

Intake Manifold Cleaning

Instructions for A4 TDI engines

Created by DeafBug

Original instructions were created by GeWilli with Snowball's assistance. It is outdated as we have determined better methods. I want to thank those guys to help get it started and I want to thank the TDIClub forums for finding improvements on doing this job, particularly JasonTDI.

The pictures in this document were taken from a 2002 Jetta. A few pictures were taken from other cars. The 2002 Jetta was really clean so that made it a great car to use for taking pictures. It was also without rust that I was able to remove the connecting pipe. Majority of us would want to leave the connecting pipe installed. I will explain more later.

A note for the Beetle owners, you can remove the cowl to get greater clearance. To work with the cowl in place is quite hard. It can be frustrated if you are not a patience person. Instructions for removing the cowl are not covered here. But for a quick reference, first you tape the windshield next to the wipers so you can reinstall in the same place. Remove the wipers. Use battery terminal lifter tool if needed. Lift up the rubber snake. ☺ Carefully lift the plastic cowl, start on one side. Remove a few nuts inside. There are two (or one if missing one) right above the brake fluid housing for the bracket that holds down all the wiring and vacuum lines. Remove the metal cowl.

You do not need any parts for this job. World IMPEX sells an intake cleaning kit for a little over \$20. If you are doing this for the first time or if it as been a long time since it was last cleaned, you may want to get the kit. The gaskets are nice to replace. The biggest part is the bolts. If you strip the head in the bolts then you have replacements. And if the intake manifold has already been removed once, a new set of bolts are nice to have.

I don't want to talk about the frustration you will get if you do strip the head of the bolts. The best method to remove stripped bolts is to get some Bolt Out tools. Sears has a set but they fit in a 19mm socket or wrench. Other manufactures have better style but in most cases you have to order it. It is even more frustrated if you working on a Beetle with the cowl on and you have stripped the bolts. So here is the bottom line. Take an easy and as the saying goes, "Easy does it." If you take an easy and relax, no rush, you will have a smooth and rewarding experience with cleaning the intake.

And all the bolts are removed and installed by fingers. I only use the tool to either pop it loose or tighten it up. Sometimes you still need the tool due to rust on some bolts that make it hard to turn with your fingers.

Now let's begin.

Tools

All the tools are common tools that can be purchased at Sears or your favorite tool supplier. There are no special tools needed for this job but there can be a couple tools that can be hard to find if Sears is not in your area or out of stock. There are several other tools that I used but not all cars I work on are equal. The tools in the picture show the tools I use for every car.



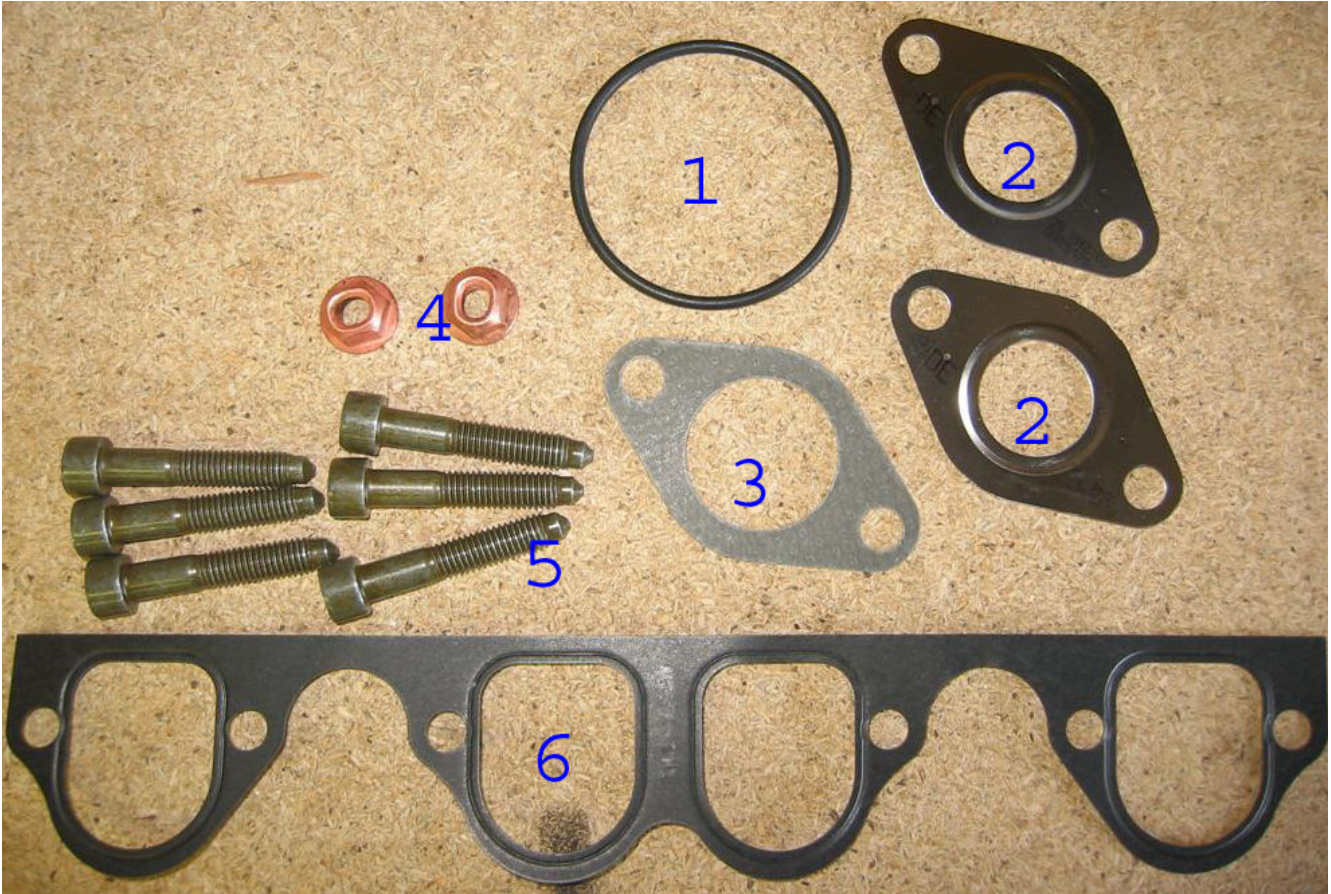
1. Mirror
2. Magnetic pick up stick (you can drop a bolt, we are humans)
3. a small wrench (10mm in picture but any size will do)
4. Long 6mm and 5mm Hex tool
5. Short 6mm Hex tool
6. Small screwdriver
7. 3 inch and 1.5 inch extension for $\frac{1}{4}$ and $\frac{3}{8}$ sockets
8. 10mm deep socket
9. $\frac{1}{4}$ and $\frac{3}{8}$ socket wrenches
10. 5mm and 6 mm Hex sockets
11. Flat band clamp tool
12. Hammer (tool not shown)
13. Large screwdriver (that can take hammer impacts) (tool not shown)

The only reason I use the wrench is to use it as a leverage to turn the bolt as shown in the picture below.



Parts

The picture below shows all the parts from the intake manifold kit from World IMPEX.



1. O-ring gasket (placed between the EGR and intake manifold)
2. Metal gasket (placed on each end of the EGR cooler)
3. Paper gasket (placed between the flex pipe and EGR)
4. Two exhaust manifold nuts (replaces the existing nuts only if you remove the pipe)
5. Six bolts (replaces the existing bolts for the intake manifold)
6. Intake manifold gasket (placed between the camhead and intake manifold)

Preparing the car

I prefer to work on the car when it is on the ramps. It is easy on my back as I don't have to bend over so much. And there are a few things I do that some people may not want to do. I completely remove the air intake pipe (the one from the airbox to the turbo) It is easier to remove it from the bottom so that also means the belly pan (or skid plate) is removed. The ramps I have are Rhino Ramps, it is a little lower than the steel ramps.

