

Project ABA 16v

1994 Jetta GL 2.0

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Parts List

- Engine Internals:
 - OBDI ABA block and accesories
 - 16v Cylinder Head (1.8L or 2.0L)
 - 16v Intake Manifold upper and lower
 - 16v Exhaust manifold
 - 16v Oil Pump
 - Distributor block off plate
 - Pistons:
 - 9a on ABA rods for 9:1 CR (what I used)
 - Stock ABA for 8.5:1 CR
 - There are alot more options here for different Compression ratios.
 - Misc. Gaskets
- Pulleys and Belts
 - Timing Belt: I used an OEM ABF Belt
 - 16v Crank Pulley
 - 16v Intermediate shaft and pulley
 - Machined Serpentine Belt pulley*
- Fuel and Ignition
 - 16v Fuel rail: I used a [Bahn Brenner](#) rail with the FPR adaptor
 - Older Syle Fuel Pressure Regulator
 - 16v Distributor/plug wires
 - G60 injector Cups
- Managment
 - I decided to used the stock ECU with a [TT](#) chip. I already had one from my cam shaft project so I just sent it back and had Collin reprogram it for me. So far it has been nothing but great. It was a very affordable alternative to standalone. Just give them a call and see what they can do for you. Great people to work with.
- Misc.

This is far from a complete list of parts but it will be a great starting point. Without a doubt get a Bentley Repair manual. I also used a smaller Haynes manual because it was alittle easy to find quick reference things like torque and capacity. It is certain that

you'll run into other things you'll need i.e. hoses, extended wiring, hardware ect. I will update this list as I remember more things you'll need.

*The machined pulley I'm talking about bolts onto the crank pulley. You'll need to shave a little off of it because the crank pulley is now wider, so your accessory belts won't line up unless you trim down this pulley. I'm not sure exactly how much you need to take off as I purchased mine from someone on vwvortex.com. Look around on there for someone with the exact numbers.

Removing the 8v

I suggest removing a lot of the front end before you start the project. Take off the bumper and radiator as well as the hood. Get as much body out of your way so you can get at things a lot easier.

This was a pretty straight forward stage. Just reference the Bentley for this part. It covers an entire engine rebuild so there really isn't any info I can give here that it doesn't already have. As for the tool used for the head bolts, I was able to find something at a local auto supply warehouse for a couple of bucks. GermanAutoParts.com has a lot of the VW tools if you can't find it locally.

The biggest problem for me during this stage was removing the 8v exhaust manifold. Most of the bolts were pretty badly rounded and very difficult to get to. Craftsman makes a set of tools called [Bolt outs](#), while they are fairly expensive they are well worth it. It took some creative use of ratchet extensions to get to the lower bolts but it wasn't too difficult.

Just a note as you take off wiring and other hardware be sure to label it and put it someplace where you know where it is. One of the things that made this job much longer than it should have been was poor organization.



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Stock



640x480 96kb

Valve Cover Off



640x480 74kb

The Head is Off

The Bottom End

In order to change the pistons you'll need to remove the oil pan. You'll also be changing the oil pump while you're down there. The reason you need to change the oil pump is because the 8v oil pump is driven off the distributor which will be removed because the 16v distributor is located on the side of the head. There are 20 or so torx screws that hold the oil pan on. You will need to remove a little plate on the left side of the tranny to get at two of the screws. If you don't take this plate off you won't be able to see them.



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oil pan removed

Once the pan is off there are just a couple of bolts that hold the oil pump up, remove those and then pull the oil pump out. Each

piston has two bolts hold the connecting rod on. Remove those two bolts, pull the cap off the rod then push the piston up through the block and remove from the top side. There isn't a whole lot more that needs to be done here. Installing the new pistons is covered in the Bentley but basically its the opposite of removal. Oil the rings drop the pistons down in and torque to spec. I was able to reuse my rod bearings but make sure you measure the clearance with Plastlgage before you reuse them. Also be sure to replace the connecting rod bolts.



Pistons are out

Once you have the new pistons and oil pump back in you can put the oil pan back on if you feel its not going to be in the way of anything.

Intermediate shaft

Before you start this part make sure you remove the 8v distributor. You'll need that out in order to get the oil pump drive gear on the the pump drive shaft. The old distro. may be pretty tough to get out but just keep working at it. If you can get it to turn alittle to loosen it up it'll help.



