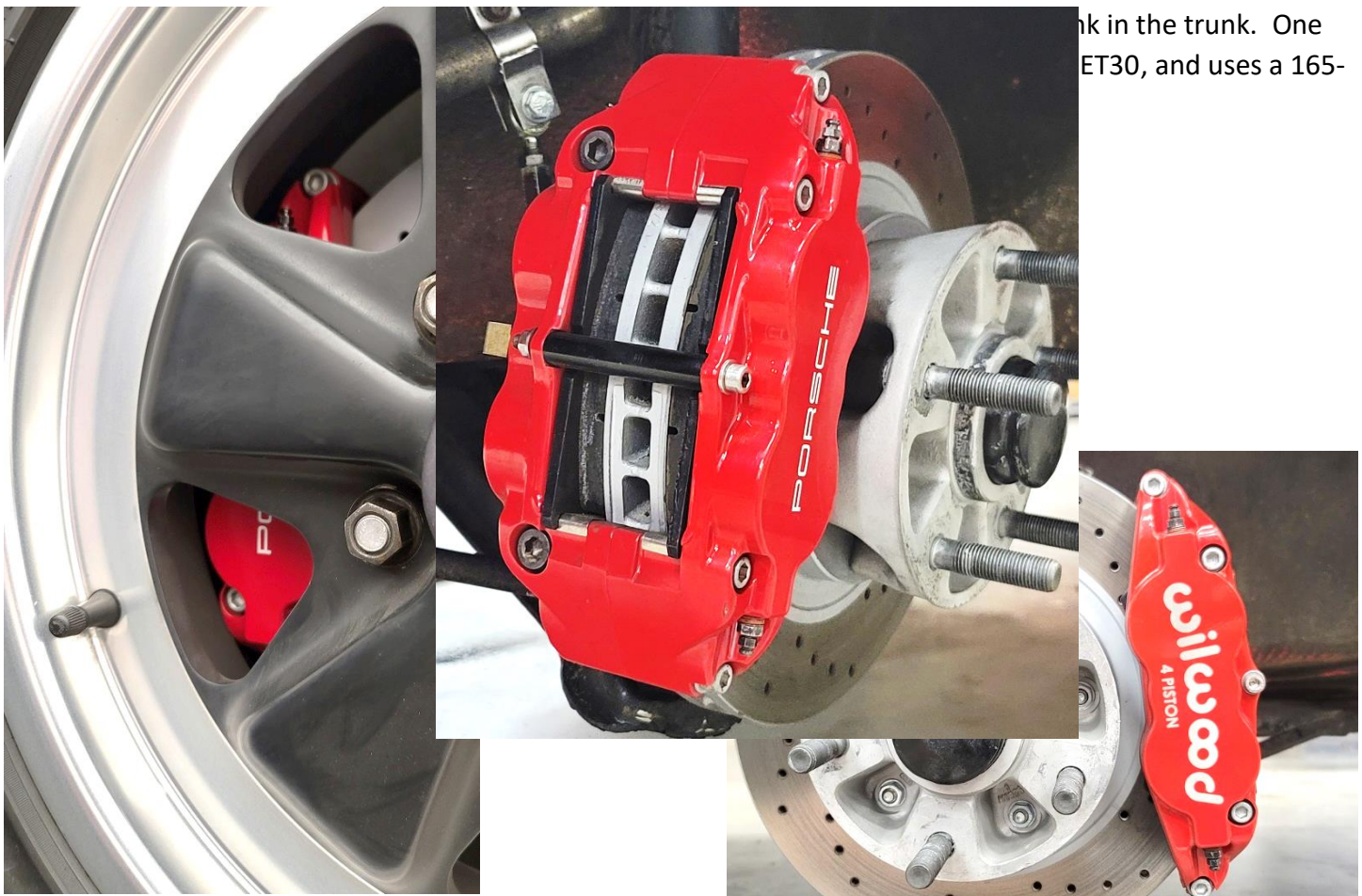
Notes:

- The factory master cylinder size is appropriate for the “Perfect Balance” Brake System. The final hydraulic/mechanical ratios at the caliper are similar to original, both front and rear. The master cylinder sizes recommended are 19.05mm for non-boosted cars, 20.6mm for boosted. Larger 23.8mm master cylinders are available as optional replacements and will result in an increase in pedal pressure for the same stopping force, which certain users may prefer.
- For '84-'89 Carrera, there is a hydraulic pressure regulating valve installed in the forward line going to the rear brakes located near the smuggler's box. This valve will need to be removed to restore proper brake balance. A line from a 911SC or a custom brake line can be installed from the master cylinder to the junction that goes back to the rear brakes. The factory 911SC line is no longer available new, but JWest sells a preformed replacement.
- The “standard” front wheel hub (originally used with '68 and later vented rotors) has a 47mm distance between the wheel mounting surface and the rotor mounting flange. Earlier hubs had 32 and 40mm distances. These can be made to work in some instances, requiring wheel spacers and/or caliper bracket spacers. The best bet is to use the 47mm version, which was made both in the early non-wheel centering version (outtie wheel bearing cap) and the later wheel centering version (innie wheel bearing cap).
- This kit is only for '69-later LWB (Long Wheelbase) rear trailing arms, aluminum or steel.
- Rotors: Front '86 944 Turbo (951.351.041.00). Rear '84-'89 911 Carrera (911.352.041.09).
- Front brakes utilize Wilwood brake pad 150-8855K. BP-10 is the standard street pad material. The Wilwood plate number for the pad is #7416. Use this number if you want to choose a different pad material that Wilwood offers. Other brands also offer pads for these calipers, but be sure to get a pad with 0.65 inch thickness, as 0.8 inch thick pads are also made with the same shape. PAGID are particularly popular with Porsche owners, the shape number is 8195 (17mm thickness).
- Rear brakes use the '84-'89 911 Carrera rear rotors - 24mm thick. 2mm pad shims are included with the rear calipers to utilize the same pads as the front (150-8855K).

