



Essential tools

- Spanners
- Socket set
- Hex bits
- Grips

Useful info

DIFFICULTY
RATING: 3/5



TIME TAKEN:
One day



VXR TURBO INTO MK4 ASTRA

Swapping the original turbo from a Mk4 Astra GSi for a VXR unit will give you more power and better reliability. Here's how to do it.

Words and photos: Martyn Williams

The Mk4 Astra Turbo can benefit from some easy power gains and one of the simplest modifications is to fit the turbo from an Astra VXR. The turbo from the Astra VXR already has high performance credentials and improved durability. It's able to stand more heat than the standard ZLET turbo, which has a manifold that has been known to crack and Courtenay also recommend it as a better bet than aftermarket hybrid units. It's also worth noting that the turbo from the Astra VXR can also be used to upgrade other Vauxhall turbo engines including the Zafira (A and B models), the VX220 and VXR220 Turbo and it is also suitable as a direct replacement unit for the Z20LEL/Z20LER Mk5 Astra (170/200 PS models). The Z20LEH turbo also has the advantage of big manufacturer research and development which adds up to a better response and a corresponding improvement in driveability - ideal for anyone thinking of upgrading to

Stage 3 and 4 along with relevant software remapping.

At £495.00 for the complete unit, the VXR turbo is relatively inexpensive - less than the original unit in fact. Another saving is that the expense of a remap is not required for standard cars. Additionally, Courtenay can reset the static pressure on the actuator to suit standard models that work at a lower pressure than the Astra VXR. Money can be saved by DIY-fitting shown here, but for non-DIY types, Courtenay charge £840.00 for the turbo and fitting which includes gaskets, oil, filter and a 12 month, 12,000 mile warranty (which you won't get if you fit it yourself). Early failures of turbos fitted by customers include bits falling unnoticed into the intakes.

The VXR turbo from Courtenay comes complete with the standard actuator which can be used on anything up to and including Stage 3 remapped cars (the Astra being converted here is a Stage 3 motor, complete with a 3 inch exhaust). An updated actuator and bracket is available additionally at £129.95 for

Stage 4 cars. Another upgrade offered by Courtenay is the fitment of an updated turbo bearing assembly priced about £150.00. The turbo can be supplied with all the items normally required for the replacement process. These include the exhaust manifold gasket, sump bolt washer, breather tube gasket and turbo oil drain gasket (at £14.50), fully synthetic Valvoline 5W-40, GM Longlife oil filter and sump bolt washer at £46.55. There is also a replacement manifold stud and nut kit (10 of each) at £23.00 and the turbo-to-exhaust clamp priced at £39.85. Courtenay also offer a stainless steel washer plate for the exhaust manifold at £20.75.

Before removing the old turbo, it's worth thinking about getting at least a couple of exhaust manifold studs and a set of nuts. Studs breaking off, particularly at the number one cylinder end, is not uncommon. If it does happen, an experienced TIG welder should be able to build up metal on the end of the stud without harming the head. If there is a stubby bit left, the welder might be able to attach a

nut to get a socket on to it. The only other complicated thing about fitting the VXR turbo is that the actuator setting is lower for non-VXR turbo cars which have not been remapped (see pictures showing adjustment of the actuator). If left at the standard VXR wastegate release pressure on a car with standard mapping, the extra pressure can set the ECU into over-boost protection mode. If this happens, the engine management warning light will come on and boost will be limited to five pounds at the most and the ECU will have to be reset. If a VXR turbo hasn't been recalibrated for lower boost, an emergency measure to hopefully prevent the ECU from tripping out is to slacken the inner and outer nuts on the actuator rod and move the outer nut so that the distance from the end of the rod to the outer face of the nut measures 5 mm. Nip up the inner nut to secure the rod, and hopefully it won't be too far out. It could be checked with a known-accurate boost gauge, but waiting for the turbo to cool down to make guesstimated adjustments is not ideal.



1

A new turbo deserves new oil and a filter. Courtenay recommend a GM Long Life filter and a fully synthetic SM-rated oil - check the side of the can, some synthetics have a lower SG rating. Whatever the oil brand, fully synthetic is best for turbocharged petrol engines.



