

# XKE Brake Upgrade using Volvo Calipers

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This describes what I had to do to fit the Volvo Calipers to the front of my 1966 XKE FHC.

I needed to do something with my front brakes and I had four choices.

After doing much research, here is what I found:

Replacing the JAG pots with stainless steel or replacing the calipers with Willwood or similar was very nice, but very expensive. Resleeving them was similarly too expensive though about half of the total replacement option. Simply honing and rebuilding wasn't satisfactory for me because of the critical design problem/ flaw of the rubber sealing against the wall of the caliper hole or "pot" the expensive part to deal with. That would only rust again and cause future problems like I have now.

I had heard of several ways to put the newer 4-pot design brakes on XKEs - the ones that seal against the caliper piston/s instead of the pot wall. These enable a much cheaper rebuild option of new pistons instead of the calipers themselves. Also the newer pistons seem to be chromed or made of stainless steel helping further. Series III XJ6 brakes had been used by several folks, but that necessitated some reconfiguration and welding of the mounting tabs on the uprights and I was looking for something less extreme. I had heard of using the Volvo calipers, but could never get any real info on that procedure. Finally I did contact someone who was very helpful, gave me encouragement and what pictures he had taken and got me started quite a way along the path. But, he used a different method than I did so I had to forge out on my own after a bit. I'll talk about that later.

The Volvo (manufactured by Girling) calipers that fit the XKE use a dual-line setup and there are actually two flexible hoses and two rigid lines that connect to the calipers per side. The XKE has only one line per caliper as do all other Jags I have seen or, indeed, all other cars I have seen. This necessitates the choice of one of two routes:

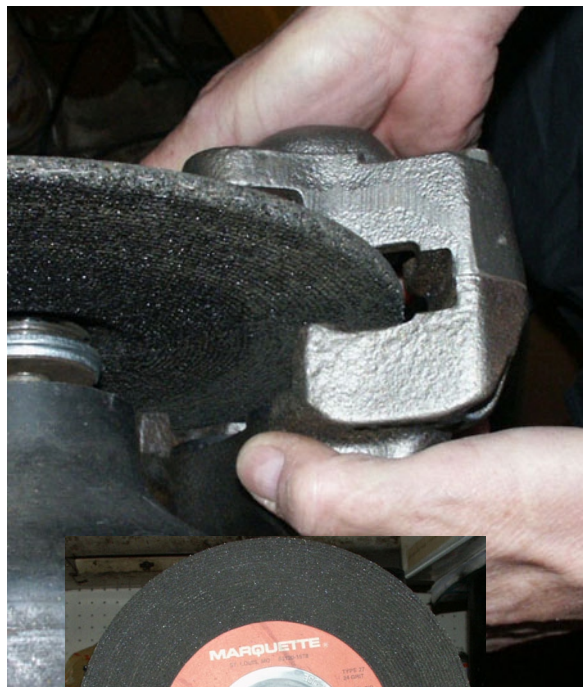
- 1) use two rigid lines into the calipers from the one flex pipe connection on the XKE..... or .....
- 2) separate the halves of the calipers and drill through the walls of the two pots per side creating one fluid route instead of two and connect the calipers as Jaguar did with one rigid line.

There has been much discussion about separating the halves of calipers with much division as to the results of same. The fellow I contacted separated and drilled his and reports no ill affects, but I opted to go the other route and try and do it the two pipe way.

Let me digress a bit here and talk about why use the Volvo calipers. They are of the newer "four-pot" design. They seem to be plentiful in the junk yards and cheap to purchase. I got the whole front end brake set up from an '84 240, (flex and rigid brass lines and all) for \$40 total. I feel It is important to get all the lines as you can use these later in the process. The Volvo calipers also have a wider swept area and, since they are used on the heavier Volvo sedan, they are of more potential stopping power. Two caliper configurations were used on the Volvos and two manufacturers. I was told to get the solid rotor kind of Girling manufacture and NOT the vented rotor kind NOR those of Teves manufacture.

Most importantly, it seems that the Girling calipers used on the Volvo 200 series ('75 -'87 240, 260) have the same three-inch on-center mounting lugs as the XKE. The only difference is that the Volvo holes are very slightly smaller (M12) and have to be drilled out to 1/2" holes to use the XKE 1/2-24 bolts. That certainly is a lot better than reconfiguring your uprights and a whole lot less work. I used a drill press for this and after drilling out the mounting holes the next problem is the backing plate.

As it is, that plate will have to be bent at an angle from the original where the caliper meets it. The resultant pie-shape bends are not critical, as long as you can actually mount the new calipers and I think the amount (relatively small) will become apparent to one doing this. Also the “tabs” for attaching the XKE backing plate will have to be bent a bit to accommodate the thicker mounting “ears” used on the Volvo calipers. Trial and error will show you how much. I did no radical cutting of any part of the backing plate - only bending so it can all go back as original if need be. It seems that the consensus is that the XKE does not need the vented front rotors unless you plan to race it (not my intention). So the solid rotors do just fine. However, if yours are scored or warped then you might consider getting the later Series II rotors as they are 1/2” thick instead of the 3/8” of the S1. I was told that the thicker rotor just means less shimming has to be done to centralize the calipers later. However this has its own problems, I understand, and I haven’t investigated those as I just used my 3/8” rotors. As you try to fit the Volvo caliper you will notice that something else has to give to mount the calipers - the rotor will need clearance somehow as the Jag rotor is of a larger diameter than the Volvo. Again there seems to be choices: grind out the caliper a bit or turn down the rotor itself...or both. Since I was trying to do as little as possible to the original car, I opted to grind out the Volvo caliper. I bought a large diameter metal grinding wheel ( \$8 at a local parts place ) of the kind that fits on a side grinder and fitted it to a bench grinder on a pedestal I have. I then relieved the inside area where the circumference of the rotor would interfere with the caliper when mounted. That achieved, I set about mounting the caliper and noticed that the brake pad pins would contact the rotor anyway unless I took its diameter down a bit. Since I did not have access to a machine shop and they wanted a minimum of 1 hour’s labor cost to do a job I was told would take ten minutes, I opted for invention.



