

2001 VW Golf TDI Gauge Installation

Copyright 2002 by Davin Swanson (gt6032c@mail.gatech.edu)

Version 1.0

This page describes my aftermarket gauge install on my 2001 VW Golf TDI. It should directly apply to any Mk4 (99.5+) Golf or Jetta TDI and it should apply to the 98+ New Beetle TDIs. For other engines, wiring should be similar, but the installation of senders into the engine will be different. The intention of this page is to share information about my install and to help others who are considering an install. I tried to photograph everything important. Shoot me an email if you can think of a photo that you'd like to see that I haven't included. In fact, any comments are welcome.

Anything you do to your own car is AT YOUR OWN RISK! I deny any responsibility or liability for anything that you may do to your car. I'm not a professional mechanic, I just like tinkering with my car. Don't do any of this if you aren't comfortable with modifying your engine and be prepared to deal with the consequences if you screw something up. On that happy note, on with the show!

If you intend to use this document as a guide, READ THE WHOLE THING FIRST. Required tools and procedures are sprinkled throughout, so make sure that you have all required tools beforehand, AND that you are comfortable with every required procedure.

Any time I mention a special tool or part that I used, I've included it in **bold** font. I assume that you have access to normal tools: screwdrivers, ratchet set, wrenches, etc. And, of course, a set of **Torx drivers**, which you should already have if you've done more than the most basic maintenance on your VW. The T-20 driver is essential for this work.

I installed 4 VDO Vision gauges: electrical voltmeter (VDO part # **332-103**), 80 PSI oil pressure (**350-104**), and 300°F oil temperature (**310-106**), and mechanical 30 PSI boost (**150-104**). The voltmeter and two oil gauges are installed in the cubbyhole area between the radio and the cupholder, and the boost gauge is in a pod mounted on the dash near the A-pillar. If you want to use an A-pillar mount, the wiring part should be pretty similar.

There's two parts of this job: exterior and interior. The exterior consists of installing senders into the engine and routing wires and tubing into the engine compartment. The interior consists of routing the wires from the engine compartment to where they need to go, making electrical connections, and installing the physical gauges themselves. The exterior work in the engine bay should be done first.

