HOW-TO: Rebuild Diesel IDI Injectors

Contributed by Administrator
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var gaJsHost = (("https:" == document.location.protocol) ? "https://ssl." : "http://www.");
document.write(unescape("%3Cscript src='" + gaJsHost + "google-analytics.com/ga.js'
type='text/javascript'%3E%3C/script%3E"));

try {
var pageTracker = _gat._getTracker("UA-356307-2");
pageTracker._trackPageview();
} catch(err) {}

This How To document was designed to assist with rebuilding Diesel IDI injectors. Like all recipies I recommend reading the instructions from start to finish before starting the project. I welcome your comments, so feel free to click on the comments link below if you have a comment to add or have completed this procedure and have a tip of your own to share.

DISCLAIMER:

- Use these instructions at your own risk
- Read them through from beginning to end before starting
- This is how I do things… it is not necessarily the right way nor the best way !
- Using equipment,tools, and supplies incorrectly could result in serious injury to you or your property or even death

Please note: You can click on any thumbnail below to see a larger version of the image. After viewing the large image, you can click anywhere outside the white image border to return to your spot in the text.

Parts needed:

4 new injector nozzles

You have many options here … current practice includes standard VW nozzles (either normally aspirated or turbo), so-called “GTD” performance turbo nozzles, or Mercedes turbo nozzles … specifically nozzles intended for the Mercedes 300D series. The ”hot” ticket seems to be the Mercedes nozzles, but others say they smoke too much. Have a set but haven't tested them personally.

The nozzles are identified by Bosch nozzle number:

DNO SD273 - stock turbo injector nozzle (DNO SD293 seems to be another common number for these)

DNO SD276 - "GTD" injector nozzle (also seen these listed as DNO SD274)

DNO SD261 - Mercedes 300D turbo diesel nozzle

Nozzles are available from a number of sources:

- Bosch dealers

- Mercedes dealers... they seem to stock nozzles much more reliably than VW dealers

- good ole eBay

I'm currently (2009) of the opinion that:

- the Merc nozzles flow more than we need and were not designed for our style of IDI head

- there's probably very little performance difference, if any, between the various factory nozzles, including the so-called "GTD" series

- the best nozzle for your VW might well simply be *new* stock ones!

Supplies needed:

- thin oil (penetrating oil works well)
- sheet of 600 grit sandpaper
- sheet of 1000 grit sandpaper
- sheet of 2000 grit sandpaper
- thin glass plate... I bought a really cheap picture frame and tossed the frame

- anti-seize coating

- clean solvent (paint thinner, general solvent, kerosene, etc.... something non-flammable at room temperature)

- Can of brake drum cleaner

- compressed air

Tools needed:

- 22mm wrench or 27mm deep socket (Mac Tools SC141,Snap-On S6104B, Craftsmen Deep, or equv.)

- strong vise

Step 1: Disassembly

There are two ways to get the (usually rusty) injector halves apart. One way is to clamp the base of the injector in the vice and use a 22mm wrench to untwist the top section.

My favorite way, which seems to work well for injectors that are particularly stuck together, is to place the injector upside down in the vice (clamping the top of the injector in the vise)

and using the same 27mm socket you used to remove the injector from the engine to remove the bottom. A larger breaker bar may come in handy and/or heat and/or penetrating oil ! I
like this way because I have tons of leverage and I’m not distorting
the bottom of the injector… but be careful not to completely unscrew
the halves in the vice and have pieces drop all over your garage floor.

You can now spread out all the parts

I like to keep the parts from each injector together throughout the process… it makes final calibration a bit more predictable and seems to result in less leaking.

I also like to take a power wire brush to the outer casings and polish ‘em up… it makes them look better, assemble easier, and most importantly keeps a speck of rust from gumming up a nozzle during re-assembly.

Here's a schematic drawing of how all the parts fit together:

If you examine the bottom of the top half of the injector you will probably find grooves worn into the sealing surface.

Likewise for the spacer or "intermediate disk":

Step 2: Lapping

In order for the injector halves to seal properly these surfaces need to be super flat. If the surfaces have worn at all this will require lapping, using a glass plate and successively finer grades of sandpaper.

Lapping removes metal and so should be done as sparingly as possible. Carefully inspect the surfaces (spacer and injector top)... if a lot of wear is evident you may need to start at 600 grit and work your way up to 2000. If there is very little wear a polish with the 2000 grit paper may well be enough. The official Bosch equipment is even finer (4000+) but I've had good results with good old autobody sandpaper.

The glass plate (I used an cheap picture frame for the glass).

The purpose of the glass plate is to give you a very very flat surface to sand on.

Start by lapping both sides of the spacer. Use circular looping motions, moving from one grade of sandpaper to the next (transfer the glass plate as well so that you are always lapping on a flat surface) . Lap both sides of the spacer, keeping the metal as flat as possible.

Finish up by lapping the bottom of the top injector half

When you’re done all signs of wear will be removed and you should have extremely flat sealing surfaces

Lay out all the parts for reassembly. I tend to keep the parts from each injector together as I work thru the process… seems to result in less leaking and also keeps the breaking pressure as close to original as possible

Step 3: Cleaning

IMPORTANT: from now on be surgically clean… the injectors and nozzles are precision parts, and a tiny bit of dirt will ruin your whole day ! Assemble on a clean surface, using clean hands and tools.

I start by thoroughly rinsing all parts in very clean solvent/paint thinner/etc

I then spray them down with brake drum cleaner and compressed air to make sure they are very very clean.

Step 4: Reassembly

Finally it’s time to crack open the new nozzles from their protective plastic cases… they will probably look much more presentable than the old ones

Reassembly is the reverse of assembly (always wanted to say that)… I start by installing the new nozzle

I put a very thin coat of antiseize on the threads of the top half, since I’ll be back this way again in about 75K miles.

Be very careful not to get any on the sealing surface however.

If you look carefully you’ll see a groove filed in the round surface of the top injector half. I do that to remind me what nozzle is installed: no groove= stock nozzle, 1 groove = GTD nozzle, and two grooves = Mercedes 300D nozzle.

Torque them together hard… the Bentley specs are 70 Nm or 51 ft-lbs.

Lately I've been leaving the antiseize off until pop-testing is complete... during the calbration cycle you tend to disassemble and then reassemble the injectors a couple of times as you hone in on the right pressure... and as diesel leaks out it tends to dilute the antiseize.

All done and ready for calibration and leak testing… don’t they look pretty:

I find that the more lapping you have to do the more the stock breaking pressure gets raised... pop-testing after this proceedure is something I'd recommend. I did a recent batch that was up at around 180 bar after reassembly... too high for proper operation in my humble opinion.

When installing them back in the head they get torqued to 70 Nm (51 ft lbs)... new heat shields are MANDITORY as they deform as they seal.

Here's a quick video of pop-testing in action:

end of proceedure

What about the 1.9l injectors (AAZ engine) you ask???

Well, as the saying goes, those are a horse of a different colour:

The AAZ injectors are on the top, and the standard 1.6l injectors are on the bottom. As you can see, the AAZ injectors are a dual-spring design and have two shims. The dual-spring concept is designed for a two-stage injection pulse: a small inital pulse at one breaking pressure, and then the main injection pulse at a different breaking pressure. The idea is a quieter engine.

I haven't played with them much yet so can't comment at this point. Lapping them should be the same job but setting the breaking pressure afterwords is a whole order of magnitude different, and of course the shims from my standard collection don't fit.

Comments? Questions? Tips or Tricks? Feel free to post them.