

Essential tools

- Trolley jack and ramps
- Sockets and spanners
- Hammer
- Releasing fluid

Useful info

DIFFICULTY RATING: 2/5



TIME TAKEN: Two hours



BIG BORE BOOST

Courtenay Sport upgrade an Astra SRi Turbo with a 76 mm exhaust and ECU remapping to match the free-flowing big pipe conversion.

Words and photos: Martyn Williams

Larger pipes are guaranteed to put some extra spin on a turbocharged car, and Jon and Mark at Norfolk-based Courtenay Sport reckon that stepping up from a decent 63.5 mm exhaust system - as installed on this Mk4 Astra SRi Turbo - to a 76 mm system will make a noticeable difference to the power delivery.

The Astra shown here being fitted with a Piper three-inch stainless system is a neat road-legal track day weapon touching 300 bhp from its heavily reworked engine. Modifications include 8.5:1 Mahle forged pistons, steel rods and a 2-inch core Pro Alloy intercooler.

A data logging check on the rolling road revealed that despite its healthy output, there was far too much ignition advance, which meant the knock-sensing electronics were kicking in hard to put a hefty power-robbing retard on the engine. A quick spin on the rolling road isn't as punishing as a few hard laps at Donington (one of the owner's favourite circuits), and if the engine got really hot, the mapping would struggle to keep detonation at bay and would certainly exceed the 12-odd degree limit of electronic travel built into the ECU. Beyond this threshold, engine damage is inevitable.

The old system was removed from the car to make way for its bigger Piper

replacement. This was done carefully because the owner intended to sell it on. It'd be perfect for someone with a less powerful car.

The Piper Astra Mk4 turbo-back system is designed to fit the SRi and GSi models. It's fitted with a sports cat and is available for just under £1000 with two silencers. A straight, unsilenced system costs less than £800. If there are no complications, fitting could be as little as £70 at Courtenay. A similar range of 76 mm systems - including cat-back variants - is available for the Astra VXR.

Our Astra owner chose a system with a back box only. This offers a weight saving, and the turbo naturally reduces noise levels so the exhaust volume isn't excessive, even at high revs. Courtenay tell us that some people come back for an extra middle box if they get fed up of the drone on long journeys. They're all straight-through silencers in any case, so they don't rob power.

Removing or fitting an exhaust system is a fairly simple DIY job. If you're friendly with anyone with a car hoist or a pit, that'll be a real advantage. Otherwise, drive-on ramps or axle stands work well as long as the car isn't wobbling about. You only have



Make sure you have all the relevant clamps before starting work.

to look online to find horror stories about what happens if a car topples off a jack - eek!

Removing a hot exhaust isn't a good idea, but attacking it while it's warm can help by making the releasing oil more effective on the nuts and bolts. Silicone spray on the hanger rubbers also makes these easier to prise off.

If a flange nut is stuck, you can sometimes sort it by using an angle grinder on the side of the nut. Most of the time the nut only has to be thinned down to make it easy to crack off with a ring spanner.

With the new exhaust fitted, it was time to go back on the rollers to sort out the mapping. Proper logging and adjustment here are probably the most meaningful things you can do to a car.

Courtenay backed off the ridiculous amount of ignition advance and found

Dyno results showed that there was an extra 20 bhp high in the rev range!

that the optimum curve just needed a small amount of advance across the rev range. Unsurprisingly, there was no significant kicking-in of the knock retard. The set up was tuned to 99 octane, which is the recommended juice at this power level.

The final power print-out was revealing. The delivery was much smoother, adding greatly to drivability. There were significant torque gains plus an extra 10 bhp just before 3000 rpm. At the top end of the rev band, from 5500 to 7000 rpm, the larger exhaust romps away with a final gain of 20 bhp as the smaller bore system ceases to cope with the flow.

Overall, it's a good result with more clean power across the range and the potential disaster of detonation has been totally eliminated thanks to the improved mapping.



Exhaust waggling is inevitable when it's being removed, so put some tape around the edge of the valance as shown to avoid marking the bodywork.



Heat can weld exhaust joints together. A spray of releasing oil can help if you leave it to soak for a couple of hours. If you don't want to destroy the system, using a rubber hammer as shown here will help. A block of wood and an ordinary hammer will also work. Then unbolt the front clamp and remove the exhaust.



The main clamp bolt head needs to be easily accessible, but check that it's not likely to bash into anything with a bit of engine movement. Offer the downpipe up, tighten the clamp bolt up and the spring will do the rest.