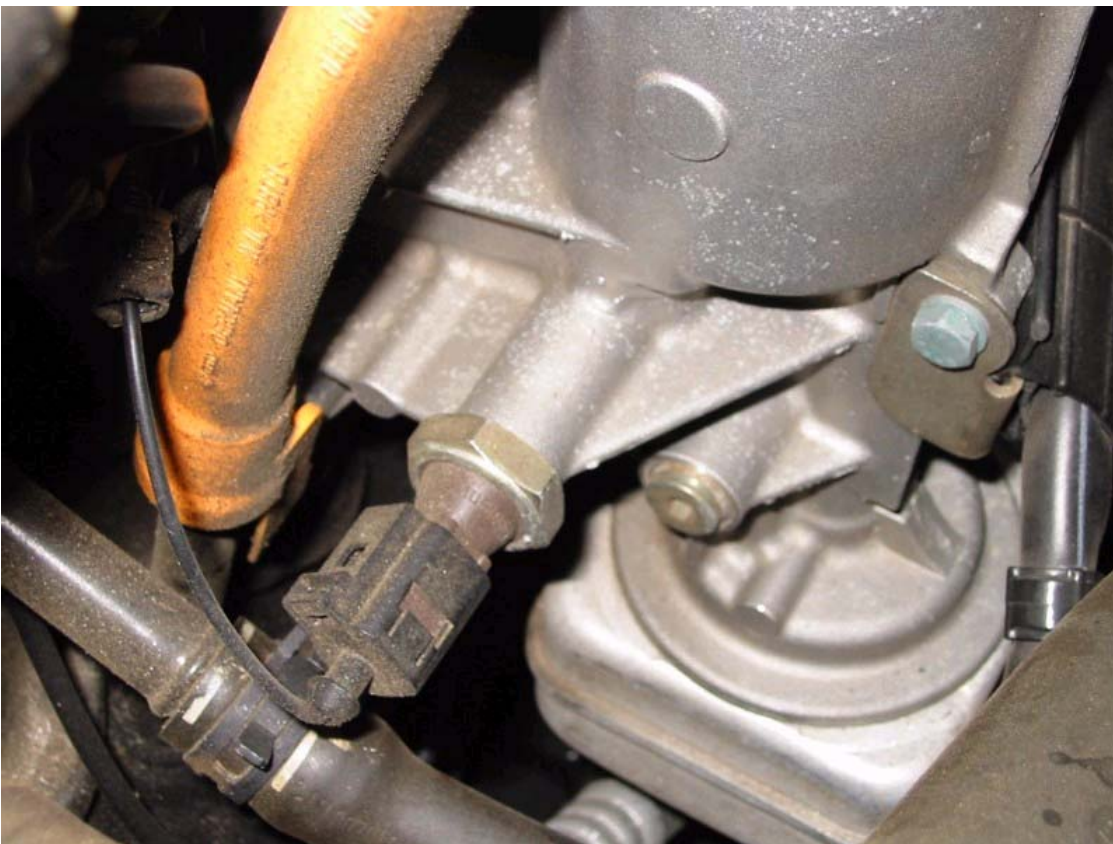
Installing the Senders



The first thing you need is a car! This is my wet and leafy 2001 VW Golf TDI. There's really no reason for this photo.



First, take off the engine cover. On the TDI, there are two nuts towards the front and one in the back. Pry off the nut covers with a small screwdriver, and use a 10mm socket to remove the nuts. Unhook the vacuum hose from the clip on the rear edge of the cover. Take the dipstick out, remove the cover, and replace the dipstick. Your view should be similar to the one in the photo above. The arrow is pointing to the oil filter housing. This is where I installed oil temperature and pressure senders.



The above photo shows the access holes on the passenger side of the base of the oil filter housing. The brown unit with the black single-wire connector is the stock oil pressure switch. After adding pressure and temperature senders, the stock pressure switch must still be operative. I used a VW OEM temperature sender (VW part # **049-919-563-A**), which works with VDO 300°F gauges. This was installed in the plugged hole to the right of the pressure switch in the photo. Before you install the sender, put a fresh metal gasket on it. Use VW gaskets, part # **N-013-811-5**. Shove some paper towels underneath the plug to catch any leaking oil, and take the plug out (it is an allen-head, but a T-30 Torx bit will also work). Once it's out, quickly thread the temp sender into the hole a few turns to stop the oil from coming out. Tighten the sender down (it will take a **12mm socket**). Torque it to 25 N-m if you can get a torque wrench on it. Otherwise, just make sure that the sender and gasket has seated tight against the filter body and that it's good-n-tight. Do NOT use any type of sealing tape, pipe dope, or anything else on the threads of the senders. The senders use the physical contact with the engine as its ground connection, so if you use something on the threads, it will insulate it from ground, and the sender won't work.

Once the temp sender was installed, I used a VDO M10x1k thread T-fitting (VDO **240-850**) to install the new pressure sender with the stock switch in the hole that the stock switch originally occupied. The pressure sender (VDO **360-001**) should be screwed into the T first, in the hole in-line with the installation hole. Remember to use a fresh gasket on the pressure sender! You might need to use a vise to hold the T-fitting while you screw the pressure sender in. Make sure that it is well-seated on the fitting. You can't get a torque wrench on it, so just make sure it's seated and tighten it some more until it's good-n-tight. Place a piece of tape over the empty hole on the T fitting. Unclip the connector from the oil pressure switch and tuck it out of the way to keep oil from getting into it. Use a **24mm deep socket** to unscrew the sender. Make SURE you get the 24mm deep socket! It is absolutely necessary later on to reinstall the switch. You might be able to get the switch off with a crescent wrench, but you won't be able to screw it back in without the socket. Trust me, I know this from experience! Screw the T fitting into the hole that the pressure switch was in. Make sure you put a fresh gasket on it! Tighten it down using a wrench on the base of the pressure sender. Again, make sure that the fitting is well-seated, and make sure that the empty hole is facing UP! Take the tape off the empty hole, and thread the stock pressure switch into it. You should be able to reuse the gasket. If you can get a torque wrench on it, torque it to 25 N-m.



