



944 Turbo Front Brake Upgrade for King and Link Suspension

by Ian Swinkels

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Overview

I'd had my turbocharged VW on the road for about 4 months, and it wasn't long before I discovered that stock VW disc brakes don't take long to over heat and fade. My available options to improve my brakes were to import a Custom Speed Parts vented kit (Costly), or try and convert a set of ventilated Porsche brakes. I figured the costs would be similar, but the Porsche braking would be better performing so I decided on the Porsche brakes.

I read all that I could get my hands on and download from the net relating to converting Porsche brakes for a VW, but none of the info I've found relates to King and Link front suspension. It seems that everyone else with a fast beetle doesn't use king and link, their all using ball joint. So I had to figure it out for myself.

There was an article that I read in one of these technical postings that related to converting Porsche 944 brakes for use on a ball joint CB performance spindle. I figured I could use this as a starting point, and work the rest out from there. However what I later found out was that a lot of the information I was reading that had been found on the web was inaccurate. Especially in relation to Porsche part numbers. So which way to go, Porsche 944 or 993/996/Boxter ?

I admit that I like the look of the Porsche 993 brake conversions, but they are just too expensive so I decided to convert a set of 944 brakes instead. Also when you think about it, the 993 brakes are designed for stopping a car that is twice the weight and capable of going twice as fast as the hottest of VW's, so that braking system on a VW would most certainly be overkill. Considering also that a similar caliper to the Porsche 944 Brembo caliper is also used on the Subaru WRX STI's and the Mitsubishi EVO 7's.

Not knowing exactly where to start, but knowing that I would at least be needing hubs and calipers, I ordered a second hand set from a Porsche wrecker. I was very lucky in that the wrecker also provided in a pair of disc's that were beyond machining. Although I couldn't use them on my car, I was able to use them to measure up and plan how I was going to do the conversion.

The hubs, calipers and discs all came from the same '86 944 Turbo. The calipers are the standard Brembo 4 piston type and the discs are 304mm ventilated disc rotors. The parts used are as follows:

- (2) New '86 944 Turbo front rotors, 304mm
- (2) '86 944 Turbo front hubs
- Inner and outer standard Porsche bearings (available at any bearing shop)
- Special grease seal, Outer dimensions to match the Porsche hub, Inner to match the CB Performance spindle. (available at any bearing shop, just take a spindle and hub by when you want to buy the seals)
- New brake pads
- (10) wheel nuts.
- (10) extra long wheel studs, which you will have to cut to length.
- (2) custom wheel spacers, to suit your wheels and applicaiton.

Here is the additional VW parts I had to locate as well:

- (2) CB Performance cast dropped spindles for disk brakes, King and Link type.
- (2) VW Disc brake spindle locking nuts
- (2) VW Disc brake hardened steel friction washers.

This conversion requires some specialist machining, but provided you can explain what you want done to a good machining shop, it's not that difficult to achieve. The calipers also require a little welding to re-shape the mounting points. Other than that, the conversion is simple to do. I say simple because you have to pay someone else to do all the hard work.

To get the hub to fit the CB spindle is easy enough. All that is required is that the inner and outer bearing surfaces be enlarged by using some custom machined bushings, then the spindle will accept standard Porsche bearings and be able to be held in place with all standard VW hardware. The bushings must be machined with very close tolerances so they have to be heated to be put onto the spindle, then when cooled they will never move.

At a first glance the caliper appears to not be able to fit the spindle because the stock upper mounting point on the Brembo caliper interferes with

the steering arm on the spindle. The solution is to cut the upper caliper mount off the caliper and then after measuring up and setting the caliper position, have a new mounting point welded into place.

To get the pistons to operate symmetrically and also to form a new mounting point on the caliper it was necessary to cut a spacer out of 6mm plate aluminium that is shaped to fit the factory caliper mounting point on the CB Performance spindle. It was also necessary to shave about 3mm from the top spindle mounting point on the CB Performance spindle so it didn't interfere with the pads in the caliper.

So with all this done, and the spacers bolted onto the calipers, the calipers were dropped off to an aluminium welding shop to have the mounting points re-formed to the shape of the spacers. The results were excellent, and only required a little bit of shaping with a file to get a perfect fit.



This is the Porsche 944 Turbo 304 mm disc rotor mounted on the Porsche 944 hub. I have also had a pair of 16 mm spacers machined up to allow my Porsche Fuchs to not interfere with the caliper.



Here you can see the upper calliper mount has been shaved of about 3mm material so it doesn't interfere with the brake pads in the Brembo caliper.



A rear view of the spindle, again you can see the trimmed down spindle mount.



This is the spindle with the inner and outer bearing surfaced enlarged with a couple of custom machined bushings. The bushings must be heated to allow them to expand and fit the spindle.



Here is the hub and disc rotor mounted on the spindle.



With the bearing races fully tapped into the bearing faces of the hubs, the disc rotor had about 2mm clearance to the spindle. The less offset change the better.



Excuse my rough picture, but this is supposed to be a picture of the 6mm aluminium caliper spacer that goes between the spindle and the caliper. After getting the fitment correct, I bolted the spacer to the caliper in the correct position so it would be welded into the correct place by the machine shop. I also grinded a deep groove along the joining surfaces where the caliper and the spacer meet.



The black line represents where I had cut a straight line from the top of the caliper to near the bottom caliper mount. This allowed me to then fabricate a 6mm spacer, and then have an aluminium welder build up new mounting points.



The inside view of the completed caliper modification. You can see the spacer shape a little better from this angle. Tip: When you take them to the welder to have them weld up the new mounting point, warn them about the possibility of brake fluid boiling out of the caliper when it gets hot.



You've all seen Porsche calipers before, but this is a picture of mine after I've re-sprayed them. I had removed the pad locking clip and the brass, and blocked them off with 1/8" BSP plastic plugs.



To finish the calipers off and to make them look as factory and un-modified as possible I decided to spend a little time making them look good. After etch priming and surface priming, I wet sanded the calipers with 600 grit paper, then painted them with red Porsche touch-up paint (2 coats). I then carefully exposed the aluminium Porsche and Brembo lettering by filing the red paint off with a flat file. Finally I finished the calipers off with three coats of clear top coat.



Last of all, here is the new brake setup fitted to my '66 bug King and Link suspension. Overall I'd guess the wheel track modification from stock is about 22mm, and an additional 16mm wheel spacers with my wheel spacers.



Completed. The Porsche 15"x6" wheels fit nicely under the stock guards, thanks to a 3" narrowed front beam that I made by using a kit I obtained from www.airspeedparts.com.

After fitting the brakes, I went for a drive to bed in the pads. I've read that the best approach is to accelerate to 100km/h, then brake lightly at first to 20km/h, and repeat 6-10 times braking more heavily each time until you finally braking very hard for the last time. When finished you should be able to smell the brakes cooking.

With the brakes bedded in, they operate very smoothly. I'd estimate they perform about twice as well as the factory VW brakes. The car actually

stops like a "NORMAL" car now. It is such an improvement that I honestly think it is comparable to something late model with power assisted disc brakes.

The pedal did feel a little spongy, but that is probably a little air and also I need to adjust my rear drum brakes. I've read about updating the standard VW dual circuit master cylinder to a Porsche 944 one, but at this stage I don't think it will be necessary.

Even after adjustment though, I expect I will be needing to upgrade my rear brakes from type 3 drums to a disc brake kit of some type. Most likely the CB Performance kit, but who knows, I may decide to upgrade the rear brakes to Porsche ones as well ?

I hope you've all enjoyed my first attempt at writing an article.

Cheers,

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