



ASTRA MK4 INTERCOOLER FITTING GUIDE

Fitting an aftermarket intercooler will lower intake temperatures, providing more power.

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This month we fit an enlarged front-mounted intercooler to our Astra Coupe. Our Astra has been fitted with an Astra VXR (Z20LEH) engine, but the fitting process is the same for standard Z20LET equipped cars.

Fitting the intercooler kit isn't a complex job, however it contains many parts so our advice is to lay out the intercooler, boost pipes, joining sections and all the relevant fittings as they would go on the car. It will help you visualise the job before you start, and means you can check everything is present and correct. Finally, be safe when you work; make sure the car is raised securely.

Why an intercooler?

A turbo increases the power of an engine without adding a significant amount of weight. For example a

typical 2.0 16V normally aspirated engine will produce around 140 bhp. By adding a turbo to an engine of similar design and capacity, the power will increase to around 200 bhp.

In very simple terms, the turbo is a fan mounted in the exhaust system close to the manifold, driven by the exhaust gases passing through it. As the exhaust gases pass through the turbo, the internal blades are spun. In a separate section of the turbo, the blades draw external air in, compress it, then send it towards the engine's intake system under pressure, typically around 10 psi. An engine that can burn more air and fuel will produce more power and a turbo simply forces more air in. More air + more fuel = more power. Simple.

There are downsides to turbocharging. With a turbo typically spinning at around 10,000 to 15,000 rpm, it can reach temperatures well in

excess of 500 degrees. As cool air enters the engine via the induction system, it travels through the turbo and while this accelerates the air, it also heats it up considerably. The hotter air, the less dense it becomes, which has a detrimental effect on the power the engine will produce. If the intake air temperature becomes too high it can lead to engine issues.

One method of combating this issue is to fit an intercooler between the turbo and the inlet manifold. These coolers reduce the temperature of the air entering an engine in the same way a coolant radiator reduces water temperatures. The hot, turbocharged air travels internally through the intercooler, while cold external air flows over it, which then reduces the temperature of the charged air. The result is that the air exiting the intercooler and entering the engine is considerably colder than it was when it

Essential tools

- Trolley jack and axle stands
- Socket set with extension bars and ratchet
- Combination or ratchet spanners
- Torx bits, male and female
- Small snips or scissors
- Large flat screwdriver or a small pry bar
- Electrical crimping kit - bullet connectors, crimping tool and wire strippers
- Electric drill with an 8 mm drill bit
- Possibly an assistant

Useful info

DIFFICULTY
RATING: 3/5

TIME TAKEN:
Half a day





1

To make things easier, raise the front off the ground. Car ramps or axle stands are fine but just make sure the rear wheels are chocked and you're on firm level ground. Remove the small Torx bolts that secure the bumper just in front of the wheels, remove the push down rivets along its top edge at the grille and finally the push down rivets underneath that secure it to the subframe.



2

Pull the bumper towards you slightly and then reach down and disconnect the fog light multiplugs and also the multiplug for the outside temperature sensor. Remove the bumper completely, taking care not to drop it face down. Store it safely out of the way on piece of cardboard. Put all the bolts and fittings somewhere safe, a small box or magnetic tray is perfect... the floor isn't.



3

There are six 13 mm nuts that secure the crash bar to the car body. Remove all six of these with a suitable ratchet. Once removed, pull the crash bar towards you to remove it completely. You may need to use a pry bar at the ends as it is very tightly fitted. Take care not to bend or scratch anything surrounding the bodywork. Now's the time to check for crash damage or any coolant leaks.



4

Remove the standard rubber boost hoses. One runs from the turbo outlet to the base of the intercooler and the other runs from the intercooler to the top hat at the rear of the engine. All are secured by jubilee clips. Also remove the boost sensor located at the top of the intercooler by removing the T25 Torx bolt and the multiplug. Put the sensor somewhere safe, you'll need it again.