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A springy screwdriver is handy for getting at the worm-drive clips on the boost hose but it can usually be done equally well with a ratchet handle and extension.



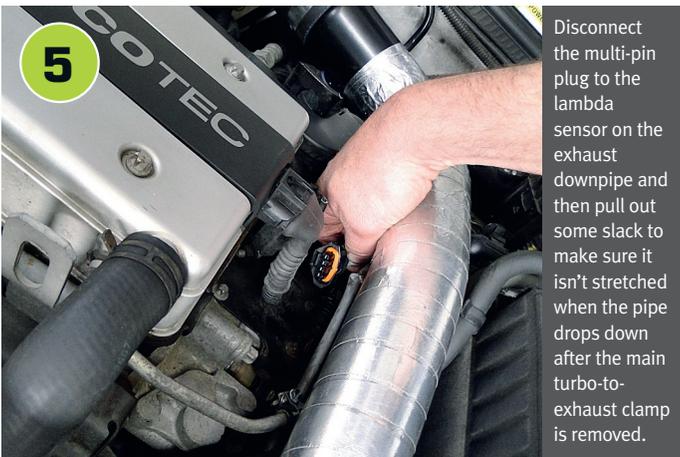
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Avoid the slim chance of anything landing in the pipe while the work is going on by plugging the ends. Any small solid objects hitting the turbo blades could be disastrous.



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The large bolt on the bottom of the block retains the oil return union from the turbo. This pipe will be fitted to the new turbo unit.



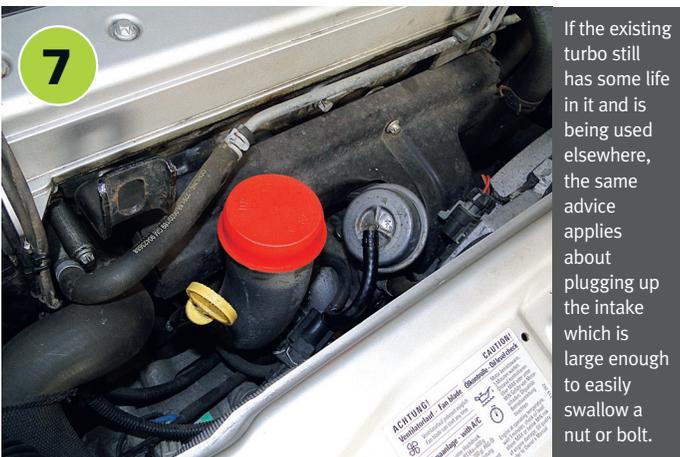
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Disconnect the multi-pin plug to the lambda sensor on the exhaust downpipe and then pull out some slack to make sure it isn't stretched when the pipe drops down after the main turbo-to-exhaust clamp is removed.



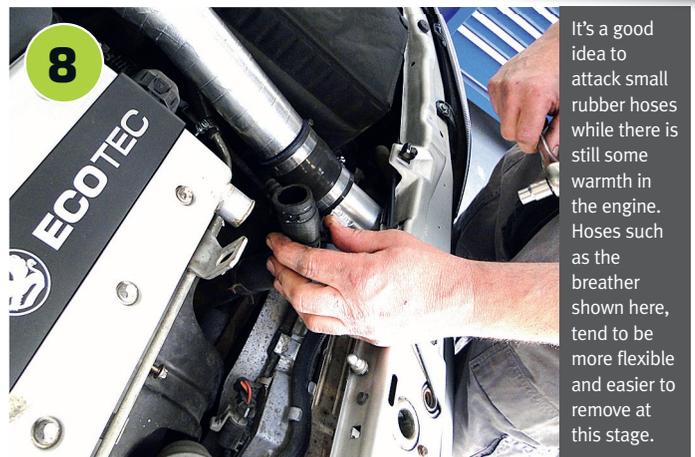
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The intake hoses across the engine need to be slacked off and the alloy transfer pipe removed.



7

If the existing turbo still has some life in it and is being used elsewhere, the same advice applies about plugging up the intake which is large enough to easily swallow a nut or bolt.