Lift Points

Since the 16v engine uses a wider timing belt, all of the sprockets need to be wider then the 8v sprockets. The 16v intermediate shaft sprocket does not bolt up to the 8v shaft so you will need to change the intermediate shaft in order to use the wider sprocket. You will need to lift the block a few inches in order to slide the intermediate shaft out. If you disconnect the shift linkages and get alot of the other stuff out of the way you will be able to lift the block enough to get the shaft out without disconnecting the driveshafts. You can screw two of the old head bolts back into the head and use them as your lift points. The holes we used are circled in red in the picture on the right. My block came up at an angle so we didn't have to go very far before we were able to get the shaft out.



Intermediate Shaft

Once you have the shaft out just slide the new one in and drop the oil pump drive gear down onto the shaft though the distributor hole. Then put the block off plate on and tighten it down.



Distributor block off

Installing the 16v

Before you drop the head on the block, there are a few things to do first. Make sure the top surface of the block is very clean. Scrape all the remains of the old head gasket off but be carefull not to make the surface uneven. Also, make sure the head is in good shape. I took mine to a machine shop and had the bottom shaved to make sure it was perfectly flat. They also did a pressure check to make sure it didn't have any cracks or other problems.



Get the exhaust manifold in place and bolted to the downpipe before you put the head on, so you don't have to mess with that later. Also there is a guide pin on the block that does not line up with the 16v head so you'll need to tap that out before you can seat the head.

The pin comes out from the bottom and is very difficult to get to. I got my dad to hold a long slim peice of metal dowel on the bottom of the pin while I went under the car and tapped it with a hammer from below. It takes alittle patients to get the dowel right on the pin but it worked pretty well.

Once you get the pin out and everything cleaned up and ready to go, install the new head gasket and make sure everything is perfectly lined up. Then put the head on and start all the new bolts. Use the Bently to get the right torque spec. on the bolts. Its a three step process. If you are using a newer style head gasket there is no need to re-torque the head bolts after you've run the engine up to temp.

Fuel,Air, and Spark

Once the head it on bolt up the the exhaust manifold and get the vavle cover on. You may want to put the front coolant flange on before you get the intake manifold on. Also make sure you put the new injector cups in the lower intake manifold then bolt the upper and lower manifold to the head. Now its time to install the fuel rail and injectors. The rail just presses onto the injectors and the injectors just press into the cups. The only thing really holding it all down is the the rail connected to the intake mani. When you run the fuel line just make sure the feed line connects to the end of the rail without the regulator. The return line comes from the regulator.

Fuel is the easy part of this step, air was alittle more complicated. I am using a 16v throttle body off of an automatic Passat because it has a Throttle Position sensor (tps). The problem was the TPS on the passat is very different from the one on the 8v Jetta. We decided to take the TPS off the Jetta TB and put it on the Passat one, so the system would think its got the same TB. This presented another problem. The shaft that drives the Passat TPS was very differnt from the Jetta one, not to mention the Jetta TPS didn't bolt up to the Passat TB. Our solution was fairly straight forward. we did alittle machine work on the passat TPS shaft in order to make it fit the Jetta TPS, then built alittle mounting plate for it to bolt up to. So now the wiring is plug and play and my system is still using the same TPS from before.

The thing to keep in mind if you are going to go this route is that the 8v TPS at full closed throttle position is not all the way to its stop. So you need to mount it on the 16v TB so that it is alittle bit open even if with the throttle closed. You'll see what I mean when

Head installed



640x480 56kb

Valve cover is on



1280x960 284kb

Fuel Rail



640x480 46kb

16v TPS shaft



640x480 36kb

8v TPS shaft

you take the 8v TPS off. It will throw a check engine and it won't idle very well if you get it to far closed.

Ignition is a little bit more complicated still. The problem here is the 16v distributor has a four window hall sensor, while the 8v uses a one window sensor. Not only that but the 16v distributor spins the opposite direction. What you'll need to do is remove the one window drum from the 8v dist. and put it in the 16v dist. and line it up so you get the same output as you did before.



8v TPS on 16v TB

To get the drum off the 8v dist. it'll help to get the shaft out first. There is a pin that holds the drive gear on the shaft which you can press out. Once that's gone you get slide the shaft right out. Before you press the drum off the shaft make sure you make a template of some sort so that you can line the window up correctly on the 16v distributor. Keep in mind it will be spinning the other way so you'll need to position it so that the window and the rotor are correctly phased in relation to one another. What I mean by this is as the distributor turns one way the window will go across the sensor then the rotor will go by. If you turn it the other way the rotor will go by the sensor before the window does, so you'll need to shift it so it reads exactly the same as it did before.