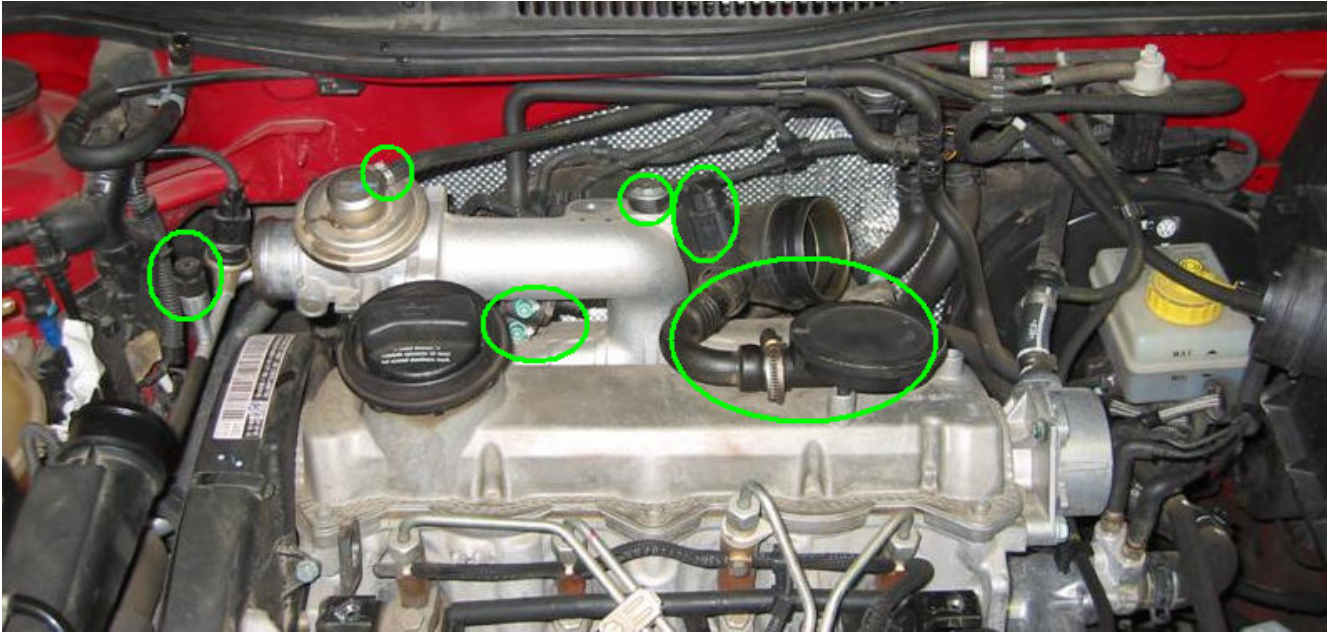
Let's remove the engine cover. Use a 10mm socket to remove the nuts that is inside the covers (3 green circles) Once the cover is removed, using the flat band clamps, remove the connecting pipe (green 1) and the pressure hose (green 2).



If you put the car on the ramps, then remove the belly pan or skid plate. If you rather work on the ground then you better not drop something (unless you have no bottom cover.)

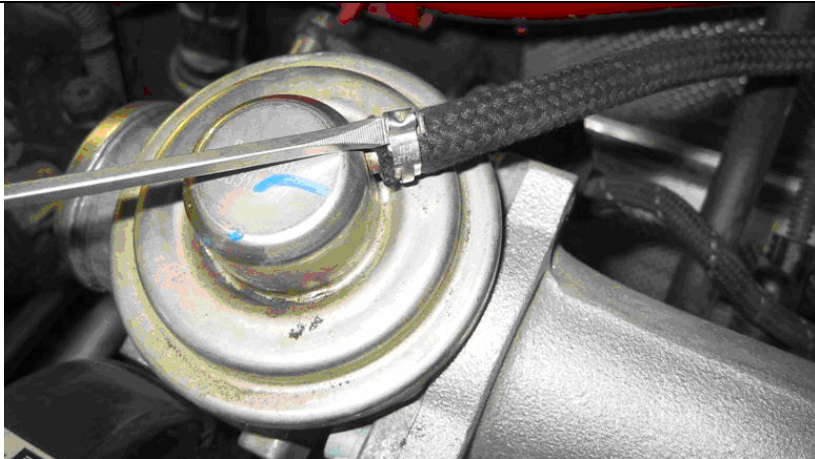
Getting the top ready

Now with the cover remove, we will be doing a bunch of little things on the top. The picture below shows what will be done and its locations.

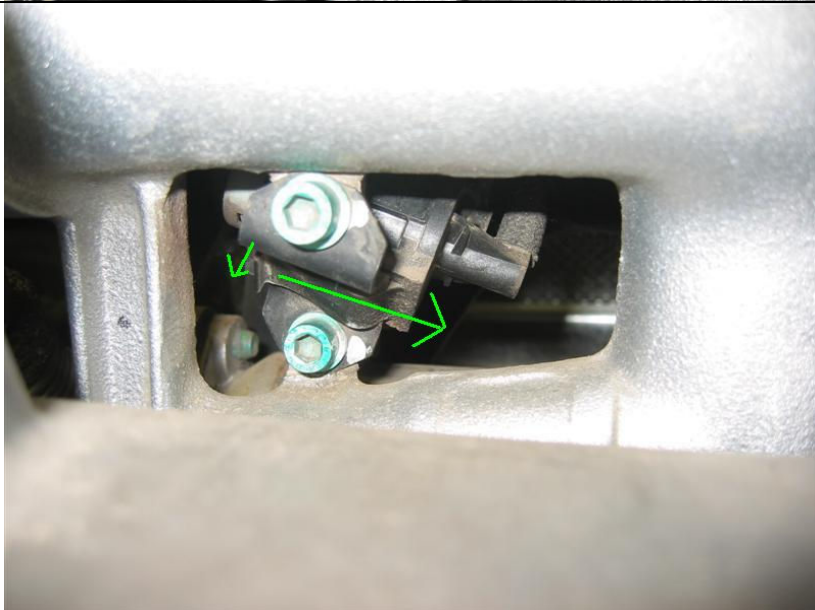


Remove the A/C valve cover. *I have at a number of occasions that the cover will come out unintentionally from your arms when you reach behind. Then you have to find it. Sometimes it takes a while to search for it. It can also be in a good hiding spot somewhere down by your subframe.*

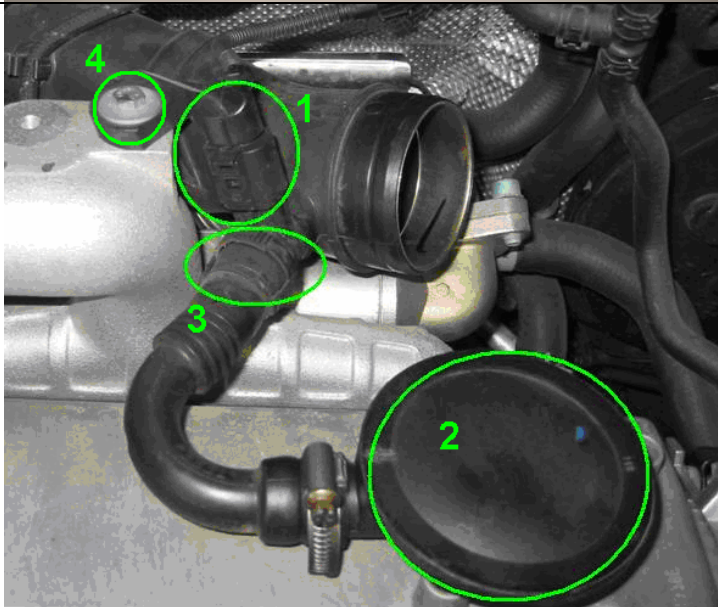




Disconnect the vacuum line from the EGR. Use a small screwdriver to loosen the grip of the clamp. You can pull it out in twisty motion after it is loosen.



Unclip the pressure converter from the intake manifold. Yes, it is a clip. Note how you pull the clip to unlatch a little then slide it out..



1) Disconnect the wiring connector from heater pipe, the electrical part. Careful not to break the tab. (Push down a bit, lift tab and pull up.) (Don't ask about the heater pipe, it is listed that way in the ETKA.)

2) Disconnect the pressure regulator valve from the valve cover by lifting it up.