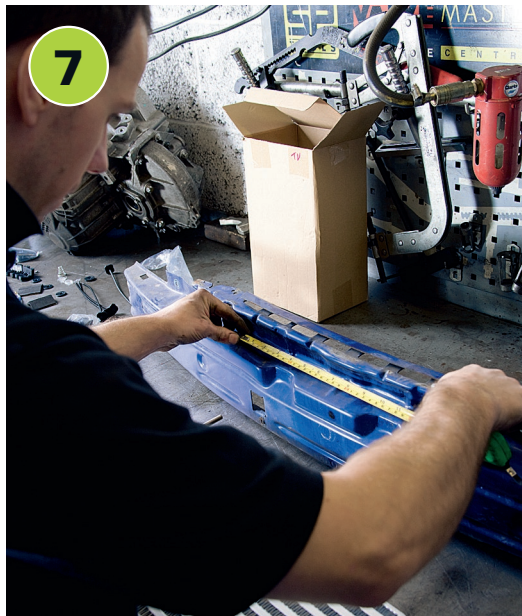
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Remove the standard intercooler and air conditioning fan, both of which are secured with T25 Torx bolts and will require a ratchet with suitable extension bar to make access easier. Disconnect the multiplug for the air conditioning cooling fan assembly. Take care not to put undue stress on the section of loom that runs in front of the radiator pack when removing these two components.



6

In this case Regal opted to move the radiator pack back slightly. The standard brackets (bottom) were swapped for Astra VXR items with the rubber locating section turned round, which moves the radiator pack backwards by approximately 20 mm. The top locating brackets were spaced back using additional nuts, again to aid clearance. This isn't always strictly necessary but does help in later stages.



7

Next task is to mount the new TX Autosport intercooler. The intercooler mounts to the existing crash bar using the fitting kit supplied with the intercooler. Lay the crash bar on a bench or the floor with the top surface facing upwards, i.e. as it would sit when fitted to the car. Find the centre of the crash bar and mark it using pre-drilled holes as a reference point.



8

The mounts on the top of the intercooler are 350 mm apart, so measure 175 mm to either side of your centre line on the crash bar and again mark the points. Offer the intercooler up to the crash bar, ensuring the lines you have marked correspond directly to the mounts on top of the intercooler. As is always the case, measure twice and cut once. Once satisfied, move the intercooler safely out of the way.



9

Drill two small pilot holes in the top edge of the crash bar, approximately 20 mm back from its leading edge. Again offer up the intercooler to ensure the holes correspond to the mounting points on the intercooler. Assuming they do, enlarge the pilot holes using a 13 mm drill bit. Clean up any rough edges and if attention to detail is your thing, apply a small amount of paint to the exposed bare metal.



10

Using the supplied fitting kit, bolt the two small metal box section mounts to the inside of the crash bar so they extend backwards towards the engine bay. Next, bolt the intercooler to the box section mounts using the bolts supplied. Do not overtighten these, finger tight is sufficient for the time being. The intercooler is symmetrical so it won't matter which way round it is mounted.



11

Refit the crash bar and intercooler combo to the car, ensuring it is fully located on its mounts. You may need to use a soft faced hammer or refit the bolts to make sure it is correctly seated. Once seated, double check the intercooler is fitted centrally on the crash bar and that it is clearing the original components and bodywork. Remove the crash bar once more and place safely out of the way.

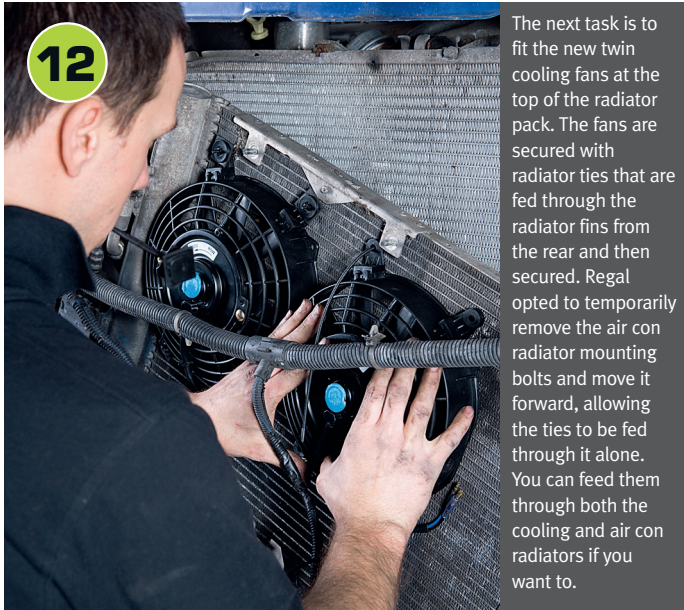
TX Autosport

There are several intercooler kits available for the Mk4 Astra and we opted for the TX Autosport kit simply because it offers exceptional value for money, retailing at only £349.00 for the kit used here and £399.00 for the oversize kit which features a larger intercooler core and 63 mm boost pipes. Both kits come with a CDTi reverse airbox which reroutes the intake for the turbo and will increase throttle response. We shall be fitting this at a later date. Contact TX Autosport on 01279 550037 and at www.txautosport.co.uk.