- The front and rear calipers have the same size bodies but different size pistons. In order to keep from accidentally mixing up the calipers, we have used slightly different mounting bolts/holes on the front and rear calipers. M10 nuts and bolts are used to mount the front calipers, while 3/8"-24 UNF studs and nuts are used to mount the rear calipers. The mount holes in the front calipers are slightly larger than the rear, so the rear calipers can't be mixed up and installed in the front position. The fronts could be mounted on the rear, but you would realize the error when trying to install rear calipers on the front and the bolts won't slide through the caliper. The 12-point nuts used on both front and rear look similar but have different thread; please don't mix them up. The rear nuts have a smaller flange. We have included a 12-point socket for the rear nuts.



- **Wheels:** Front brakes with the larger rotor and big caliper may pose clearance issues. 15 inch wheels can fit, but may require spacers depending on the inner rim shape. 16" 911 Fuchs typically barely touch just at the edge of the inside diameter transition. A wheel spacer at least 4mm thick and maybe more is required for clearance. 951 16" front Fuchs will clear since they have a different shape than the 911 Fuchs. 16" Phone Dials typically clear. See the clearance diagram as a starting point for wheel clearance. Approximately 3mm clearance is required between the caliper and the wheel. The rear should not pose any clearance issues, but always check when fitting the wheel for the first time. Also, check your spare wheel before you find out it won't work on the side of the road. The steel 15" wheels won't clear in front without a spacer. 15" 944 Turbo/964 aluminum spare wheels with collapsible tire



FRONT:

Items needed that are not included in the kit:

Brake fluid, basic suspension and brake tools (pliers, wrenches, socket set, hammer, drift, gear puller, torque wrench, Allen sockets and/or keys).

- 19mm socket/ratchet for caliper mounting bolts
- 12mm 12-point wrench/socket for caliper nuts
- 8mm hex bit/Allen key for caliper bolts
- 6mm long hex bit or long Allen key for wheel bearing nut
- 13mm wrench/socket for brake shield and rotor mounting bolts
- 11mm flare wrench for brake fittings
- 14mm wrench for original brake hose
- 2-arm gear puller
- Drift or tube and hammer for wheel bearing spacer installation
- Wheel bearing cap removal tool (various types and methods)
- Torque wrenches with range from 7-52 ft-lb (10-70 Nm)
- Grinder/hammer/paint for clearancing A-arm, or offset ball joints, or raised spindle struts
- Brake bleeding equipment (hose in a jar/pressure bleeder/assistant/etc.)

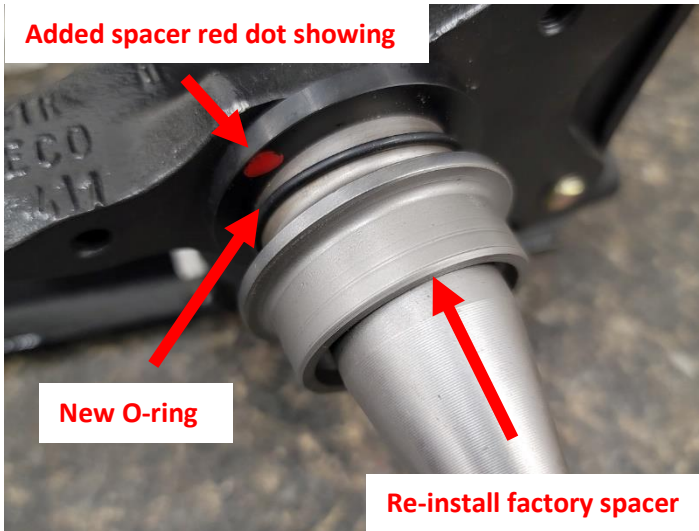
Optional items:

New wheel bearings and wheel bearing seal, saw or snips if retaining the front brake shield, new front brake hoses.