3) Pull (disconnect) the air hose from the heater pipe.

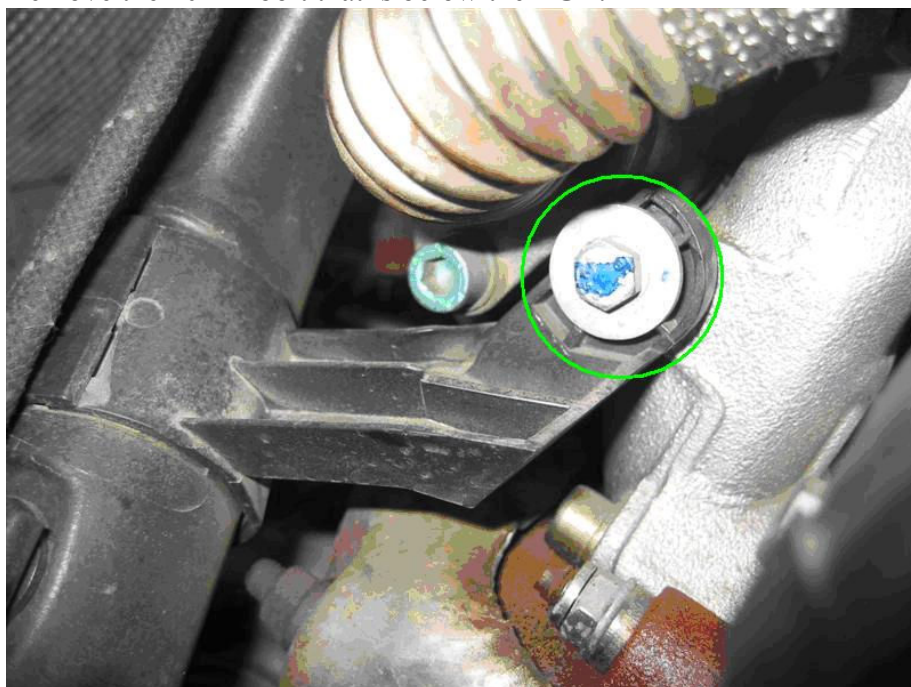
4) Remove the 10mm bolt.

Removing the air intake pipe

You will need to unclip all the vacuum lines and wirings that is clipped to the air intake pipe. Most of them are along the top. There is one long vacuum tubing that goes along the pipe to the VNT.

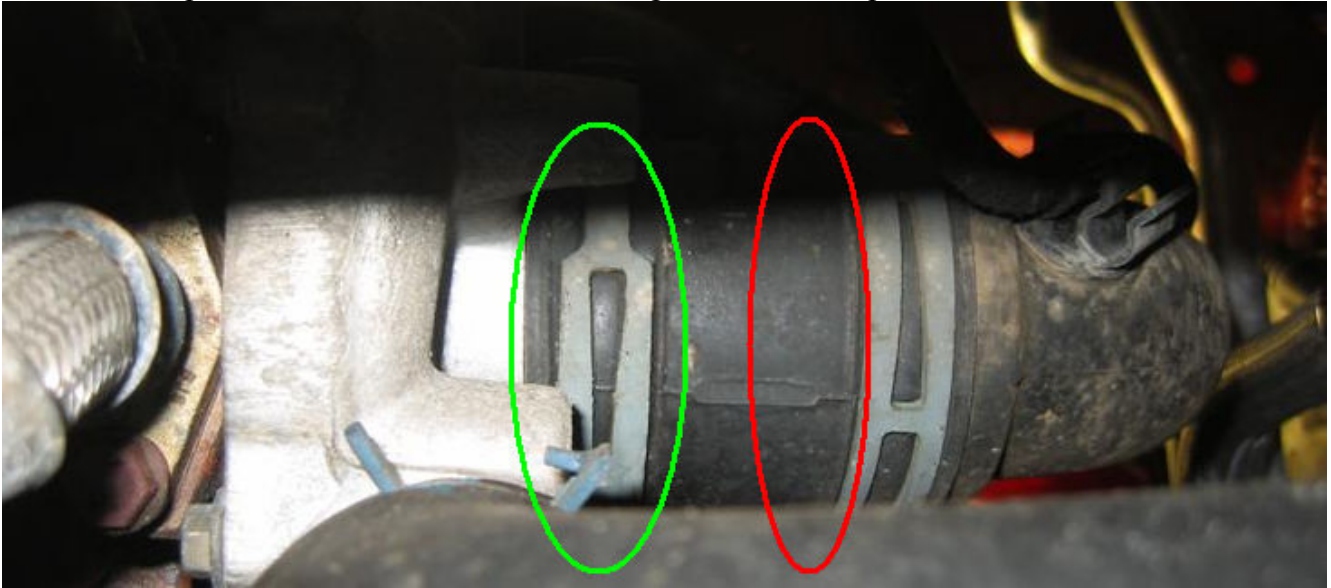


Remove the 10mm bolt that is below the EGR.



Go under the car with flat clamp pliers. If the car is not on the ramps, then you have to do it from the top.

Slide the clamp over on the rubber tube. From the green to the red spot.

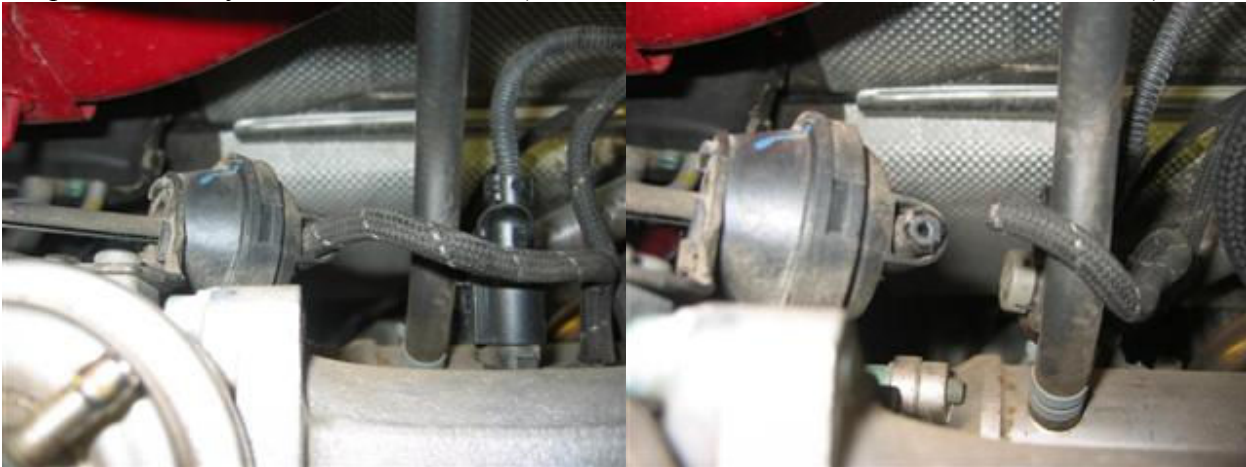


Now pull it off from the turbo. Removing the air intake pipe can be tricky. Some people like it from the top. I prefer from the bottom.

Just watch how it comes out. When you pull it down, the tabs where the 10mm bolts go is annoying. So you have to work with it. I find it that you have to rotate the intake pipe counter-clockwise when you got at least half pulled out near the bottom. Once you complete half turn of the counter-clockwise, it just comes out easily. Remember that when you have to reinstall it.

Cut or pull the tube on the anti-shutter valve?

Some cars have it pulled while others require a cut. To pull it off, try twisting it first. Use pliers if needed. Don't give *way* too much effort that you can break the nipple. If you can't get it loose, then cut. It is the same as pulling the fuel lines off of the fuel filter. Always twist first. If you got it loose, the pull in a twisty motion to remove it. (Break it? There is fix for it. It is mentioned later.)



Now let the fun begin.

Okay, now the car is quite ready to start the real work. Got your patience so you don't get frustrated? There are two different methods. One is the removal of the metal connecting pipe and the other is not to remove it. So that makes it an optional step. By not removing the connecting pipe, it doesn't give you much room to work with when you have to set the EGR cooler aside. The good news is that if the car is a Beetle, you can skip the removing the connecting pipe.