The above photo shows the senders installed. Note that I did not take the advice of putting paper towels underneath when I took out the plug! I had a plastic bag to catch any leaking oil, but that didn't work too well. If you take out the plug and immediately thread the temp sender into the hole, only a small amount of oil will leak out. This would be a good point to mention that it would be a good idea to have a quart or two of your favorite oil on hand ([Mobil Delvac-1](#) for me, thank you).

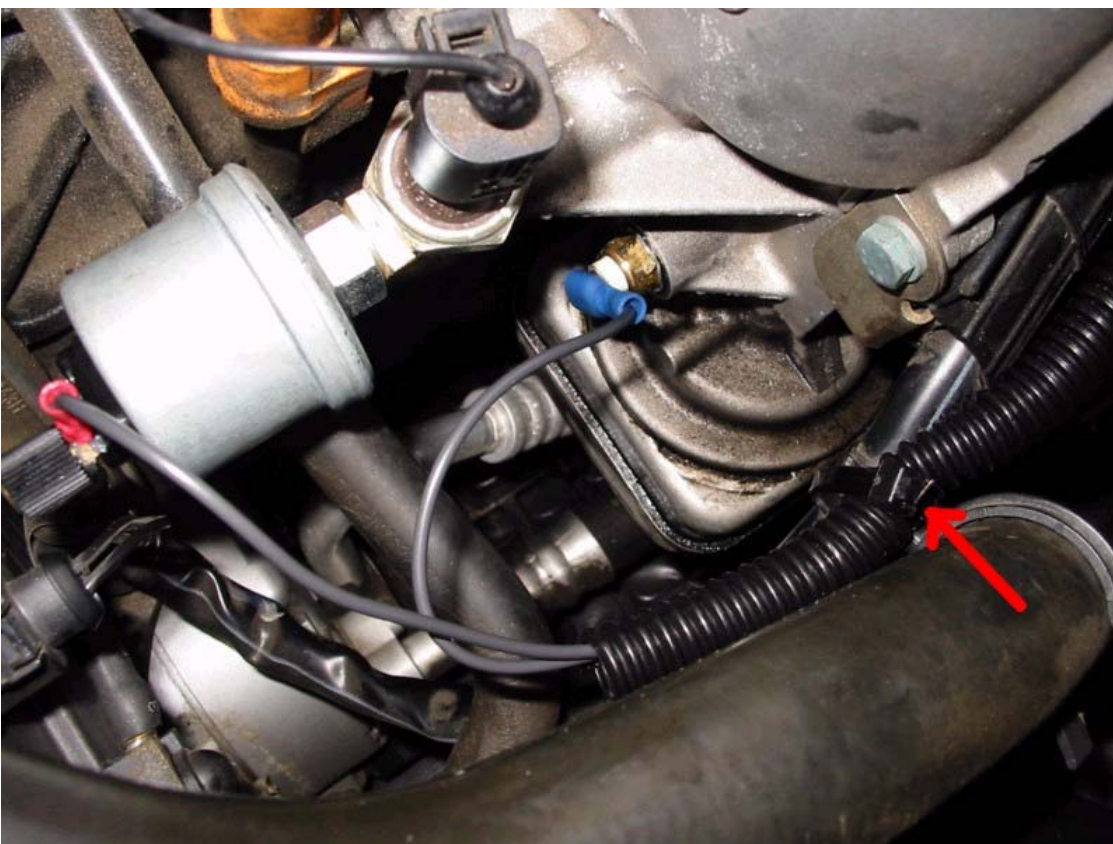
Running the Wiring - Engine Compartment



At this point, the senders are installed. Now, wiring needs to be run. I used **16-gauge wire** for all connections. The oil pressure sender takes a **#8 ring terminal** and the oil temp sender takes a standard **1/4" female spade connector**, which is the same connector used on the gauges themselves, so I used a lot of them (25 or so). I prefer insulated connectors, but a notch must be cut into it to allow it to be slipped onto the sender. A modified spade connector is shown in the photo above crimped onto wire. For all connectors in the engine bay, I squirted a little dielectric grease into the connector before I stuck the wire in and crimped it. Use at least 15-20 feet of wire per connection to ensure there's enough once you route it into the cockpit. Make two wires, one with the modified spade connector, and one with a ring connector.



