

## Galaxy TDI – Intake Manifold Cleaning

Removal and cleaning of the intake assembly. (VW PD Engines)

Version: V1.07  
06/07/2011

www.mirez.co.uk

### Preamble:

In common with a lot of diesel engines the Galaxy has an EGR (Exhaust Gas Recirculation) system and CCV (Crank Case Ventilation) system.

**The EGR system:** is designed to reduce emissions by redirecting a small proportion of exhaust gases back into the intake for a second combustion. This has the effect of raising the intake air temperature and subsequently the effectiveness of the combustion. The EGR system functions mainly at low power requests by the driver.

**The CCV system:** is designed to vent out air displaced by piston movement and thus aid power and economy. In high compression engines (most modern diesels) small amounts of oil pass by each cylinder during its cycle, combining with the fast moving air to form oil vapour which is then passed out of the engine via the CCV. The CCV on the Galaxy is fed back into the air intake just up from the turbo, the result being that the oil vapour enters the intake tract and, as it cools, turns back into oil coating all the components on the way.

Both these systems work well to do the job they were designed to do however as the oil vapour from the CCV system mixes with the sooty air from the EGR system it forms a sticky sludge that over time builds up inside the intake system and subsequently restricts airflow. This build-up can have a dramatic effect on engine power, response, idle noise and has been linked to increase turbo wear.

**The EGR Heat Exchanger:** is designed to lower the exhaust gas temperature and raise the coolant temperature. It's bolted to the back of the intake manifold.

### Minimum Requirements:

- Allen Key's (5mm, 6mm)
- 16mm Spanner/Socket (2004>6 cars)
- Cleaning equipment: Wire wool, steel brushes etc
- Manifold Gasket
- Hose clip removal tool (Large pliers etc)

### Additional Recommendations:

- Allen Sockets (5mm, 6mm)
- Ferric Chloride
- EGR Gaskets
  - EGR Valve to Manifold Gasket
  - EGR Heat Exchanger to Valve Gasket
  - EGR Joint Gasket x 2
  - EGR Intake to Heat Exchanger Gasket

### General Information:

This is a reasonably strait forward task but time consuming. It took 6 hours work to complete but if the manifold was nicely accessible it would have taken no longer then 2 hours. Since a lot of the work is done without sight and with restricted access this adds considerably to the time.

The process below details how to remove the EGR valve and Inlet manifold. The heat exchanger is left in situ for this task as removing it would require draining the coolant system – however the restricted room also adds to the time.

**Location:** (Engine cover already removed)



**MAF**

**Intake Manifold**

**EGR Valve**

**MAP Pipe Section**

Quick Strip Down:

Remove Engine Cover - Pull upwards)

On 2004 > Remove windscreen wipers and detach scuttle assembly

Remove air box assembly – One allen bolt, undo the pipe clip after MAF

Remove intake pipe – Remaining one clip on turbo downpipe

Remove bulkhead extension panel – 2 nuts, 1 bolt and weather seal

Remove the MAP section of pipe work – one clip, one giant E clip (top)

Cover intake pipe with cap/rubber glove etc.

The next task is one of the awkward ones! Remove the EGR Heat Exchanger (HE) output to valve pipe. Its 4 allen bolts in total taking care to recover the gaskets:

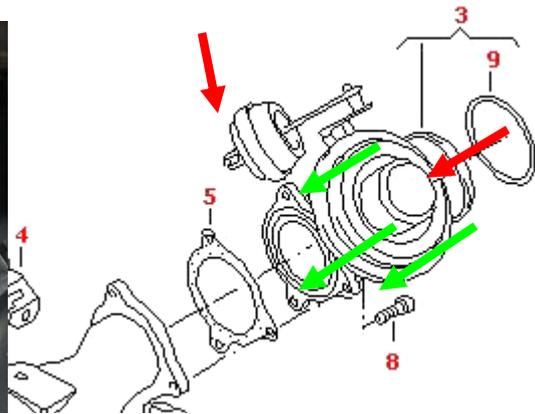
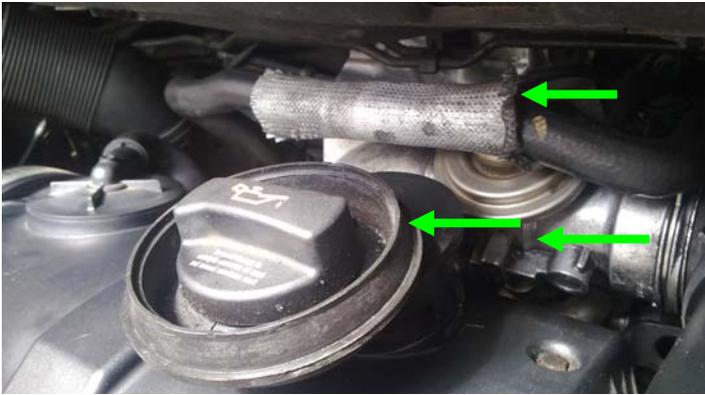


