

## Jaguar XJS conversion from Inboard Rear Brakes to Outboard Rear Brakes

These comments are based on the conversion of an 89 XJS with inboard rear brakes (IB) to outboard rear brakes (OB).

I was motivated to do this conversion because of the chronic IB brake problems of the Jaguar XJS – Difficulty of maintenance, poor and ineffective parking brakes, poor brake cooling, and heat transferred to the differential and resultant deterioration of oil seals, followed by differential fluid on the disks and pads causing loss of stopping effectiveness. Some have lauded Jaguar for the IB setup and tried to make an issue concerning the unsprung weight of the OB setup. The problem is the poor implementation by Jaguar of the IB concept on these cars and the resultant chronic problems. While the IB setup does offer the advantage of less unsprung weight and perhaps some degree of better ride and handling, one will probably never know the difference unless he drives the car on a lot of lumpy roads and at the handling limit. In my opinion (and Jaguar's also, as on the later models of the XJS - along with most other manufacturers), the advantages of the OB setup far outweigh the singular unsprung weight issue.

This project was started with the purchase of a complete rear cage assembly from a '94 XJS. I was very fortunate to get an excellent buy on it and it was in great shape. I did ask them to include the brake line crossing the rear cavity since my initial investigation showed it would ease the conversion. The reason is that on the pre "Facelift XJS, the brake line from the front is on the left side of the car, and on the "Facelift" XJS, it is on the right side – maybe because both the supply and return fuel lines were relocated to the left side. My cage assembly also included the parking brake set up which resolves one of the major problems of those who try to do a conversion using various pieces. As far as I know, all of the OB brake cages come with the Salisbury 3.54 differential. We wanted to keep our 2.88 for efficiency and cruising (the 300 HP & 340 ft-lbs torque of LT1/4L60E have no problem handling that), but it had some float noise and leaking seals – guess why – inboard brake heat. So, we exchanged our 2.88 (with the speed transducer on the rear cover) for a rebuilt one from Coventry West, and removed and sold the 3.54 from the OB cage assembly. The rebuilt 2.88 was installed in the OB cage assembly. The thing to watch here, is that you must replace the shims that are between the wishbone inner fulcrum shaft pivots and the differential exactly as they came out – this affects toe-in of the assembly (there is no other way to adjust toe at the rear of the car). You must also exactly, with respect to each side, replace the shims/spacers that are used with the OB setup where the inboard disks used to go. That is the camber setup. The only other thing I did to get the OB cage ready for installation was change the unvented disks to vented disks and the corresponding calipers and brake hoses. The vented outboard disks were incorporated into production in mid 1995. These items are readily available. This involved a slight modification to the

back plates/dust shields on each side. There is a spot welded filet ring that interferes with the vented disk when it is used. These rings can be easily removed. I suspect the shields were designed with the vented rotors in mind for the XJR S and the filet rings were installed for other cars using the unvented disks. You will also have to cut the shields radially a bit for the somewhat larger vented disk calipers to fit up. If you have an OB cage assembly from a mid '95 or later XJS, it will already have the vented brake disks and associated calipers. All in all, it works out really well with absolutely no problems to date.

Since I had never seen an XJS with the OB setup, I did not know where the chassis connections and brackets for the caliper brake hoses were located. Dr. Chad Bolles was gracious enough to provide me with some digital photos, from his '95 XJS, of the placement of the brackets where the brake hoses attach, and the rear cavity brake line. You can grind or cut the brackets off the old cage assembly or source some from your local "recycling yard". Similar brake line brackets are available on line. They can be either welded or bolted/screwed to the frame at the locations indicated in the Chad Bolles photos. I essentially reverse bent the cavity brake line I had gotten with the OB cage assembly so it would work with the brake line from the front that is on the left of the car for the pre "Facelift" cars. This is something you can bend from straight stock brake line if you need to. You will need to cut the brake line from the front to fit into the tee location at the left frame location (see photo). A bubble flare is used for the connection, but I'm sure other ways can be found to make the connections if necessary. A bubble flare is simply a double flare half done – or you can buy a bubble flare tool on the net.

Suggestion – before you get into the brake line and bracket exercise, check those rubber sections of the fuel supply and return lines at the top left and right of the cavity. Now is your best chance to replace the aged rubber hoses which are known to seep, weep, and contribute to the gassy smell in the boot. Do it now while you have easy access, and you can think about how to resolve the brake line issues while you are doing this. Use good fuel injection hose that will last for as long as you might care about not having to do it again.

Once you have prepped your cage assembly, and done the brake line and bracket work, you are ready to install your OB cage assembly. Make sure you have the diff. fluid topped up and your speed sensor installed if applicable – both are easier before the cage is reinstalled in the car. By the way, the speed sensor doesn't care what rear ratio you have, it counts the ring gear/tire revolutions rather than driveshaft speed – the only clever thing (I know of) that Jaguar did with this car. If you were lucky enough to get the OB cage assembly with the parking brake stuff, it is a no-brainer hook-up. I can't give advice on other ways since I haven't been there. Once you have the cage bolted back up to the car, hook up the rear speed sensor wire through the boot, route your ABS lines up through the normal locations, connect your caliper brake lines, and connect and adjust your parking brakes – they will

really work! Reinstall your exhaust plumbing, and don't forget the driveshaft!! Bleed your rear brakes now while it is easy – use the ABS pump – what a piece of cake it is now!!!! Put the tires on, drop it and go drive. Rear alignment should be on or very close, but don't go too far without checking it.

#### Other Observations:

As far as I can tell, with regard to the XJS, the differential (except as noted below), the cage, wishbones, struts/trailing arms, and associated parts are the same for IB and OB cars. The half-shafts (dog bones) are the same, but the outer stub axles and carriers (uprights) are not. Between the half-shafts and the differential output shafts, where the brake disks used to be, is simply a spacer that is approximately the same thickness the brake disks were at this point. In fact, you could make your own spacers for use here by having a machine shop cut off the outer brake surface portion of the disk, leaving only the inner section of the disk with the same diameter of the differential and half shaft flanges. Each spacer is selected at the factory with a thickness that will give the desired camber as it leaves the factory. Shims, as used with the inboard disks, can still be used with these spacers to trim or adjust the camber. One problem was noted here. If one of the spacers here is on the minimal thickness side, and you are using your own, or a rebuilt differential from a car that had the IB setup, you might have an output shaft on your differential that has a shoulder that is too tall. It will not allow you to tighten the half-shaft coupling flange down to the spacer. I ran into this problem with the rebuilt 2.88 that came from Coventry West (see photo). They were not aware that the shoulders on the differential output shafts are of different heights and that differentials used with the OB assemblies must have the output shafts with the short shoulders. The problem was discussed with them and a free exchange for the proper output shaft was made. They are now aware of this problem and should ask if the differential will be used with an IB or OB setup. If you are getting a rebuilt, make sure your rebuilder is aware of this, and if you are using your own, this could happen and you might have to get an output shaft with a short shoulder. If you are using the diff. that came with the OB cage, you are safe!

Happy motoring!!

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