The reason for the Beetle having that advantage is the heater hoses routing. The hoses that are connected to the EGR cooler is routed different that makes it very easy to set the EGR cooler aside and still give you comfortable space to work with. The Jettas and Golfs don't have that flexibility. But hey, don't fret. Beetle owners have that cowl to remove. Well, that is optional too. ☺

Okay, let's get started.

Relocating the EGR cooler

This involves a bunch of bolts to remove. If the car is not on the ramps, don't drop them or the gaskets.

Look at the driver's side of the engine. You should see something like the picture below. Use a socket with a 6mm on a short 1.5 inch extension. Remove the two bolts from the metal connecting pipe to the EGR cooler. And the gasket too.



Skip the next page if you plan not to remove the connecting pipe. But I know you will read it anyway. I should warn you that this was done on a car that was very clean and very well maintained that allowed me to do it. If you have ride without a bottom protection at some point or the car was sitting outside undriven for a long time. Don't bother with it. The big difference is that by leaving the connecting pipe, you cannot, I repeat, cannot move/bend the pipe. If you move it too much there is a chance for a hole in the middle of the pipe. It will create a high pinch sound.

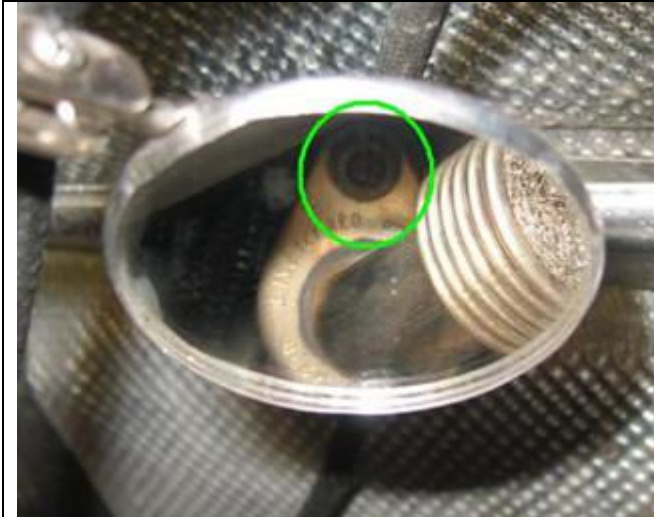
Removing the connecting pipe (optional, at your risk)



If you follow the connecting pipe from the EGR cooler to the exhaust manifold, which is where the turbo is connected to. You will see that there are two bolts that hold down the connecting pipe.

- The tool to use is 12mm socket.

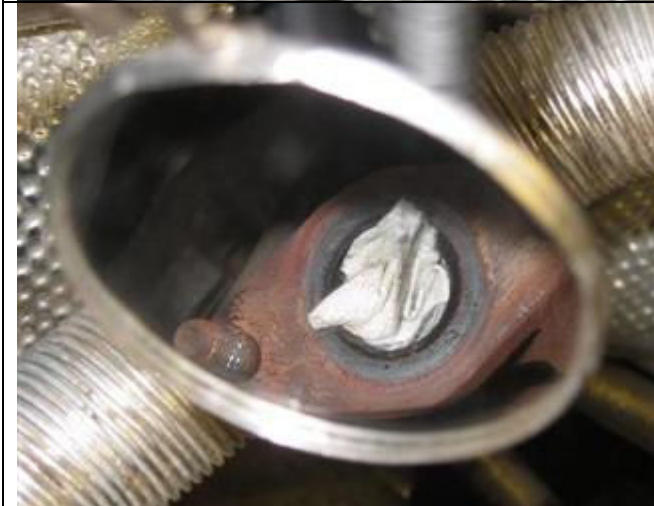
Two of the pictures show one on each side. While the 3rd picture shows a small piece of paper towel inside to prevent stuff from going in. Put the paper towel in very gentle, do not force it. You don't want to risk making carbon loose. Otherwise cover it completely on the outside such as latex glove with a rubber band. But I have found that it can come loose while working so secure it good.



WARNING: Do not force the nuts to come out. If you feel resistance after giving some effort, STOP! You don't want to break the stud in half.

If you do manage to remove the nuts. Throw them away if you have the intake manifold kit from World IMPEX, They give you two new copper nuts. That is what they are for. However, grab the gasket; you will have to re use it.

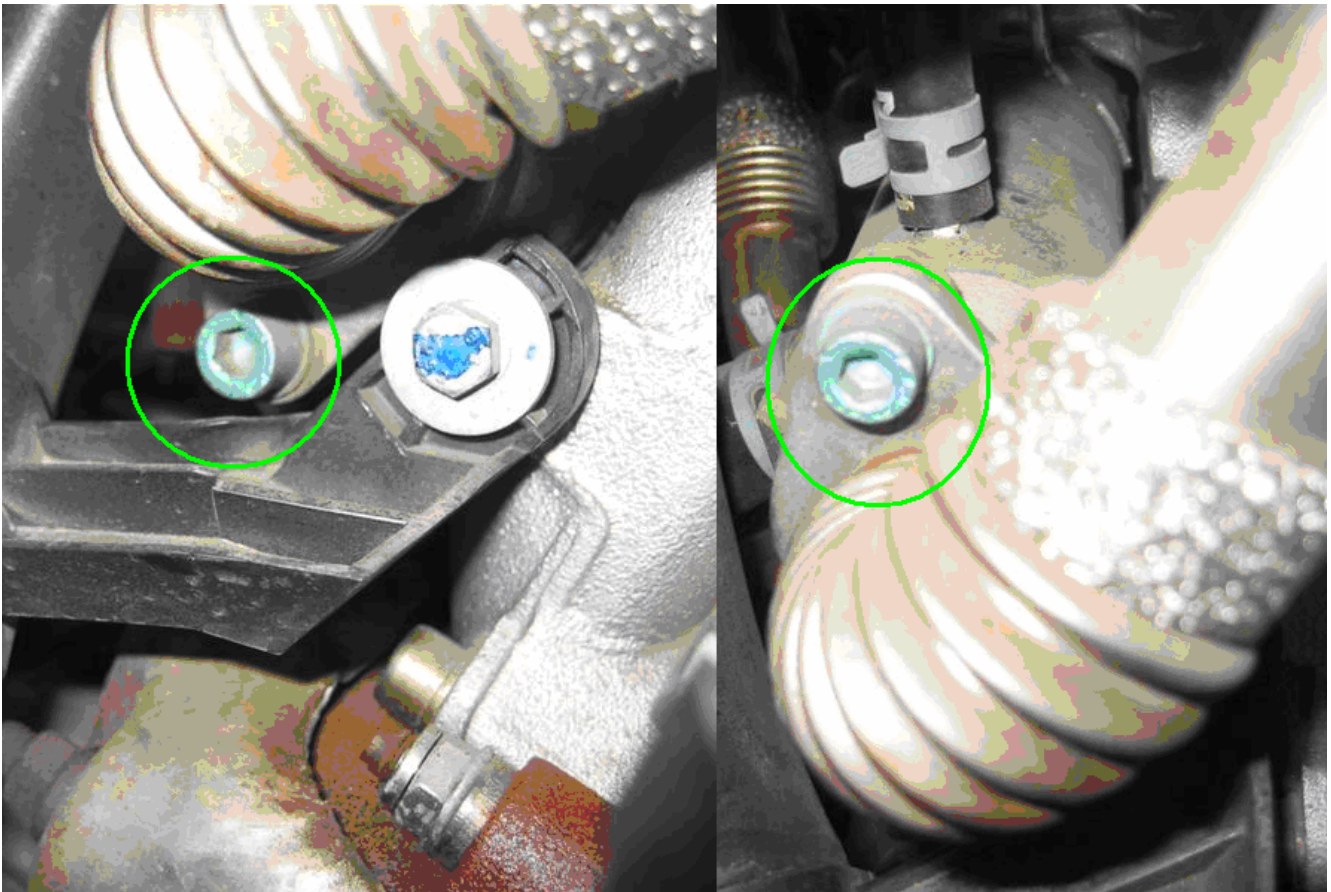
Yes, I have been a bad boy once. Below is a picture of a stud broken in half. This was a different car, not the one I took pictures of for this document. (Notice the amount of rust.)