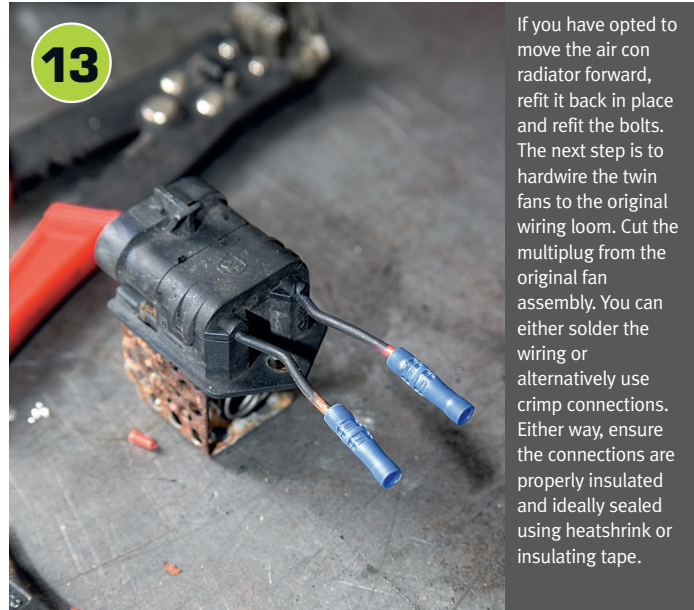
Regal Autosport

The fitting was entrusted to Southampton-based Vauxhall experts Regal Autosport, who not only fitted the intercooler for us but also will be carrying out some further tuning in the near future including VXR injectors, airflow meter, full exhaust and a remap. Regal quote £185.00 inc vat and around half a day to fit a front-mounted intercooler kit (although this is subject to change) They can be contacted on 02380 558636 or via their website at www.regal-shop.co.uk.



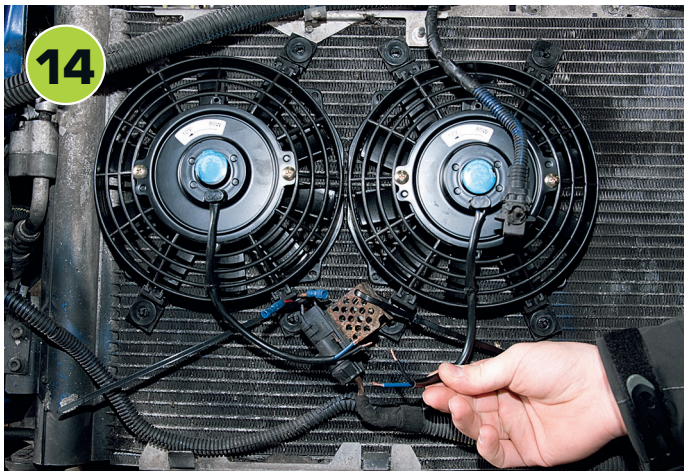
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The next task is to fit the new twin cooling fans at the top of the radiator pack. The fans are secured with radiator ties that are fed through the radiator fins from the rear and then secured. Regal opted to temporarily remove the air con radiator mounting bolts and move it forward, allowing the ties to be fed through it alone. You can feed them through both the cooling and air con radiators if you want to.



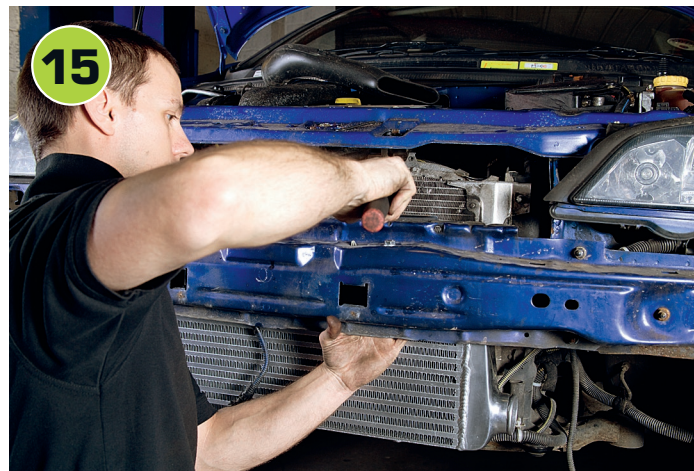
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If you have opted to move the air con radiator forward, refit it back in place and refit the bolts. The next step is to hardwire the twin fans to the original wiring loom. Cut the multiplug from the original fan assembly. You can either solder the wiring or alternatively use crimp connections. Either way, ensure the connections are properly insulated and ideally sealed using heatshrink or insulating tape.