8

It's a good idea to attack small rubber hoses while there is still some warmth in the engine. Hoses such as the breather shown here, tend to be more flexible and easier to remove at this stage.



Other items that need disconnecting before the turbo can be removed include the plug to the boost control solenoid and the vacuum pipe to the recirculation valve.

Cooling the turbo - up or down?

When the factory developed the Astra VXR with its improved turbo, they also changed the water flow direction to the unit so that it feeds from the cooler bottom end of the radiator, through the turbo water manifold and up to the top of the rad. All the previous models (apart from the VX220) feed from the top of the rad to the bottom.

Vauxhall offer an 'improved cooling service kit' which adapts the hoses to flow the VXR way, but this hasn't proved to be a big seller, probably because of the £155.00 price tag. Courtenay report a lack of interest in this conversion, and point out that Vauxhall often change things to cope with extreme 200 hour engine endurance testing, not typical road use.



Clamping-off the coolant hoses to the turbo means one less job of draining the system. At Courtenay they use these neat hose clamps but it can be done with clamping grips used with a bit of old hose, (or similar) to protect the pipes from the metal jaws.



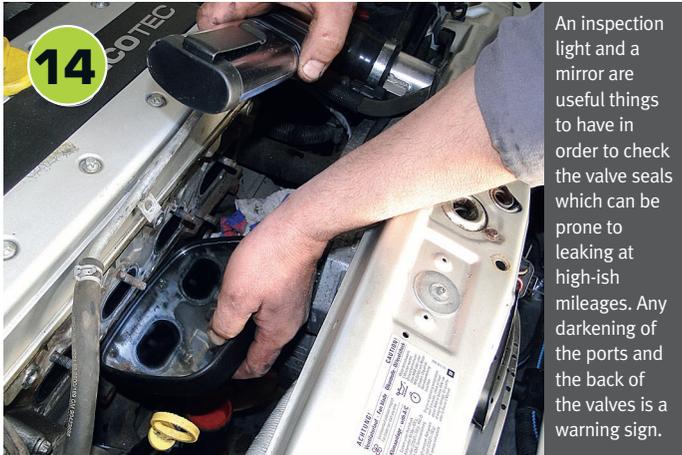
Removing the big banjo bolt and pulling the water hose free is not a problem but the oil union bolt can be a bit of a teaser and is sometimes difficult to free-off. It's essential that the hex bit is a tight fit.



When removing the engine breather pipe from the bottom of the block, it needs to be done with care to avoid dropping a retaining bolt through the breather hole - it has happened! A temporary plug is a good idea and a new gasket is recommended. The gasket can be held in place with some sealant on the end of the pipe to stop it dropping off as it is lowered into place.



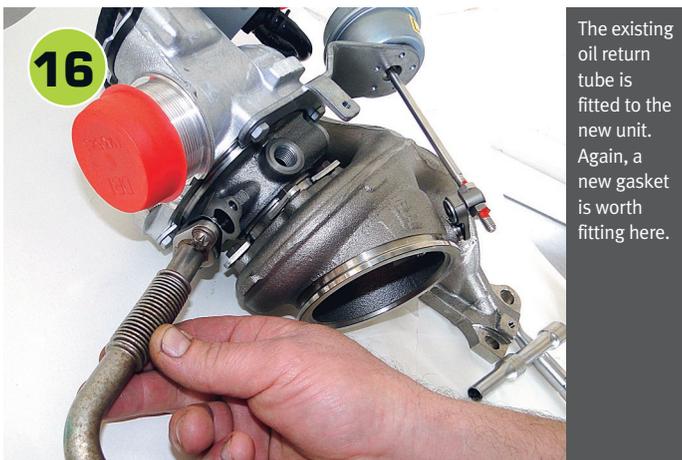
When removing the old turbo the top priority is to avoid bashing the radiator on the way out, otherwise it's just some careful wiggling about to pull the turbo assembly out.