So now don't get confused with the remaining pictures as I took it without the connecting pipe. Some pictures are taken early before I removed it.

Now let's continue. Let me say this first. As we go forward, almost always you have to use different tools to remove the bolts. I will not explain what tools. That is for you to figure it out. I will just tell you what size to use but you remove the bolts your way. Be certain that the tool is fully seated so you don't strip the heads with the hex tools. It is not any fun to try to use another means of removing the bolt if you strip the bolt. Consider yourself warned. Be patient and relax. Easy does it. (Where did I hear this before?)

Remove the two bolts that are holding the flex pipe to the EGR cooler with a 6mm hex. There is a gasket in between.



Now remove the 3 bolts that hold the EGR cooler to the intake manifold. For 2001 and older, it is 10mm bolts. For 2002 and 2003, it is 5mm hex bolts.



This bolt is right on the top of the EGR cooler and right in the center. You can see it without the mirror.



This bolt is a little tricky. You can see it with the mirror from a different angle so you can see how to place the tool.

Hint: The tool goes to the bolt over the top of the oil line. The oil line is the black metal line back there.

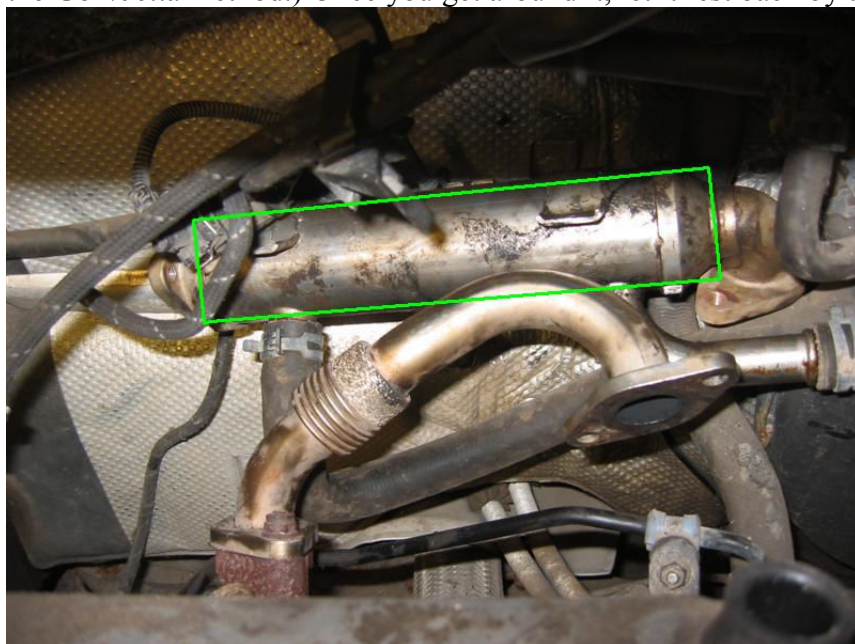


This bolt is can be accessed from the side as it almost directly below the heater hose connected to the EGR cooler.

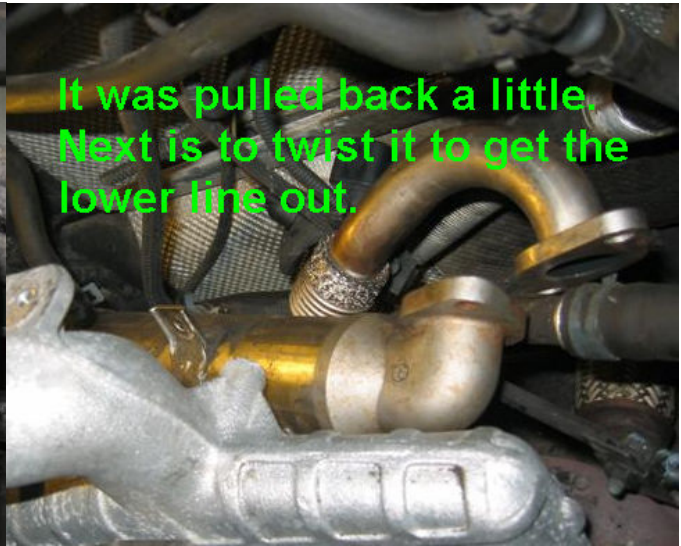
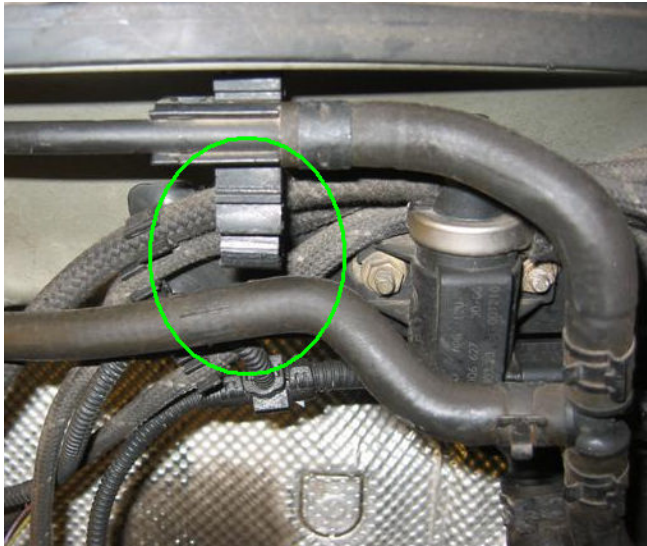
Connecting pipe removed method: To set the EGR cooler, you simply push it back and let it rest by the firewall. Just get it on the other side of the metal oil line.



Beetle method: You can almost push it back but you have to work around the connecting pipe. (See the Golf/Jetta method.) Once you get around it, let it rest back by the firewall.



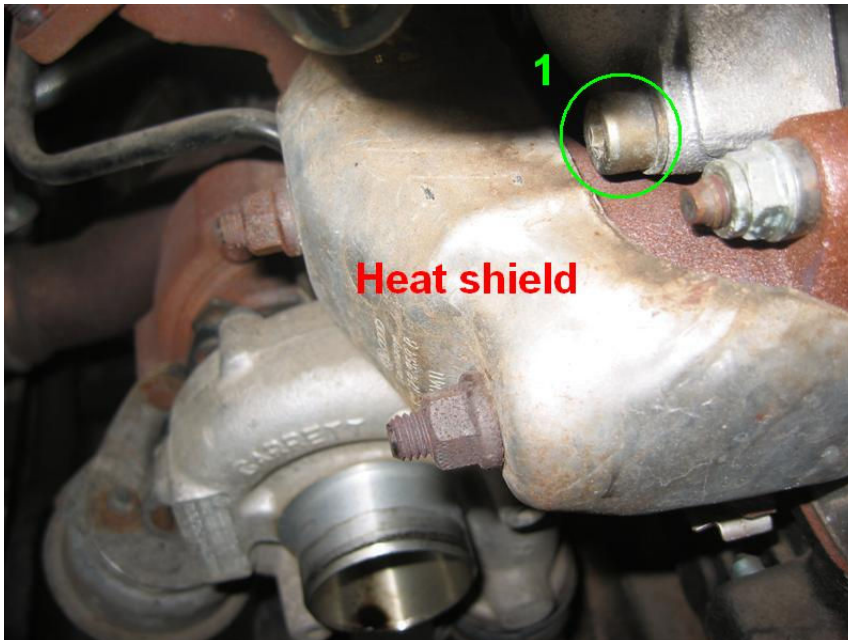
Golf/Jetta method: To set the EGR cooler with the connecting pipe. It takes several steps. Important part is try not to move (bend) the connecting pipe. It will have to move slightly as you try to get the cooler out. Not all movements are equal. Everyone is a little different. See the pictures below to get some ideas. You may have to disconnect the coolant line from the clip on the top to give more room. Once you get the EGR cooler free, how you rest it against or on the car is up to you. (Picture shows with a bungee strap.) Just don't kink or bend the coolant lines severely. They will be bending anyway but don't be hard on it.