The above image shows the senders with wires attached. The wires are 15-20 feet long and are basically just hanging out of the engine compartment. I also used dielectric grease on the connectors before attaching them. This will help keep moisture and dirt out. You can see from this photo why it's necessary to put the stock switch on top of the T instead of sticking straight out, as the stock wire will not reach if it's installed in the other position. The next step is to put protective flex tubing around the wires. See the next photo.



Here, the wires have been put into the flex tubing, and the tubing has been zip-tied to a power cable coming from the battery (see red arrow). Make sure that the wires and the flex tubing don't touch anything that could get too hot or get near any moving parts (such as the shift linkage).





The wire loom is routed between the battery and the airbox, along the hood release cable, then over and along the rear edge of the engine compartment. It's zip-tied along the way to keep it in place. This is a good photo to show how much yellow pollen is in the air in Atlanta in the springtime!



There is a grommet on the firewall to the left of the brake booster that I used to pass the wires into the engine compartment. This grommet is empty; it's where the accelerator cable goes through on non-drive-by-wire cars. The photo above shows the position of the grommet; it's hard to see, but the red arrow is pointing

to it.

The flex tubing and wires should be routed near the area of the grommet, but don't totally zip tie them down until the wires have been passed through the grommet. At this point, the wires are ready to be passed through, but you will need access to the area underneath the dashboard to pull the wires through. So, it's time to take the dashboard apart!

If you intend on installing a boost gauge, skip to the end of this document to read about installing the boost tubing. It would be a good idea to do this now, so that you can pass the tubing through the firewall along with the sender wires.

Running the Wiring - Inside the Car



Four parts must be removed from the lower instrument panel: the trim around the fusebox, the lower kick panel, and the left and right panels below the steering wheel. First, take off the fuse panel by prying it out with a small screwdriver. Be careful not to mar the plastic. There are three clips keeping the panel in place, they will just pop out with some force. Then take out the three **T-20 Torx** screws on the bottom of the lower panels. Once these screws are out, the left and right panels may be pulled out. There are three clips holding on the left panel, and five for the right. A little elbow grease may be needed. Then the lower kick panel may be removed. I can't remember, but there may be one more screw along the way that needs to be removed. Keep your eye out for it.



Once the panel is out, pry out the dimmer switch with a small screwdriver and disconnect the green harness connector from it. The blue wire on the dimmer connector will be used to provide power to the backlights on the gauges so that they will dim along with the rest of the dash lights when the dimmer is used.



