



## Installing Your Eaton M112 10% 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!*

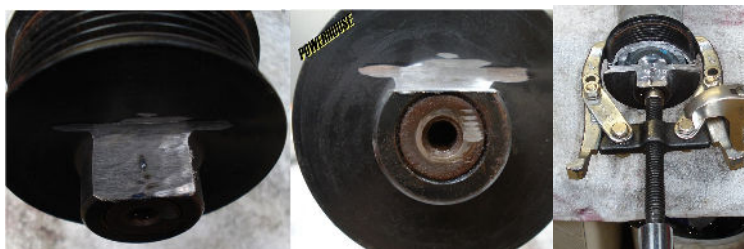
- 1. Inspect the drive belt.** Once plastics and covers are out of the way, first task is to remove the supercharger drive belt. The tensioner arm should have a square hole you can insert a socket drive into and use that to de-tension and remove the belt. Inspect both belts for cracks – if either looks 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 pulley puller.** Mark the snout casting round the back of the pulley with a marker pen or scribe before you remove the pulley – you will need this line later. These pulleys are an interference fit on the shaft – that means they are *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. We have occasionally come across unusually tight pulleys. If 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.



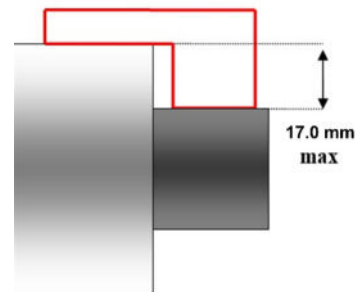
So, one of the two methods above worked, the pulley is off – you can relax, and have a coffee.

**The next stage can seem off putting but is NOT that hard if you take your time and keep measuring!**

5. **Trim the end of the snout casting for clearance.** This is the part of the job only needed for the 10% pulley. The pulley inner diameter is 55mm, 4mm smaller than the snout casting which is about 58mm. You now need to trim the material from the end of the snout to bring the diameter down to 54mm, back as far as the mark you made earlier behind the pulley. Note that these castings are not exactly central with the shaft – so measure material removal using the shaft as a datum, not the top of the casting. The most effective and available tool to do this is a carbide burr in a die grinder – make sure you keep the burr wet with paraffin to prevent the tool clogging with aluminium. Levelling after rough cut works well with a hand file – which will also do the job from scratch, though slower.



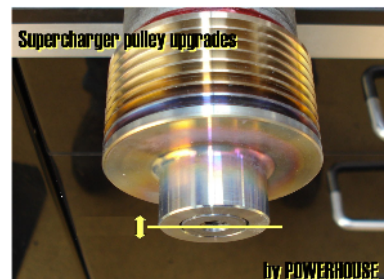
6. **Make sure you have removed enough material before fitting the pulley.** Just don't rush the job. You can confirm clearance at the end of the snout with calipers, or a ruler measuring from the shaft to the highest point of the casting, but to ensure the radius is correct all the way round the snout, cut out a template with a 17.0mm deep step (see diagram to right) which will make it easier to check all the way round. Make sure that you have carefully trimmed and checked this all round the pulley, especially underneath – a high spot will bind and removing the new pulley will not be a pleasant job.



7. **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.

8. **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 do gain additional benefit from a remap, so ask us about remap options for your car (4.0 models and some early 4.2 cannot be mapped). We work with Viezu for our remap packages, because nobody has better experience and expertise in engine tuning development of the JLR models. Ask us about the remap options for your car.

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