4 window Drum

Once you are sure you can line it up right on the 16v distributor press the drum off the shaft and swap it over to the 16v dist. We used a little epoxy to on the drum to make sure it stays in place.



Phase Explained

Now you can set everything (crank shaft and camshafts) to Top Dead Center then put the timing belt on. Once those are in sync put the distributor on and use the slots on either side to line it up to the Top Dead center mark also. Once everything is at the right point your timing should be perfect.

Wiring and Sensors

Now that your timing is all set you can finish up the mechanical loose ends like the intake and idle valve. I kept the 8v idle stabilization valve (isv), so that it would be plug and play. I tried to keep as many of the 8v sensors as I could. I figured that if the ECU got the same signals it got with the 8v engine it would be happier. In order to rig up the isv for the 16v we made a small bracket and plumbed it with pvc painted black. The output side of the valve connects to the right side of the intake manifold, where the old cold start injector was located, which by the way was removed and the hole blocked off. The other vac line on that fitting runs to the air box. This set up seems to be working quite well and after a few adjustments with the idle stop on the throttle body it idles smoothly at just under 1k.

Most of the rest of the wiring was plug and play as I am still using the 8v TPS and the distributor hall sensor has the same harness. The coolant temp sensor on the right side of the head needed to be re-wired a bit just so it would fit under the longer head. All we needed to do was solder the leads directly to the sensor and leave out the connector.

The intake manifold I got didn't have an intake air temp. sensor in it so we needed to drill and tap the intake to fit the 8v sensor. We drilled the hole on the back side of the manifold because that's where it looked like it was located on a picture I found. As far as I can tell its

working fine so far.

Initially when we started the engine, the low oil pressure light was blinking on the dash. It looked like we had all the pressure sensors connected right, but there was no valve chatter that would be expected with low oil pressure. Finally after a day of trying to figure out the problem I found out that the sensor on the side of the head that looks identical to an oil pressure sensor is not an oil pressure sensor. I ended up removing the sensor that was on the 8v head and putting it in place of one of the oil filter plugs. Luckily that solved our problem.

Final Thoughts

When I was first test driving the new engine I had alot of problems with getting it to idle at the right RPM and not die. After tinkering around with it a bit, I learned that the throttle body on the manual transmission 8v engine has a stop that allows the throttle body to close slowly after the throttle has been lifted. Since the 16v TB didn't have this I decided that the engine was stalling when I lifted to go to idle because the throttle was closing to quickly and to far for the 8v ISV to keep up. There is a small set screw on the throttle body that changes the idle stop. AFter making a few adjustments with that I found just the right place where the idle isn't to fast but the ISV has time to react and set the proper idle RPM. After that, I havn't had a sigle problem with the idle nor a single stall.

As far as performance gains, I am very very satisfied with this mod. One thing I especially like is the fact that the 16v TB has two butterfly valves, one large one and one small one. The large one dosn't open until the small one gets to a certain point and you can feel that point in the pedal. The engine is pretty tame up until the point where the large butterfly opens up, then things get fun. It revs right up to redline with no problem, and really makes the car fun to drive. This is also a great platform to build off of. Forced induction is perfect for this engin because it breathes so well. Also cams for the 16v claim some impressive gains. Hopefully the next big project for me will be a supercharger.

All in all this mod was alot of work and alot of money but I think it was well worth it. Not only did I gain some valuable knowledge but the car is a blast to drive. If your thinking about doing this mod, I suggest planning things out very well in advance and make sure you can afford to have the car down for quite awhile. I thought it would only take a few weeks but it ended taking about a month and a half. Most of all be prepared for unexpected problems, this is what really slowed me down the most.

If anyone has any questions or comments about the build feel free to go to the contacts page and send me an email. Also if your on vvwortex, my name is Mr.Incognito so you can PM me there if you want.