I took another bench grinder I have with two grinding wheels mounted on it (one coarse and one fine) and I put this on a 4 X 4 block of wood that brought the grinder up to the rotor front at the height I had the car jacked up to. I then took the coarse wheel and played it onto the diameter of the rotor at varying speeds so as to keep grinding the outer circumference and not merely turn the rotor with the grinding wheel. Having done that for a while and with the caliper mounted but the brake pins out I was able to determine, by trial pin fitting, how much needed to be taken off so the pins could be fitted without any chance of them contacting or galling on the rotor. Then I used the fine grinding wheel and dressed up the rotor and it looks very nice indeed.



Having done both rotors I concentrated on the task of centralizing the calipers on the rotor edge so there would be even application and wear of the brakes. It turns out that there is a plain washer under my original XKE caliper mounting bolts that, if doubled, is the exact size needed to centralize the caliper on the rotor. It also turned out that I had enough of these from many years of Jaguar ownership and maintenance so I used two of these for each mounting lug as spacers for a total of eight for the both sides. These are tricky to install (space is limited) each time you are fiddling with trial fitments, so I glued them together and to the upright lugs so I'd have a better chance. Also, since the whole shebang is thicker (with the shims, etc.) than the original XKE set up, I bought four new 1/2-24 grade-8-hardened 2" long bolts which I cut down to 1-5/8" long and I drilled the heads for safety wiring.



The final hurdle is the manufacture and fitting of the rigid lines. All the work I have done thus far sounds complicated, but really isn't and not hard at all, just a few more steps than I had anticipated. This last bit with the brake lines was the trying part. As I mentioned, I got all the lines with the old Volvo calipers. This gave me plenty of line and metric fittings (Volvo) to use for making the "new" pipes.

First, I considered swapping sides with the flex line fixing points on the XKE calipers. This would have given me a fixing point at a comfortable distance from the calipers and given me more room to make less acute rigid line bends for fitment. This didn't seem to work out as that put the flex hose too far forward and gave me some other problems with wheel lock-to-lock turning interferences. In the end I opted to leave the fixing point of the flex hoses in the same original XKE position. That meant a rather short and, it turns out, torturous route for the two rigid lines from the Volvo caliper. To connect two lines into the one original Jag flex hose you first obtain two three-way brass "T" connections. These are used on the Jag rear brake setup and on many British cars of the sixties through the eighties. Put one of the straight through (ST) sides onto the flex hose connection. This leaves the other straight through (ST) and the 90 degree "T" leg (TL) (pointing up) for the lines from the Volvo caliper. I took the bottom Volvo pipe fitting and bent it in a rather tight "S" curve to give me a straightish shot into the remaining ST hole and then fashioned a somewhat easier L-shaped bend to go down into the (TL) leg of the brass 3-way fitting from the top Volvo fitting. After initial trial and error fittings of the shaped pipes (now longer than they need to be) I cut them off with a pipe cutter and, using a double flaring tool I borrowed from a local parts store, I created a double flare (what Jaguar used for brake connections) on each of the "open cut" ends after putting on the appropriate Jag or other British end on the newly formed line. So, in the end I had two sets of roughly identical lines for both calipers with the Metric fitting of the Volvo on the caliper end and the British fitting on the other end for the brass three-way union. By the way, here's where I used the original Volvo rigid brake lines for this as they are of brass and bend somewhat easier than steel. Also the original Volvo pipes already had narrow radius bends at the caliper connection end. I used a spring



pipe bender for small diameter pipes (I bought at a hobby store) for this which snakes onto the pipe fairly snugly and keeps the round shape prohibiting the pipe from collapsing while I did these small radius bends. Of course, take that off before you put the “British” end on and since you can’t use the bender anymore you have to get them very close before you do that. Now comes the fun part. After some experimentation I found that I had to loosely thread and fit ALL the connections to the 3-way union and the calipers ( flex included) allowing some movement after the threads caught (VERY IMPORTANT - EASY TO CROSS THREAD NOW) so I could, in fact maneuver all the connections into their holes. After all was loosely threaded correctly I could tighten the connections and think about bleeding the brakes. BUT FIRST. make sure you have tightened the caliper mounting bolts to the proper torque as the bottom “S” bent line is now in the way of the bottom bolt head. You should also safety wire the bolts together before putting together the rigid line arrangements.

I know the single line system obtained by drilling through the walls of the separated calipers is, by far, the more desirable and easier way to connect these pipes. I just am still leery of separating the halves and not having the whole mess leak when they get bolted back together.

Bleeding the XKE brakes can be a very interesting thing indeed. I found, though the brake fluid found an easy gravitational path out of the fluid bottle, that same path was not good enough for the bleeding process. I found I had to start at the top and bleed each & every connection along the way from the reservoir right through to the caliper nipples of which there are three on the Volvo to do (if you didn’t drill the caliper walls to make just one nipple the operative one while leaving the others as blanking plugs to fill the, now not utilized, bleeding ports). It was a slow and tedious task as the pipe connections are not easy to get to. But, eventually I did bleed the brakes and they are tight and right up at the top of the pedal. I had a helper operating the brake pedal, but perhaps if you have one of the one-man brake bleeders, it’ll be easier for you.

I’ve spent (Volvo calipers, new rebuild kitb and the grinding wheel) a total of \$ 79. The other stuff I had, but as you can see, this isn’t an real expensive project.