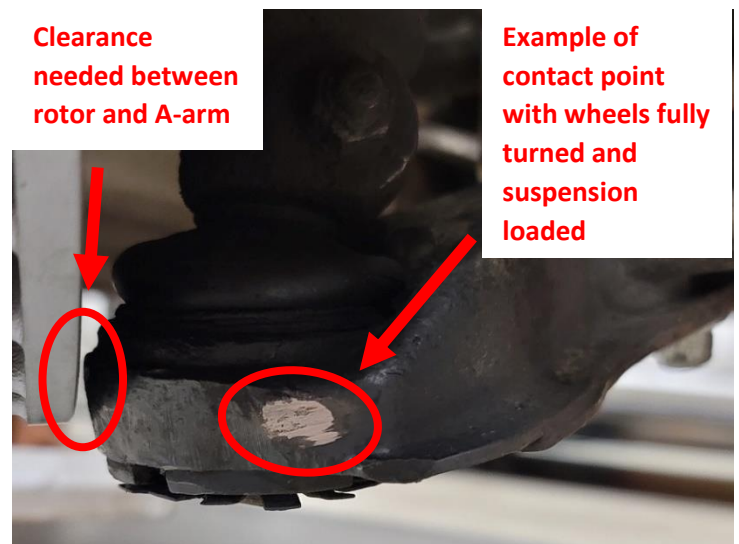
1. Raise and support the front of the car and remove the wheels.
2. Remove the fluid line from the caliper using an 11mm flare wrench. If that connection is stuck, it technically does not need to be removed, but it is less messy for draining the fluid versus the connection to the hose at the strut mount (11mm and 14mm flare wrenches) which will also have to be disconnected at some point. Remove the brake caliper mounting bolts and remove the brake caliper.
3. Remove the wheel bearing cap, loosen the clamping screw on the spindle bearing retaining nut (just enough to release pressure, don't remove the screw) and unscrew the spindle nut. Remove the rotor and hub assembly.
4. Remove the 3 bolts securing the brake rotor sheet metal shield and remove the shield.
5. Remove the brake fluid line attachment from the hose connection on the strut if not accomplished earlier.
6. Using a 2-arm gear puller (or a hammer and drift if you must), remove the wheel bearing seal spacer from the spindle. There is a small overlap at the top and bottom where you can get to the backside of the spacer. Remove the old O-ring from the spindle.



7. Do NOT install an O-ring on the spindle before the new spacer. Install the new spacer onto the spindle with the chamfer facing the flange. The red dot should face out toward you.
8. Install the new O-ring on the spindle. Remove any burrs from the factory wheel bearing seal spacer and install onto the spindle. Drive the spacers all the way on. Do not leave spacers unseated and expect to use the spindle nut and bearings to push the spacers into place as this could damage the bearings.



9. Install the brake caliper adapter using new M12x30mm hex bolts and washers. Torque the bolts to 70 Nm (52 ft-lb) with a 19mm socket.
10. Using 13mm socket wrenches, unbolt the brake rotor from the hub and install the new rotor. Torque the 5 nuts/bolts to 23 Nm (17 ft-lb).
11. Many people discard the brake rotor shield for additional cooling. If you desire to reinstall the shield, trim it using the included template. The flat area above the ball joint (6 o'clock) will need to be reshaped (hammered) away from the rotor for clearance, and the upper area (12 o'clock) can be bent toward the strut to provide clearance. You will need to test-fit the new rotor to confirm clearance. See included images of modified shield. Once fitted, torque the 3 bolts to 23 Nm (17 ft-lb).
12. Install the hub/rotor assembly onto the spindle. Install the spindle nut and tighten enough to fully seat the bearings. Check for clearance between the rotor and the lower control arm near the ball joint. Check this clearance through all suspension and steering motion. It is ok if this clearance is very small (typically 0.5 mm). If the clearance is not acceptable, the outer flange of the A-arm will need to be hammered and/or ground to gain the small clearance. Do this with the ball joint nut installed to support the arm and limit any distortion. Creating the clearance this way has been common practice for many years in the various adaptations of 951 rotors to the 911. Another clearance option is the offset ball joint sold by Elephant Racing, which will increase clearance by about 2.5mm and afford more negative camber. If you



have raised spindles, the rotor will be moved above the control arm so clearance should not be an issue.

13. Set the wheel bearing play. The factory method to set the play is to rotate the disc/hub and tighten the spindle nut in small increments until the thrust washer can barely be moved back and forth with a direct push with the tip of a screwdriver. Do not pry or twist the screwdriver against the wheel hub to move the washer.
14. Torque the spindle nut clamp bolt (the Allen bolt, not the adjusting nut) to 15 Nm (11 ft-lb). Reinstall the bearing cap.
15. Install the new brake hardline on the brake hose at the strut. The end with the red paint goes on the strut side. Pay attention to the direction of the bend on the tube (see image). Leave the fitting a little loose for now.
16. Slide the caliper onto the rotor with the two bolts sliding down through the caliper bracket. Make sure the brake hardline is inserted into the caliper fitting. It is best to get a few threads on the hard line started before seating the caliper all the way, then tweaking the line for final shape/fit. Install the 12-point nuts and torque to 47 Nm (35 ft-lb) using an 8mm hex bit and 12mm socket or wrench to hold the nut. Tighten all the brake line fittings using 11mm and 14mm flare wrenches.
17. Proceed to the rear caliper installation.