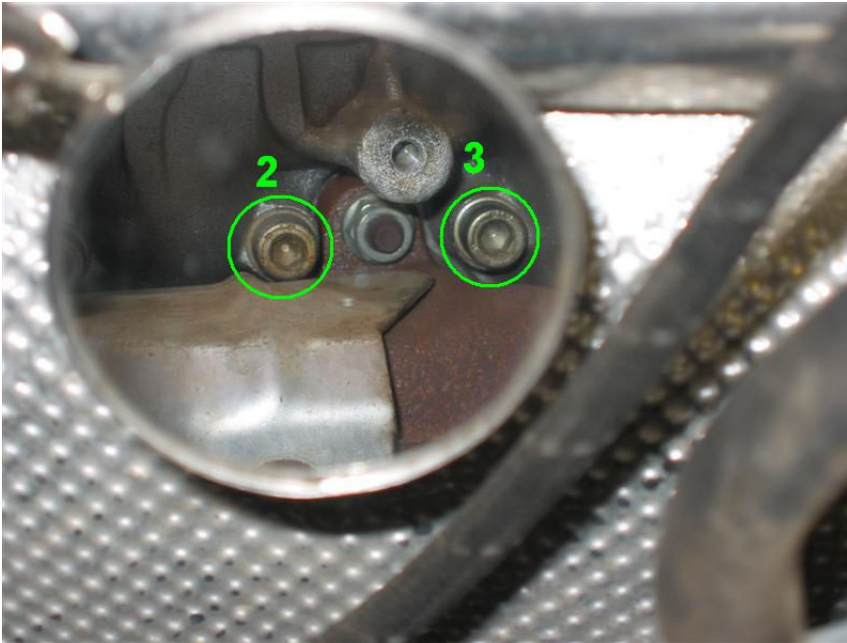
Removing the intake manifold

There are six bolts holding the intake manifold to the camhead. Two of them are blocked by the heat shield that you can't pull it out once you get them loosen. The others are straightforward to remove them. Again, I won't mention what tools to use to loosen them. I will just show you where they are then you have to decide how you are going to loosen them. I prefer to pop them loose first except one. That one is popped loose but snug on. I rather have the manifold not wobbling in place. If you rattle it a lot, some of the carbon stuff between the manifold and camhead port can get loose and fall in the ports. Once all of them are loosen then remove them. Finally, with one hand holding the manifold and using the other hand to remove the snugged bolt. The manifold should come out with the EGR and the flex pipe all together. You are probably thinking which bolt I leave tight. Since I am left hand and it is easy for me to reach in. Also with the heat shield there, it is also easier to handle it all together. The bolt is the first one on the passenger side. You can do whatever pleases you. That is just my way of doing it.

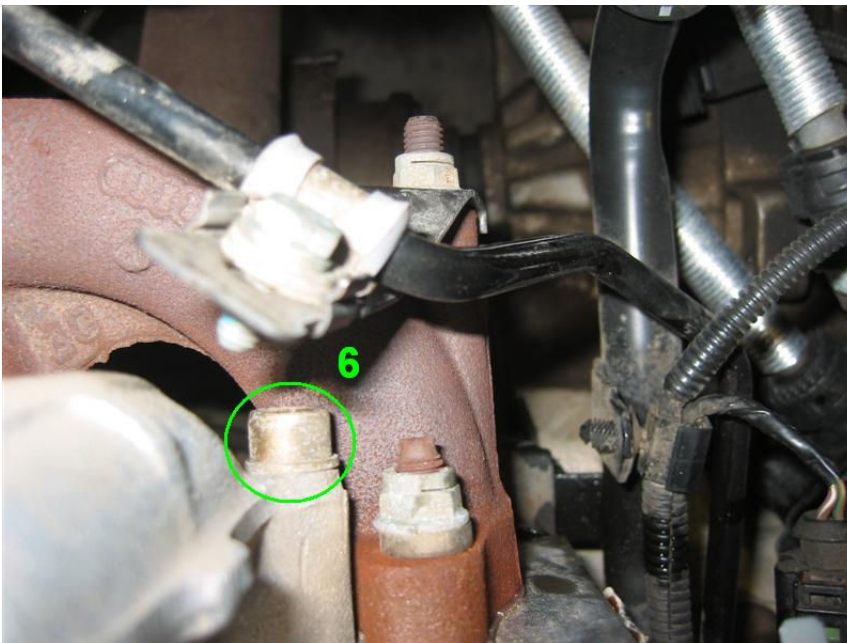
Now all the locations of the bolts are numbered from the passenger side to the driver side. Not all are shown but you should get the idea to find bolts 4 and 5. Bolts 1 and 6 are visible without a mirror. You may have to lean over for bolt 6. They are 6mm hex size. Remember to insure that the tool is fully seated before turning.



Notice how the heat shield is in the way for the bolt. You just remove it complete out of the camhead but you can't pull it out completely. Bolts 1 and 2 are the same. Remaining bolts can be pulled out completely.



The nuts that are between 2 and 3 in the picture above and to the right of 6 in the picture below (as well as to the right in the picture on the last page) are for the exhaust manifold. Don't touch them.



With bolts 1 and 2 completely unwound and with the other bolts completely removed the intake manifold should come out with the bolts.



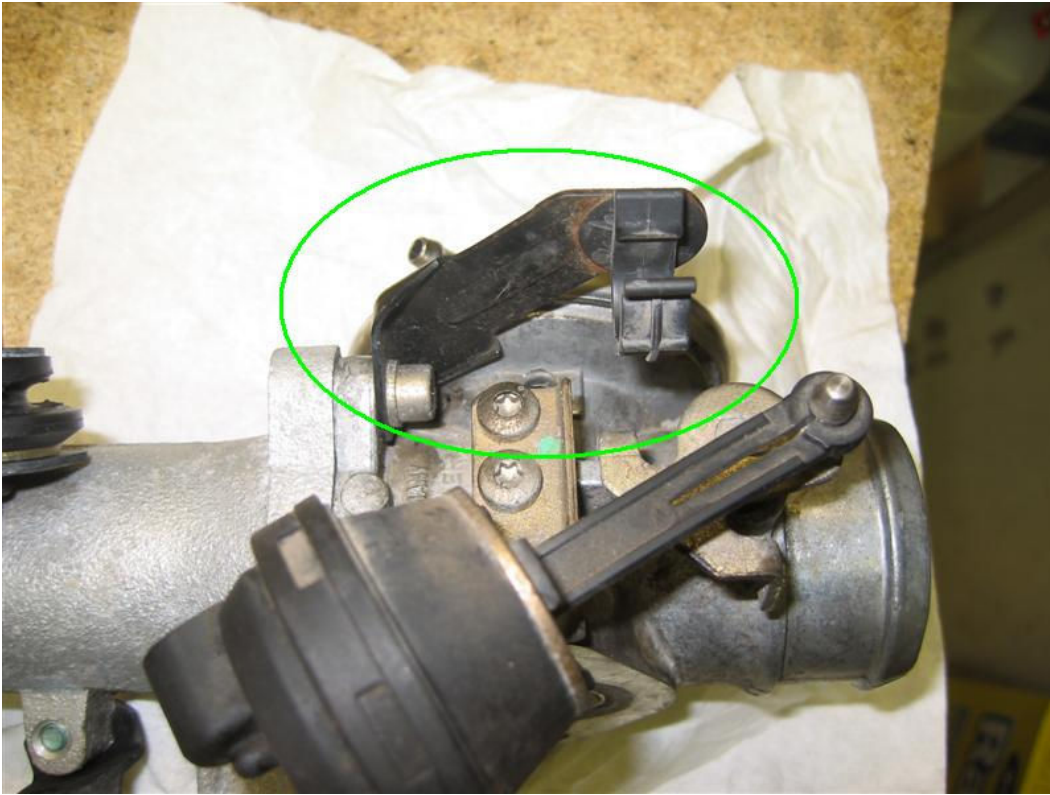
With the intake manifold out of the car, locate the gasket. It could be on the manifold or on the camhead, or anywhere in between. 😊

Now you have one piece all together, intake manifold, EGR and flex pipe.