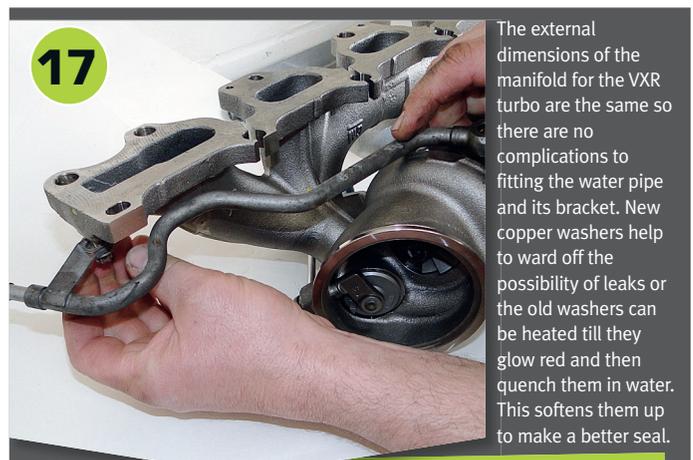
14 An inspection light and a mirror are useful things to have in order to check the valve seals which can be prone to leaking at high-ish mileages. Any darkening of the ports and the back of the valves is a warning sign.



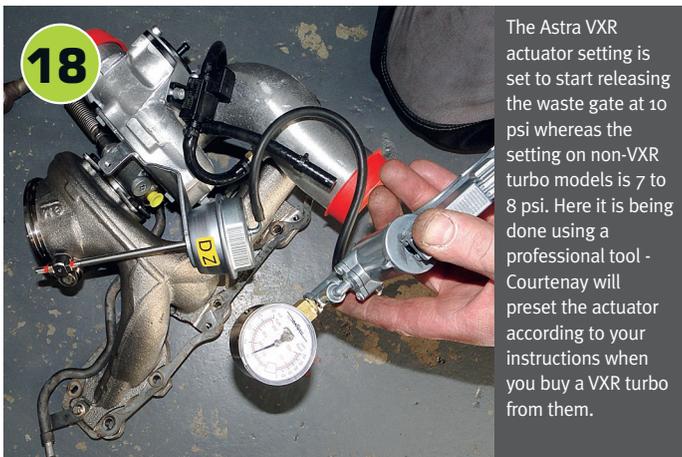
15 This is the new VXR turbo. The original VXR coolant pipe is not used on any non-VXR installation.



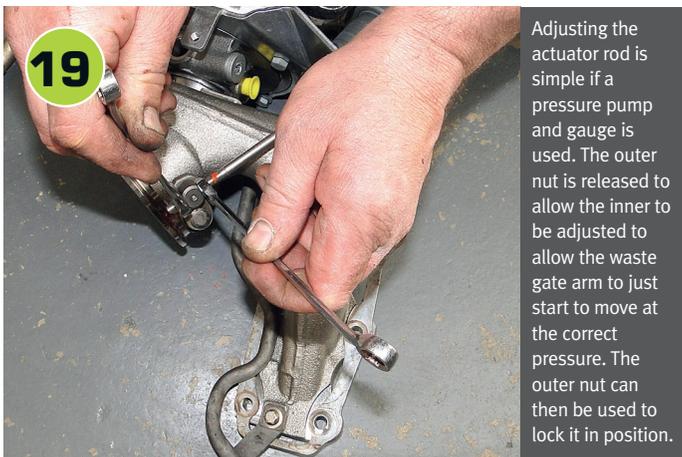
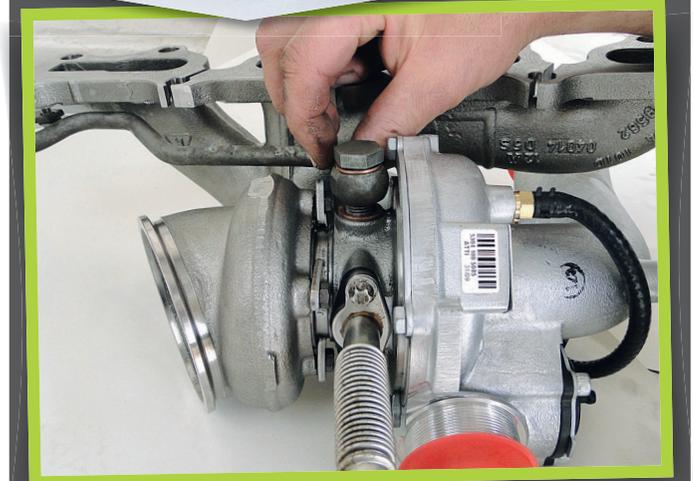
16 The existing oil return tube is fitted to the new unit. Again, a new gasket is worth fitting here.