With the HE off the vehicle its

easier to see where the 4 bolts are:



With this pipe removed you now have access to the 3<sup>rd</sup> retaining bolt of the EGR Valve which is next to be removed. Disconnect the two vac pipes going into the valve (red) and the bolts (green) – again they are tricky to access. Lift out the EGR valve assembly.

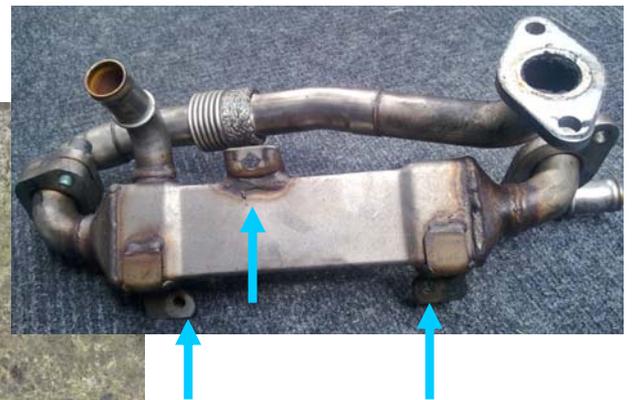
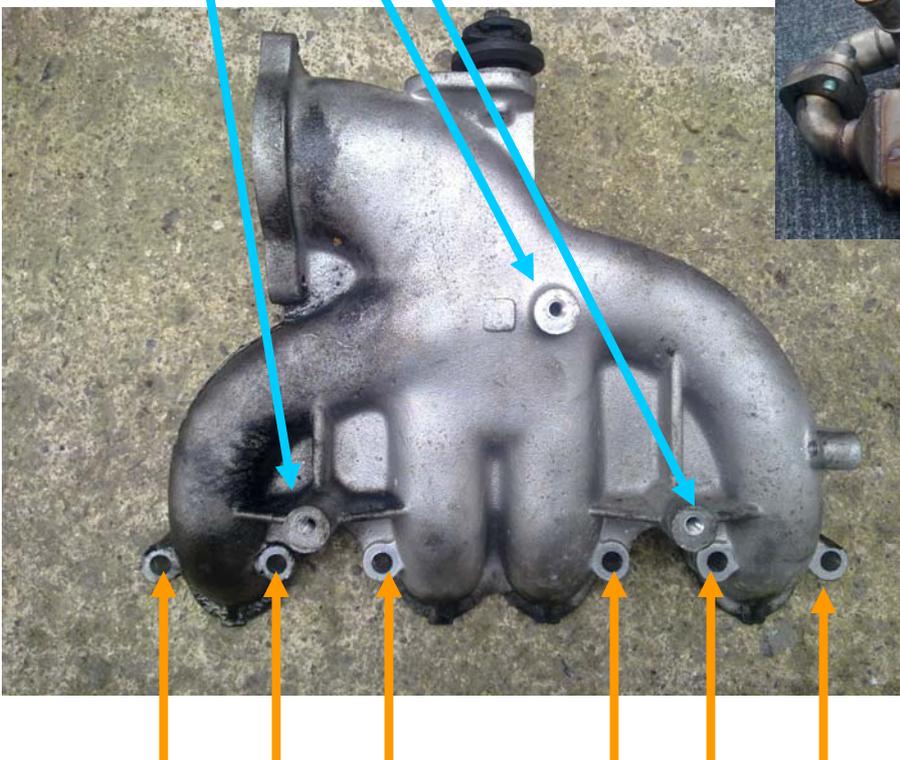


The valve assembly is where the mixing starts, so don't be surprised to find some standing oil on right side and a very gummed up left side. Next, remove the turbo downpipe retaining bolt (red) from the side of the manifold and then the three bolts (blue) that hold the EGR cooler to the back of the manifold together with the two bolts holding the final piece of EGR pipe work to the cooler.