First remove the flex pipe with a 6mm hex tool from the EGR. Once it is removed, be sure you have the gasket that was in-between. Normally it is stuck on the EGR making it look like it is part of it.

Next you want to get a 5mm tool and remove the 3 bolts on the intake that is holding the EGR. Beetle owners, you have that extra part (the bracket with the clip) attach to it. See picture on next page. Once you separate the two parts, take a good look and how clogged it is. Now find the black O ring that was between the intake manifold and the EGR.

Set them up and take a picture for your records or whatever.



Cleaning the parts

How you clean it is really up to you. Everyone is different and may not have all the materials. I like using the (purple) degreaser in a spray bottle for the EGR. Use it after you scrap it off. I like using a can of brake cleaner to blast down the intake neck after scrapping it off. I use some makeshift scrappers.

The flex pipe can be scrapped out but carefully not to damage it. Technically there is much you can do with the pipe. When you are done with it, blow it out with compressed air. Be sure to point away from you. There will be a large puff of black cloud.

The EGR can be scrapped out completely and you can spray with degreaser or some cleaner inside. But do not soak it. The black piece (anti-shudder valve) can not get wet or the nipple on the round metal top can not get liquid inside.

The intake manifold is all metal and can be soaked or whatever you want to do with it to get it cleaned. Be sure to blow dry the inside. There are several tricky spots that you will have to be creative with the tools or metal scraps you have to get them out. Be sure to get the neck part after the bend.

WARNING: Unless you don't care, the black stuff that you will scrap off is really sticky and really smears if wet. It will get on your carpet (from your shoes) If that black stuff is dry it still smears and still sticks to your shoes. I wear latex gloves when cleaning. Also I work on the parts over a carboarded floor so that I don't get it on the real floor.

The following pictures are for your pleasure.



First I scrapped everything off.

Then I gave the intake manifold a bath in a degreaser. I had an old bottle cleaner brush. You can go with something thicker. I have seen a toilet bowl cleaner brush for a buck at Walmart. You can remove one end of it so it is not a loop but a straight line. Cut the metal tip.

If you have a vacuum pump, connect to the EGR and pump it to so you can clean the port opening when it lifts. Pull the hose, it closes quick! Keep your fingers clear.

See how clean the ports are now.

Reassembling the parts

Before you put the parts together, you need to do one thing. If you had cut the vacuum hose, you need to get the remaining part of the hose out. I normal use a pick tool or you can use a Exacto knife to slice it then pull it with pliers. Use the slot groove on the back to assist you. Don't break the nipple!

Break the nipple? Read this thread. <http://forums.tdiclub.com/showthread.php?t=75544>



Install the black O ring on the EGR and put it on the intake manifold. Beetle owners don't forget that one part, the bracket with the clip. Torque it to 7 ft/lbs (10 Nm).

Install the flex pipe to the EGR. Be sure to use the paper gasket (It doesn't matter which side) Torque it to 18 ft/lbs (25Nm).

Beetle owners may want to do one little thing before installing the manifold into the engine. That little extra part that is attached to the EGR has a plastic clip. You want to remove it and flip it. I have seen several cars that have the rubbing on the coolant line. The rubbing happened from the anti-shudder valve.



And one thing to make installing the intake manifold on the car a little easier. You want to bang down the heat shield so you can insert the bolts with ease.



Intake ports on Camhead

You should inspect the ports on the camhead with a mirror. Ideally, you can know how clogged they are based on the appearance of the ports on the intake manifold. If they are really clogged, then you would have to get them strapped out so you can enjoy your power. This is best left for experts but you can do it yourself. Air compressor is strongly recommended. Remove the valve cover (Seven 5mm hex bolts) on the camhead. Remove the timing belt cover. Using a tool, turn the engine at the camhead pulley clockwise direction, insure that the lobe for the intake port you are going to work on is up. Place the valve cover on the camhead as you will lean over. Scrap the intake port on the camhead. Blow it out with compressed air. Then work on the next one. Remove the valve cover, turn the engine so the lobe is up on the port you are going to work on next. Repeat until all 4 ports are clear.

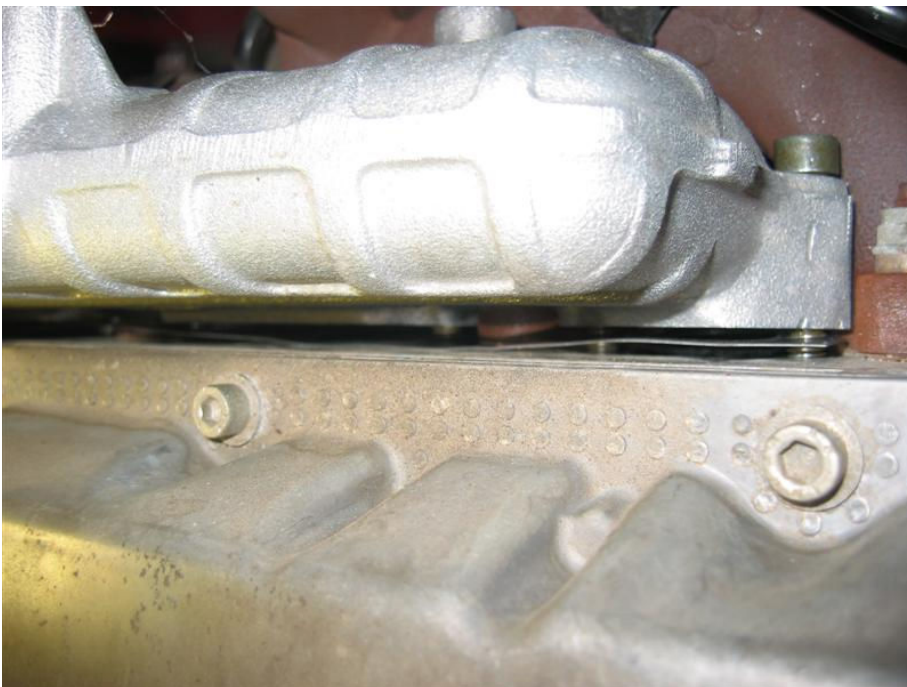
Reinstall the bolts for the valve cover, torque to 7 ft/lbs (10 Nm). Reinstall the timing belt cover.

(I will add pictures when I can. In the meantime, <http://forums.tdiclub.com/showthread.php?t=155184>)

Installing the intake manifold on the camhead

Note: All the bolts for the intake manifold, flex pipe and connecting pipe are to be torque to 18ft/lbs (25Nm) but you can't quite get the torque wrench back there. So a good reasonable hand tight is acceptable. Just don't overdo it. If you can get a torque wrench back there easily, please do.

Now with the gasket and one bolt, pick a hole (1,2, 5 or 6) Install the bolt a little, just hand turn it a few times. With another bolt, install it on the opposite end with a few turns. After you get two bolts in, check the gasket. If it looks good, go ahead and install remaining bolts. Again, I just finger tight them all before giving it a final tightening. (You can do what please you.) Remember to relax and insure that the tool is completely inserted in the bolt head before tightening it otherwise you can strip the bolt head.



