



Installing Your Eaton TVS 5.0 7.5% Upper Pulley

This job is well within the ability of home mechanics, and most of our pulleys are DIY fitted at home. BUT - even if you are a competent professional mechanic please read these instructions fully. If you don't, then get it wrong, you won't enjoy hearing 'told you' when you ring us for advice!

- 1. Inspect the drive belt.** Once plastics and covers are out of the way, first task is to remove the supercharger drive belt. The tensioner arm should have a square hole you can insert a socket drive into and use that to de-tension and remove the belt. Inspect both belts for cracks – if either looks worn, this would be a good time to replace.
- 2. Check the snout coupler.** Once the belt is off, check that the drive coupler in the supercharger snout is healthy. Rotating the pulley left and right by hand, you should have one or two mm free play, and feel a light spring tension in one direction. If you have little or no free play and no discernible 'spring', the car has probably had a solid coupler fitted at some stage – that's okay. If there is 5-10mm of free play, accompanied by clunking as you turn the pulley left and right – bad news. Forget the pulley for now - your drive coupler has failed, and the blower needs to come off to be fixed before it gets worse and starts eating itself. Usually this announces itself by the blower being clattery at idle – but sometimes they are sneaky and don't give the signs.
- 3. Removing the old pulley with a ribbed puller.** These pulleys are an interference fit on the shaft – that means they are on tight – *really tight*. Ideally removal is done with a ribbed pulley puller like the one in the picture to the right. Make sure the puller ribs are snugly located into the pulley grooves, and that it is aligned squarely. Also, heat the pulley a little – either very gently with a blow lamp, or by pouring boiling water from a kettle onto it. Even with the correct puller every little helps – you might grimace at the amount of load you're putting on the puller, then there will be a 'pop' as the pulley starts to move. Now and then, we've come across unusually tight pulleys. If it looks like your puller or the pulley are deforming, follow the procedure at **4.** below to reduce the pulley's grip on the shaft, then try again.



Don't try to knock or tap the pulley off, that will just damage the snout bearings, and don't get carried away heating it up more than mildly as we described – the heat will transmit down the shaft to the bearing seals faster than you can heat the pulley up.

- 4. Removing the old pulley with a universal leg type puller.** If you don't have a ribbed puller, you can use a more traditional 2 or 3 leg universal puller, if you first grind away some of the pulley nose material. This reduces the hoop stress of the pulley material on the shaft – loosening it a bit. Without doing that you'll just bend the pulley and/or break the puller. Protect the engine bay with a damp sheet, then grind flat the front of the pulley until you very nearly – but not quite – cut through the pulley to reveal the supercharger shaft beneath. You will see when you've



nearly ground down to the shaft when the remaining pulley material is thin enough to discolour due to heat.



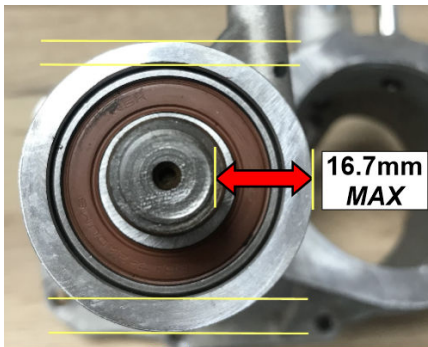
This is the bit you have to take care with – slowly does it, don't be a gorilla and cut into the shaft (see left). When you've ground as deep and close as you dare, gently heat the pulley (with boiling water or gently by blowlamp only to 100c), fit your puller and the pulley should draw off – it will still be tight, and you'll have to put plenty of tension into the puller. If the puller looks like it's buckling, go back to the grinding stage and see if you can carefully remove a little more pulley material without damaging the shaft. In 99% of cases the pulley will come off this way – if it doesn't, you may need a ribbed puller.