These are easier to see but again, photography wasn't easy so this is the view of the back of the manifold assembly, referenced with the HE view from earlier.

With the HE now free to move the final stage is to remove the 6 allen bolts that hold the manifold to the head (Orange) Again recover the gasket at this point. Note where oily residue has been leaking from the EGR system down the back of the manifold and also where the intake gasket appears to have been leaking between ports 2 and 3 (below)





With the manifold removed it's now time for the cleaning and de-gunking of the assembly. It's easy to forget this stage later on so start by using a clean rag to wipe around the back of the cylinder head against where the gasket will seat. Care should be taken that nothing falls into those inlet ports including debris and solid particles from the surrounding area but a clean surface is essential for a good seal when the unit is refitted.

The car this manifold is from is a 2003 TDI with 70K on the clock



The two photos above show the intake to the manifold before and after, you can see the volume of contamination that's built up here which is severely restricting airflow. Below is a closer photo of the same intake with a small section scraped away, it aids to show just how thick the sludge is measuring at 6mm thick at this point. To the right is the port outlets which have fared a little better but the build-up here is still over 2mm thick – more interestingly is that the build-up is less on ports 3 and 4 which could have given an imbalance in intake air and potentially the cause of the increased idle.



Cleaning out this assembly is a messy old affair so be warned! Use a screwdriver to scrape out as much solid debris as possible and then the wire brush to get back to metal. Try and get into as many areas as possible but be careful to avoid doing damage to the mating surfaces.



Experimenting with various chemicals found that Ferric Chloride was reasonably effective at eating through the left over debris but if you do plan on using it remember that its an acid/etchant so protective equipment **MUST** be worn.

Mix up enough solution to allow it to be lightly poured into the upturned manifold and then, using a paintbrush, work it over the remaining surfaces. Leave it for a few minutes to work before washing out and repeating again.

Remember the used solution must be contained and disposed of correctly. Most local recycling centres will take it if properly marked in their household chemicals section.

When cleaning the EGR valve, care should be taken to avoid damaging the rubber seals and diaphragm so use any chemical sparingly.

Once complete the manifold, valve and pipe work can be reattached to the vehicle but must be fully dried! When re-attaching the manifold ensure a new gasket is used, this one is a "crush" type and can only be used once. In practice the EGR gaskets are normally ok to be reused but it would be prudent to change them at the same time.

## Prevention;

So it's all very nice having a clean intake again but whets to stop it happening again? Well the short answer is nothing, the contamination will re-occur but there are a few solutions to combat this. Since the CCV system must be left connected, the most common seems to be to blank off the EGR or otherwise disable it. It should be noted that this is probably illegal in most countries, will produce greater emissions and can have adverse effects on idle and shut-down.

A more sophisticated way to deal with the problem is to separate the oil from the air vapour as it leaves the CCV system. There are a few products that do this but the most effective seems to be the MANN and HUMMEL ProVent System, this filtration system extracts the oil vapour allowing clean air to pass back into the inlet. Without oil the sooty air entering the tract from the EGR system won't stick and instead be consumed as normal without coating the intake.



At the time of writing the provent system had been ordered for this vehicle but had not yet arrived for installation. Further information to follow.

**DISCLAIMER:** Activities and vehicle modifications appearing or described on Mirez Network documents, sites and it's pages may be potentially dangerous. Mirez Network and the authors of these articles assume no liability for how any particular individual chooses to use the information presented here. We do not endorse any such activity for others or recommend it to any particular person - we simply document the experiences and opinions of our staff and members. If you choose to engage in these activities or modifications it is by your own free will and entirely at your own risk. Any and all modifications will likely cause a vehicle to behave differently than from factory. Some modifications may significantly increase your risk when driving the vehicle or be dangerous in some driving situations. Use good judgment when engaging in any activity or making any modifications. Do not take unwise risks. Consult a certified professional if you are not sure of something. Some of these modifications may void your vehicles warranty.