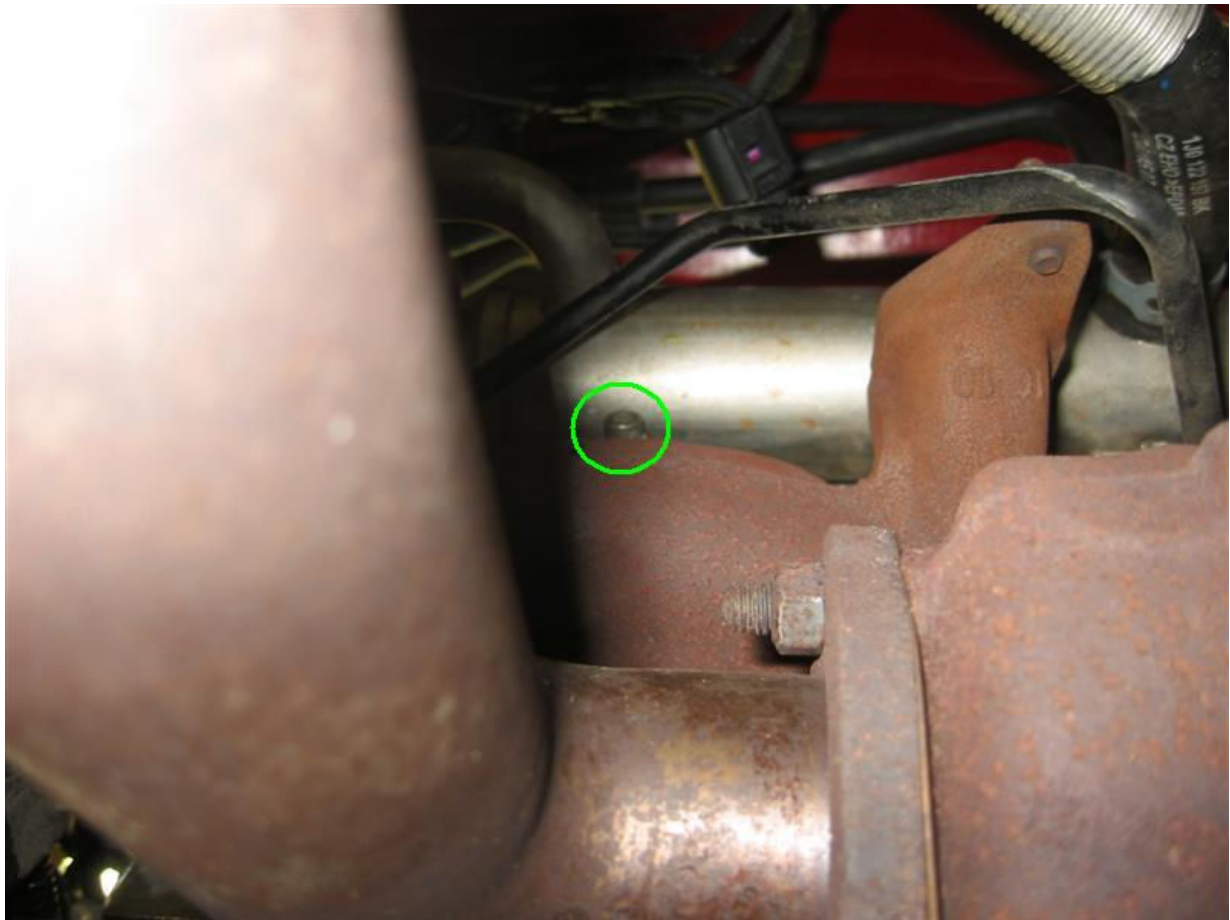
Getting the rest of the parts assembled

The following steps should be done in that order or you will get frustrated since it gets tight to try to insert the bolts in position. All bolts should be inserted and turn several times by your fingers first before you use a tool. You don't not want to risk cross-threading it.

Now that you have completely installed the intake manifold, it is time to get the EGR cooler installed. Reposition the EGR cooler.

Get one bolt and the metal gasket. Whichever is comfortable for you, (the top for me) insert the gasket in place and install the bolt from the flex pipe to the EGR cooler. Just get it secure and turn only a few times. Do not thread it in completely. Now do the same with the other bolt. Make sure the gasket is in place correctly before inserting the second bolt.

Secure the EGR cooler to the intake manifold with the 3 little bolts. I recommend getting the top center bolt in first. Again just a few turns not all the way in. Do the same with the other two attaching the bottom part of the cooler. It is easier to do the bottom bolt on the passenger side first. For the bottom bolt on the driver's side, I go under the car and insert it from the bottom. It is easier for me. See picture below. All you can see is the bolt. So you can't quite see where to insert it but you can feel it easy. Nice to be left handed. 😊



If you have removed the connecting pipe, install it on the exhaust manifold. Don't forget the gasket. You have to re-use the gasket. And use the new nuts if you ordered the intake manifold kit. The new nuts are 13mm, unlike the old ones, which is 12mm. (Odd that you get new nuts but no gasket.) Torque is 18 ft/lbs (25 Nm) or a good hand tight.

Now attached the connecting pipe to the EGR cooler with the two 6mm hex bolts. Don't forget the metal gasket.

At this point, you have the EGR cooler in position with all the bolts loosely in place with the gaskets. Go ahead and tight the four 6mm hex bolts to 18 ft/lbs (25 Nm) or a good hand tight. Tighten the 3 (either 10mm socket or 5mm hex) bolts to 7ft/lbs (10 Nm). Don't over-tighten it or you will strip the threads.

Almost done

Install the air intake pipe. Remember the doing the twist to get in place. When you insert the pipe up in the engine bay, make sure the long vacuum line hanging back there that is connected to the VNT is pushed back to the firewall. Don't want to get it caught with the vacuum line inside. Once you get it up in place, connect the pipe to the turbo. Install the 10mm bolts (with the large washers attached) Nice gently hand tight, don't over-tighten it or you can strip the threads.

Go under the car and slide the clamp to the turbo that is on the air intake pipe.

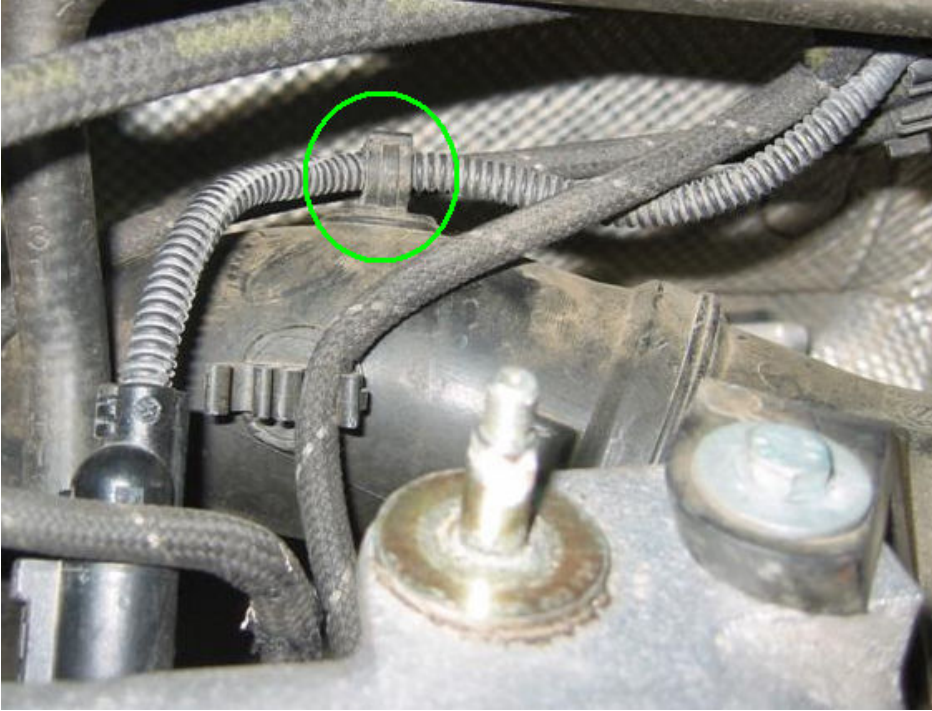
Now connect the pressure converter back on the clip on the intake manifold.

Install the vacuum line to the anti-shudder valve. If you had cut it, it can be difficult to push it down all the way. At least half or more is good. The picture shows that it is at least half inserted.



Now connect all the vacuum lines and wiring to their clips on the air intake pipe.

There is one wiring that you do not want to connect it to the clip. I have seen several cars have the wiring worn off from all the rubbing. So it is better to have it loose than clipped down.



Leave it unclipped like picture below.



Connect the vacuum line to the EGR valve nipple (the silver round thing on the EGR)
Install the A/C valve cover

Install the engine cover

Install the belly pan or skid plate.

Start the car and enjoy your newly restored power engine.

Note: If you see smoke coming out the back side of the engine after starting for a few minutes. It is just the leftover crumbs from the intake manifold that fell on the exhaust manifold being burned off. You can blow the area clear of crumbs after you installed the intake manifold before installing the EGR cooler. (Doesn't sound good to have this step at the end of the instructions. ☺)