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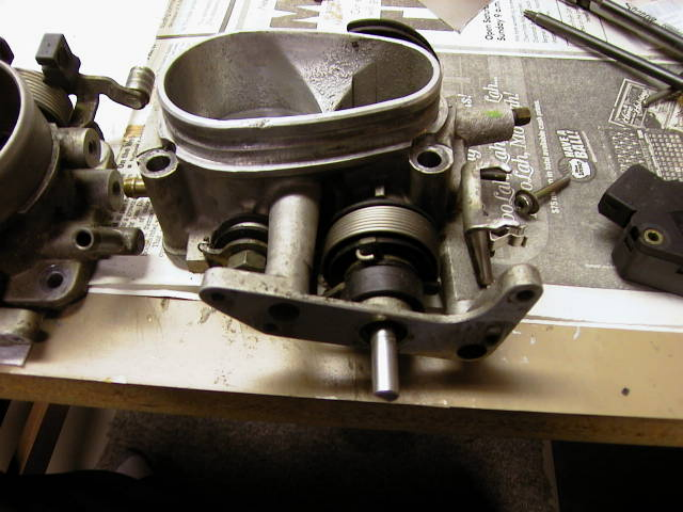














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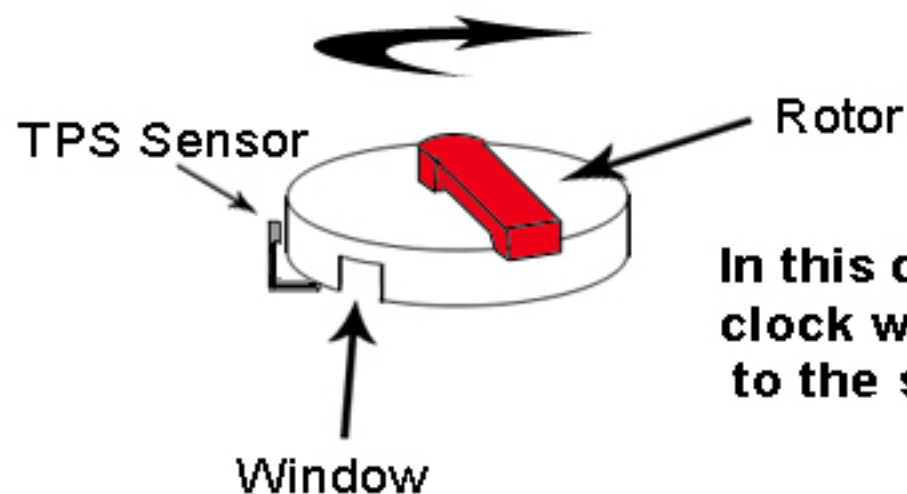
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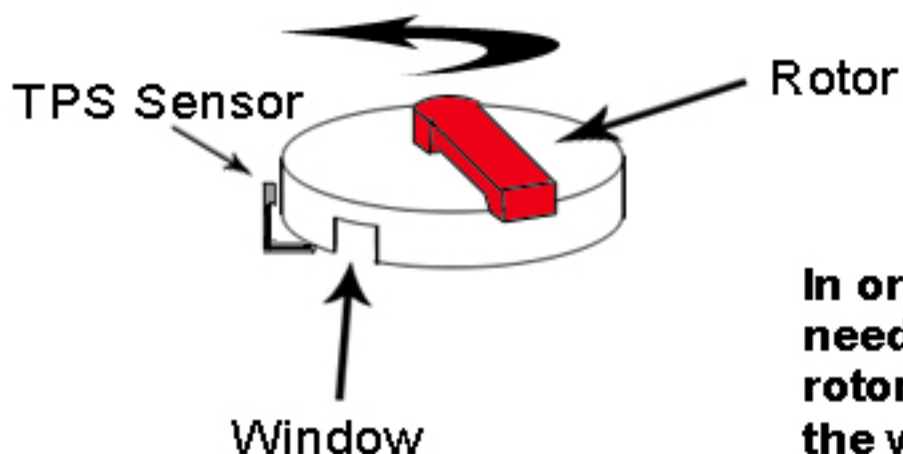
A photograph of a car engine with various components visible, including hoses, belts, and a red text box with arrows pointing to a specific part. The text box contains the text "This is the Intermediate Shaft".

This is the Intermediate Shaft





In this case the rotor is spinning clock wise So the window will get to the sensor before the rotor will.



Here the Distributor is spinning counter clockwise so the rotor will reach the sensor before the window does.

In order to make it run right you'll need to mirror the position of the rotor so it is correctly phased with the window.





 DOHC 16V