In this area, make sure the Lambda sensor wire is neatly tucked up because it has a habit of hanging a bit low. If necessary, careful levering on the appropriate body hanger bracket will bring the system into the central space to prevent contact with the body. Nobody likes an exhaust thumping off the floor!



You'll ideally need large grips rather than a lever to pull the body-mounted exhaust hanger bracket away from the exhaust pipe. You may need to move brackets about on either side to achieve a fairly even tension on the rubber hangers.



This shot shows a cam pulley tool - ideal for levering the exhaust mounting vertically. A large, open-ended spanner and grips could do the same thing, lowering or raising the height of the exhaust by cranking it up or down.



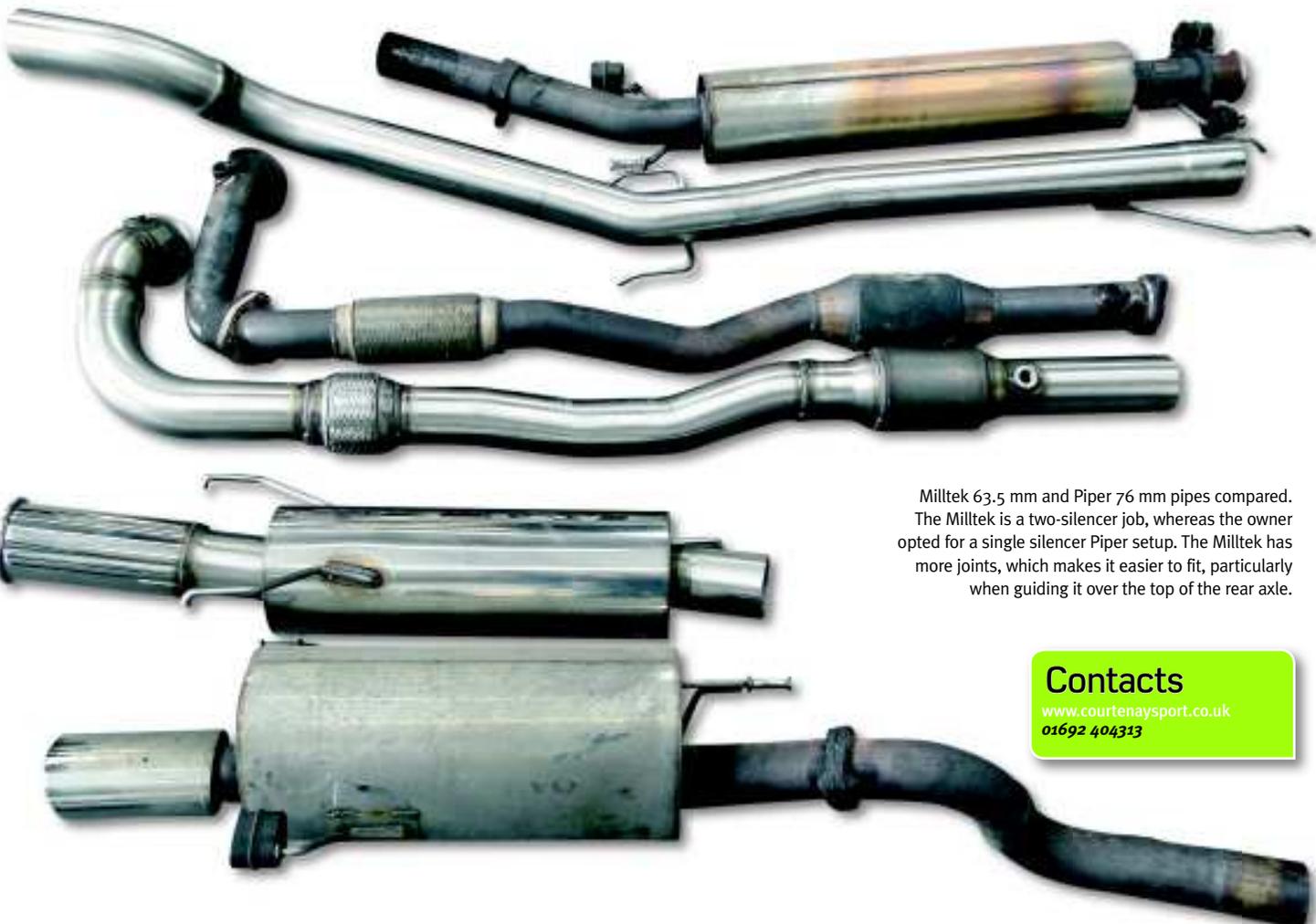
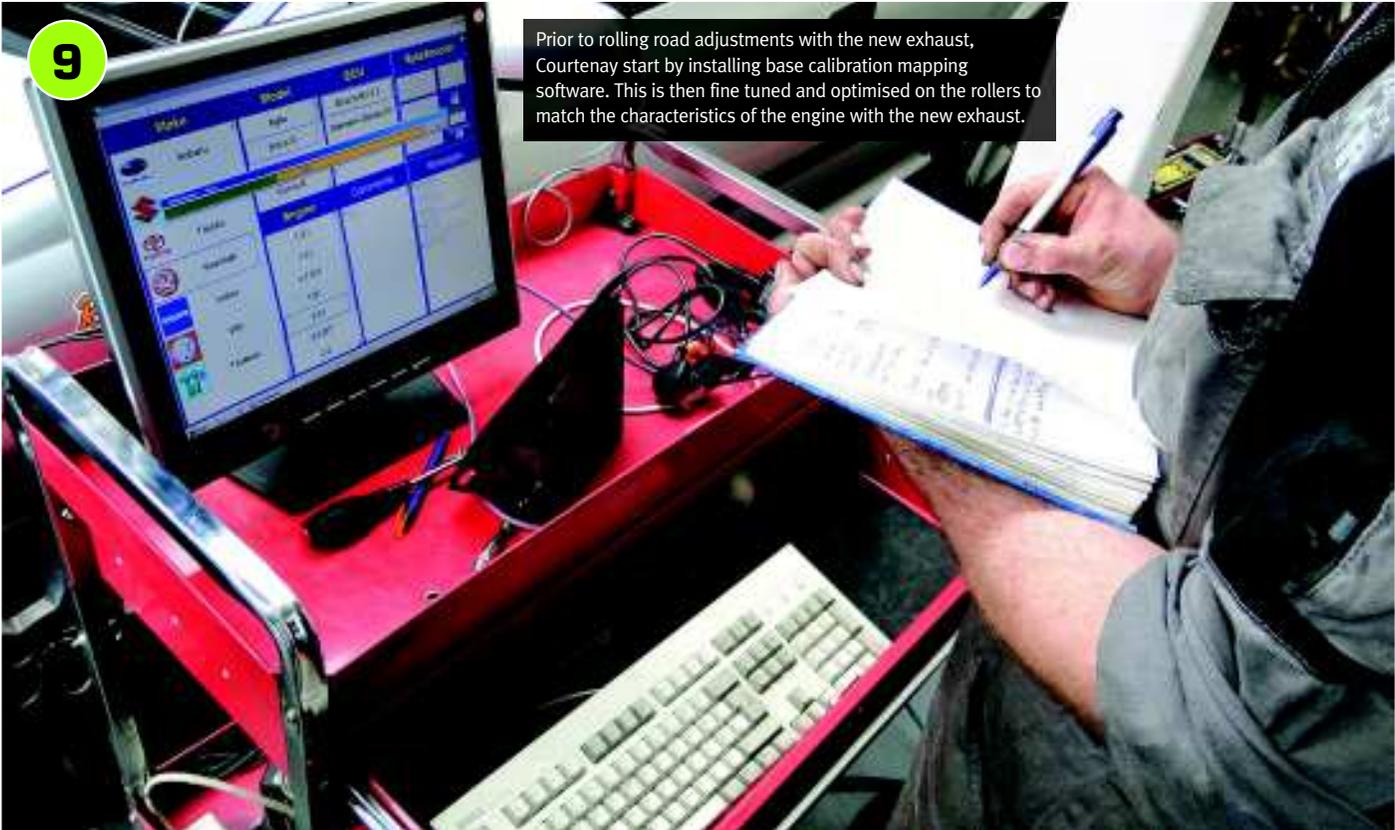
Getting near the end here, the owner was keen to avoid a boy racer look by having it nearly flush with the body. Alignment is achieved by carefully tapping the silencer with a rubber mallet. The silencer often has to be tensioned in the right direction as the clip is tightened in order to centre it.



Here, a power hacksaw is used to remove about a centimetre off the corner of the front engine-mounting bracket where it sometimes gets very close to the exhaust downpipe, particularly on overrun. The gap can vary and some cars don't need it.

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Prior to rolling road adjustments with the new exhaust, Courtenay start by installing base calibration mapping software. This is then fine tuned and optimised on the rollers to match the characteristics of the engine with the new exhaust.



Milltek 63.5 mm and Piper 76 mm pipes compared. The Milltek is a two-silencer job, whereas the owner opted for a single silencer Piper setup. The Milltek has more joints, which makes it easier to fit, particularly when guiding it over the top of the rear axle.

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