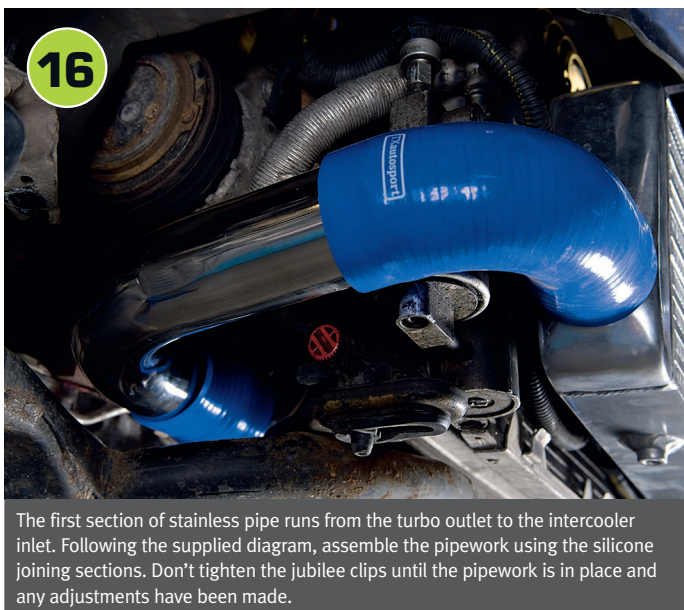
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Bare the wires leading from both the new fans and either solder or crimp to the corresponding wiring on the original multiplug. Refit the multiplug assembly to the radiator using a cable tie and then plug the multiplug back into the car's wiring loom. Note the positioning of both fans and also the wiring - this is crucial to clear the crash bar and intercooler and avoid the wiring being trapped.



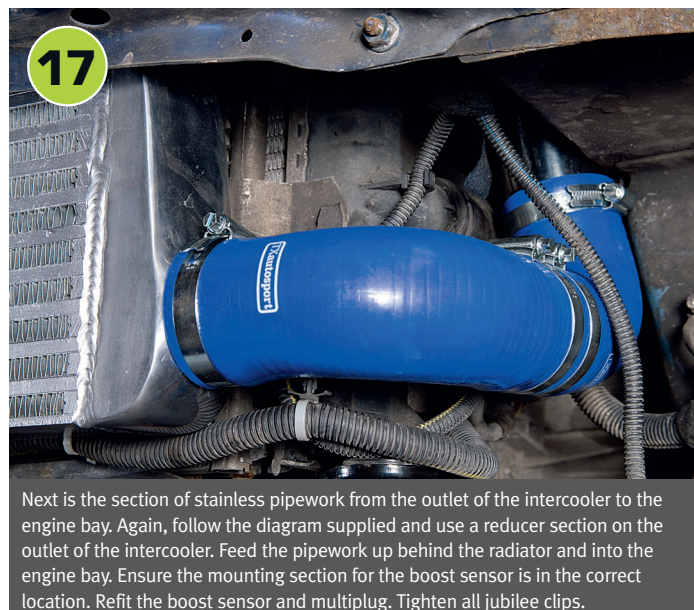
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Refit the crash bar and intercooler assembly, ensuring there is sufficient clearance and the wiring is not trapped or pulled excessively tight. If required, reposition the intercooler and/or fans until there is clearance. Ensure the section of loom for the outside temperature sensor is fed between the crash bar and intercooler. If all is well, firmly tighten the bolts that mount the intercooler to the crash bar.



16

The first section of stainless pipe runs from the turbo outlet to the intercooler inlet. Following the supplied diagram, assemble the pipework using the silicone joining sections. Don't tighten the jubilee clips until the pipework is in place and any adjustments have been made.