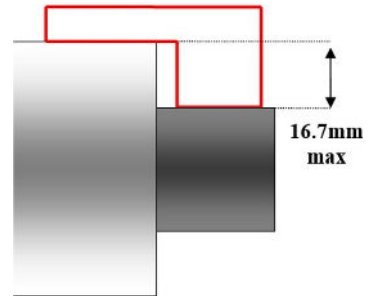
So, one of the two methods above worked, the pulley is off – you can relax, and have a coffee.

DO NOT go straight to fitting the new pulley – first read the rest of these instructions!

5. **Inspect the snout casting for centrality.** The pulley inner diameter is 51mm, made to give adequate clearance over the snout casting which can have an outer diameter between and 49.0 and 50.2mm. BUT – some snouts leave the factory machined off-centre, so the 'high' side of the casting may need trimming to ensure it doesn't catch on the inside of the pulley.



Once the pulley is off, look at the end of the snout and visually check if the shaft is central in the casting. You can confirm this with a ruler measuring from the shaft to the highest point of the casting, or cut out a template with a 16.7mm deep step (see diagram to right) which will make it easier to check all the way round. On 95% of snouts, this isn't necessary, but if you don't check this, fit the pulley, then find it binds on the snout when it cools, your day will be ruined.

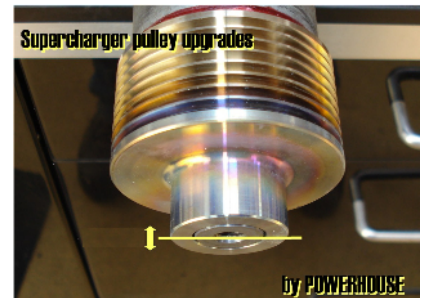


Worse, if you ring to blame us and complain, we will not have any sympathy; instead, we will ask you why you think we put this part of the instructions in bold red font. You will then suffer a period of painful realisation which will ruin your day even more.

Generally, if the snout looks reasonably central, it should be fine and this stage of the job isn't necessary, but if they look noticeably off-centre like the picture above left, just trim the high material with a hand file or rotary burr until you're happy no aluminium is more than 16.7mm above the shaft, then you're ready to put the pulley on.

6. **Fitting the new pulley.** You will need a gas welding torch or strong blow lamp, a welding glove, a water sprayer and a metal straight edge like a 6-inch rule. Do this within a short distance of the car, to reduce heat loss while transferring to hot pulley to the shaft.

The pulley will discolour clearly with heat. Watch it turn blue, then past blue to dark grey, then keep the heat on for another 10 seconds or so, and be ready to immediately transfer the pulley to the shaft (**Do not heat it enough to make it glow!**).



Quickly pick up the pulley with thick welding gloves and present it to the shaft. It should slide on quite easily (if you feel it catching or dragging at all, take it off quickly before it cools enough to grab the shaft and investigate why – there could be high spots on the charger snout, or it may just not be hot enough. You only have 20 seconds or so to fit the hot pulley, do not let it cool down and bind onto the shaft before it is in the correct position!

Make sure that you align the end of the pulley as accurately as you can with the end of the shaft – use a straight edge to push the pulley the last bit to **make sure it is level with the end of the shaft within 1/4mm**. As soon as it's lined up, spray copiously and evenly with water from a plant sprayer to cool it down, and keep going until it stops steaming.

7. **Tuning your car.** The pulley will yield gains on its own without remapping, and the car will run fine with a pulley on factory ECU mapping, but these cars benefit most from a combination of remap and pulley, so ask us about remap options for your car. We work with Viezu for our remap packages, because nobody has better experience and expertise in engine tuning development of the 5.0 JLR models. Ask us about the remap options for your car.

- With a Viezu remap from Powerhouse, you get a state of the art map produced by a team of experts who have developed maps for 28,000 different vehicle models and provided over 150,000 maps.
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POWERHOUSE, Unit 3A Broom Business Park, Bridge Way, Chesterfield, S41 9QG, United Kingdom

Tel: 01246 260665 – Option 3 Email: tuning@powerhouse.uk

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