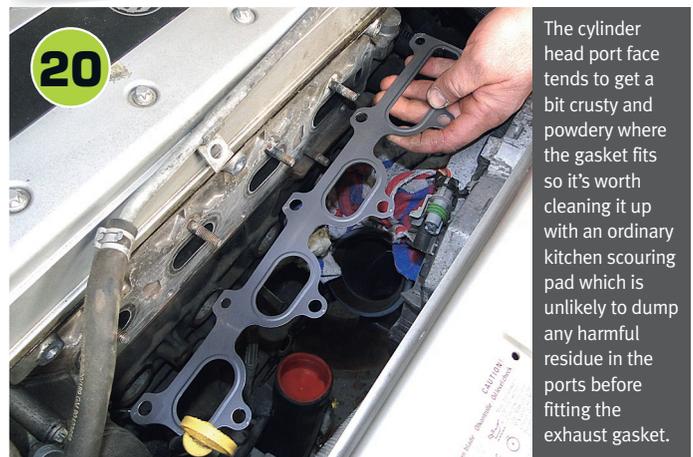
17 The external dimensions of the manifold for the VXR turbo are the same so there are no complications to fitting the water pipe and its bracket. New copper washers help to ward off the possibility of leaks or the old washers can be heated till they glow red and then quench them in water. This softens them up to make a better seal.



18 The Astra VXR actuator setting is set to start releasing the waste gate at 10 psi whereas the setting on non-VXR turbo models is 7 to 8 psi. Here it is being done using a professional tool - Courtenay will preset the actuator according to your instructions when you buy a VXR turbo from them.



19 Adjusting the actuator rod is simple if a pressure pump and gauge is used. The outer nut is released to allow the inner to be adjusted to allow the waste gate arm to just start to move at the correct pressure. The outer nut can then be used to lock it in position.

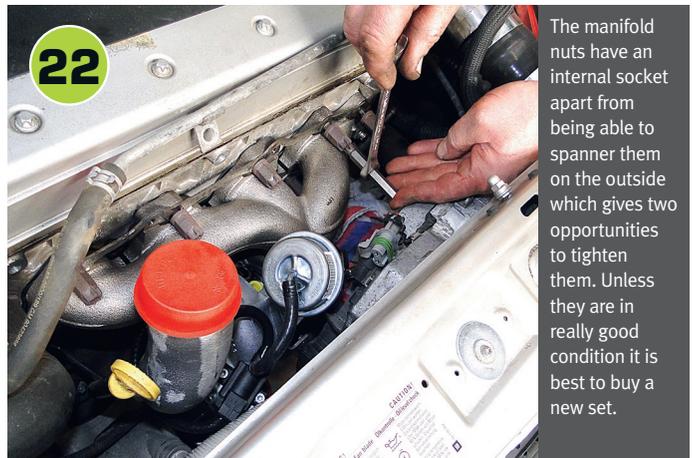


20 The cylinder head port face tends to get a bit crusty and powdery where the gasket fits so it's worth cleaning it up with an ordinary kitchen scouring pad which is unlikely to dump any harmful residue in the ports before fitting the exhaust gasket.