17

Next is the section of stainless pipework from the outlet of the intercooler to the engine bay. Again, follow the diagram supplied and use a reducer section on the outlet of the intercooler. Feed the pipework up behind the radiator and into the engine bay. Ensure the mounting section for the boost sensor is in the correct location. Refit the boost sensor and multiplug. Tighten all jubilee clips.



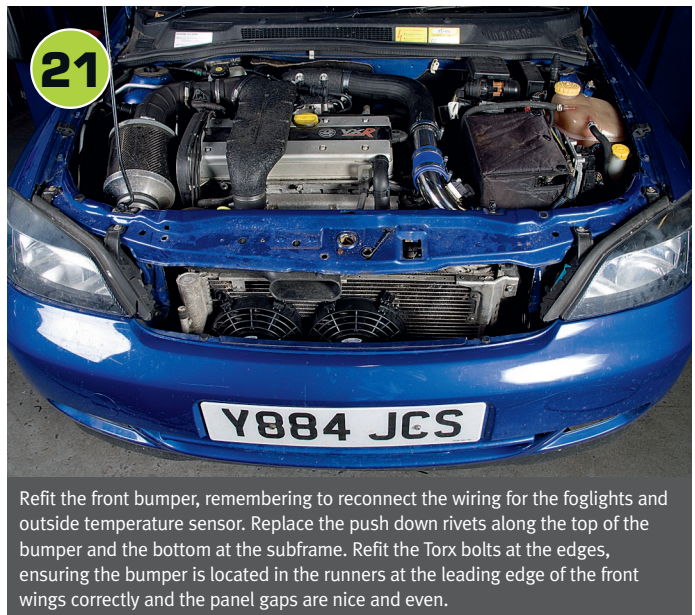
The intercooler pipework is designed to connect to the existing top hose, however you will need to cut the original hose approximately halfway and fit it over the new stainless pipework. If you have a TX Autosport top hat kit or an alternative hard pipe you will need to connect these to the intercooler pipework. As ours has the standard pipe, this is what we have used in the images.



Trial-fit the front bumper. Cars with GSi front bumpers shouldn't need any modification, however the Coupe bumper requires small sections of plastic removed from the rear to enable it to clear the intercooler. Regal used an air powered hacksaw to cut back small sections of the plastic grille but sharp snips will do. Cut small sections at a time, trial-fitting the bumper until it clears fully.



Before refitting the bumper, recheck every nut, bolt and jubilee clip, ensuring they have all been refitted correctly and are sufficiently tight. Ensure the jubilee clips have been seated correctly and evenly on the silicone hoses. Check all wiring is safely secured with cable ties, especially the section of loom that runs behind the crash bar, making sure no wiring is trapped or pulled excessively tight.



Refit the front bumper, remembering to reconnect the wiring for the foglights and outside temperature sensor. Replace the push down rivets along the top of the bumper and the bottom at the subframe. Refit the Torx bolts at the edges, ensuring the bumper is located in the runners at the leading edge of the front wings correctly and the panel gaps are nice and even.

The results

We must stress here, the power figures we achieved are simply a guide and results will vary drastically from car to car depending on the level of tune. Bearing in mind our Astra Coupe has been fitted with an Astra VXR engine, Regal initially carried out a power run prior to the intercooler fitting and achieved 258 bhp and 251 lb/ft on the standard map. The car was then remapped, again bear in mind it's a VXR engine but still runs the Z20LET injectors, exhaust and airflow meter, achieving 274 bhp and 334 lb/ft.

Finally after fitting the intercooler kit the car was once again given a power run and achieved an impressive 281 bhp and 358 lb/ft, although more significantly the intake charge temperatures dropped by almost 40 degrees, proof indeed that the new

front-mounted intercooler was hugely more efficient than the standard item. We shall run the car again once we've fitted the reverse airbox, VXR injectors and 80 mm airflow meter and most importantly, fitted a full exhaust with pre-cat replacement pipe.

Regal and TX Autosport commented that the standard exhaust was dramatically restricting the car's ability to produce any more power. We're getting lots of cold air in, we just aren't getting it back out efficiently due to the restrictive standard exhaust. We shall update our quest for power once all the tuning work has been completed, however the front-mounted intercooler has proven to be a worthy modification, especially when you consider the cost. Value for money indeed.