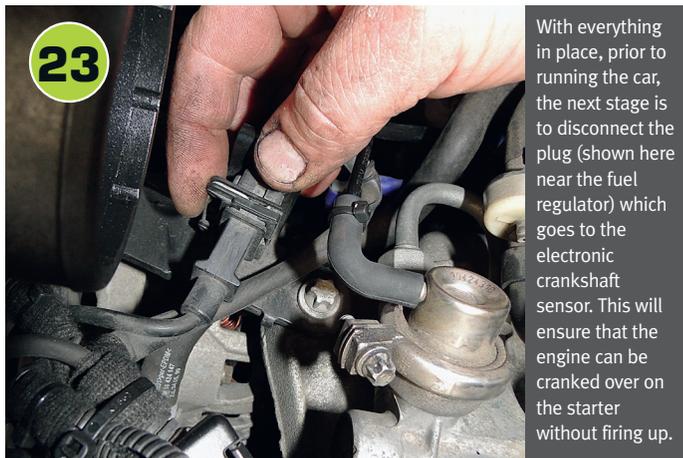
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Refitting the new unit is basically a reversal apart from fitting hoses to the turbo where needed. They include the oil drain pipe and the coolant return union on the back of the turbo.



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The manifold nuts have an internal socket apart from being able to spanner them on the outside which gives two opportunities to tighten them. Unless they are in really good condition it is best to buy a new set.



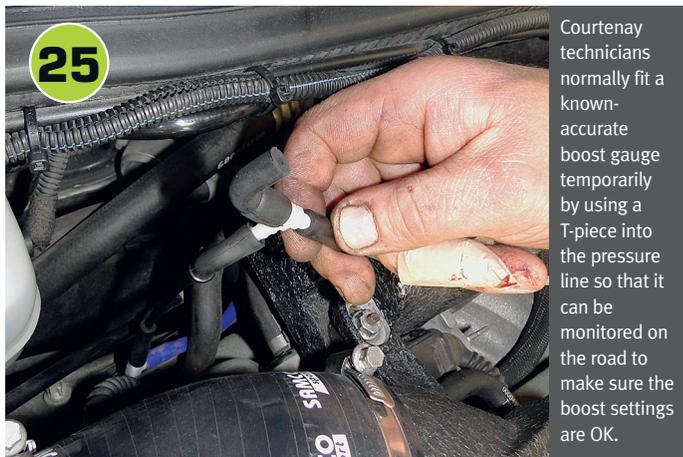
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With everything in place, prior to running the car, the next stage is to disconnect the plug (shown here near the fuel regulator) which goes to the electronic crankshaft sensor. This will ensure that the engine can be cranked over on the starter without firing up.



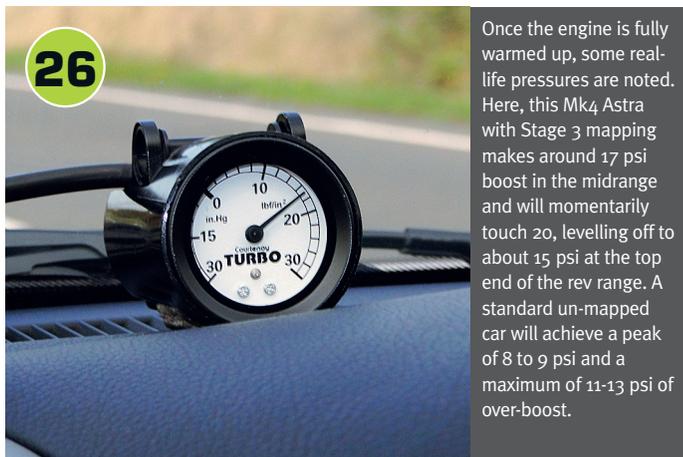
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After fitting the new oil filter and topping up with fresh oil, remove the oil feed banjo bolt and slowly pump in plenty of oil to pre-charge the turbo, making sure that it doesn't start dry. Once topped up with plugs and caps in place, the engine can be turned until the oil light goes out and then the crank sensor is ready to be plugged back in to fire it back into life.



25

Courtesy technicians normally fit a known-accurate boost gauge temporarily by using a T-piece into the pressure line so that it can be monitored on the road to make sure the boost settings are OK.



26

Once the engine is fully warmed up, some real-life pressures are noted. Here, this Mk4 Astra with Stage 3 mapping makes around 17 psi boost in the midrange and will momentarily touch 20, levelling off to about 15 psi at the top end of the rev range. A standard un-mapped car will achieve a peak of 8 to 9 psi and a maximum of 11-13 psi of over-boost.