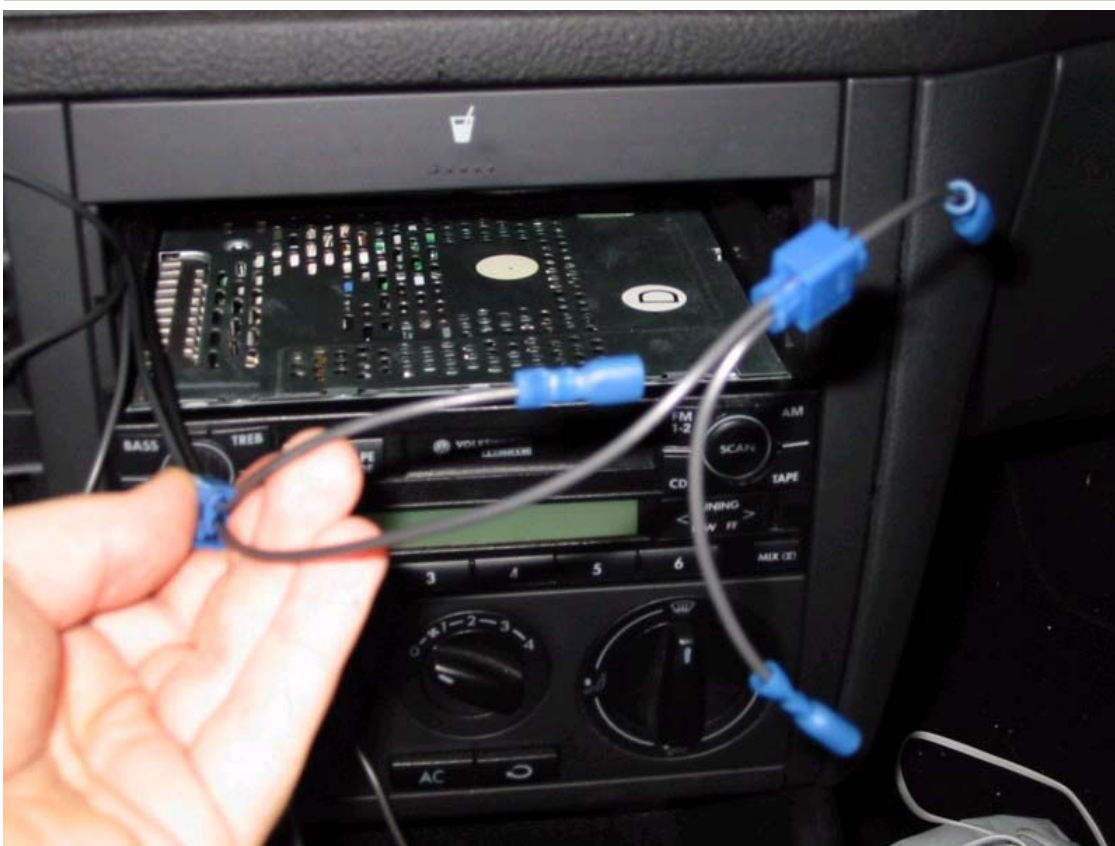
Wedge yourself under the dash with a flashlight and look above the accelerator area. You should be able to see the empty grommet. At this point, I pulled the grommet out from the engine bay side with a pair of needle-nose pliers (DON'T drop it!). I punched a hole in it, and threaded the wires through it. I placed numbered flags on the ends of the wires so that I would know which was which once they were passed through into the car. You can use different colors or write on the ends, or whatever. Just make sure you know which is which. I then taped the end of the wires to the end of a wire coat hanger and fed it through the open hole where the grommet was. My assistant untaped the wires from the hanger and slowly pulled the wires through the hole. As he pulled the wires through, I guided the grommet back into place and snapped it in. He then finished pulling the wires through into the cockpit.



I wanted to install the voltmeter and oil pressure and temperature gauges in the cubbyhole space in the dashboard. Pull the cubby hard and it will pop out. If it pops off part of the radio faceplate, it should just pop back on. If you happen to have the VW radio removal tools, use them to slide the radio out first (this is the proper way to do things, but I didn't have any problem with the "grunt and yank" method.) Fish around under the dash, and thread the wires you just passed in from the engine compartment behind the center console and out through the new hole above the radio.



Now it's time to make the wiring harnesses. Above is the three-position harness that will be run from the dimmer switch. I used 16 gauge wire, and **quick splice connectors**. I crimped an insulated female spade connector onto the end of each of the wires. Make sure that the wire lengths are long enough and appropriately spaced so that they may reach all three gauges. I fed the end of this harness behind the center console and into the driver's footwell area. It is a very good idea to mark each connector with a Sharpie so that you know which is which. I used a "D" on each one.



I did the same thing for a power harness. Three wires with spade connectors, with the free end passed back behind the console, and into the driver's footwell. Mark the connectors. I used a "+" on each one.



Finally, I made the ground harness. I used 14 gauge wire for this, per VDO's recommendations. This harness must have six connectors, as each gauge must have an instrument ground and a lightbulb ground. Again, the end of the ground harness is passed through into the driver's footwell. Mark the connectors. I used a "G" on each one.

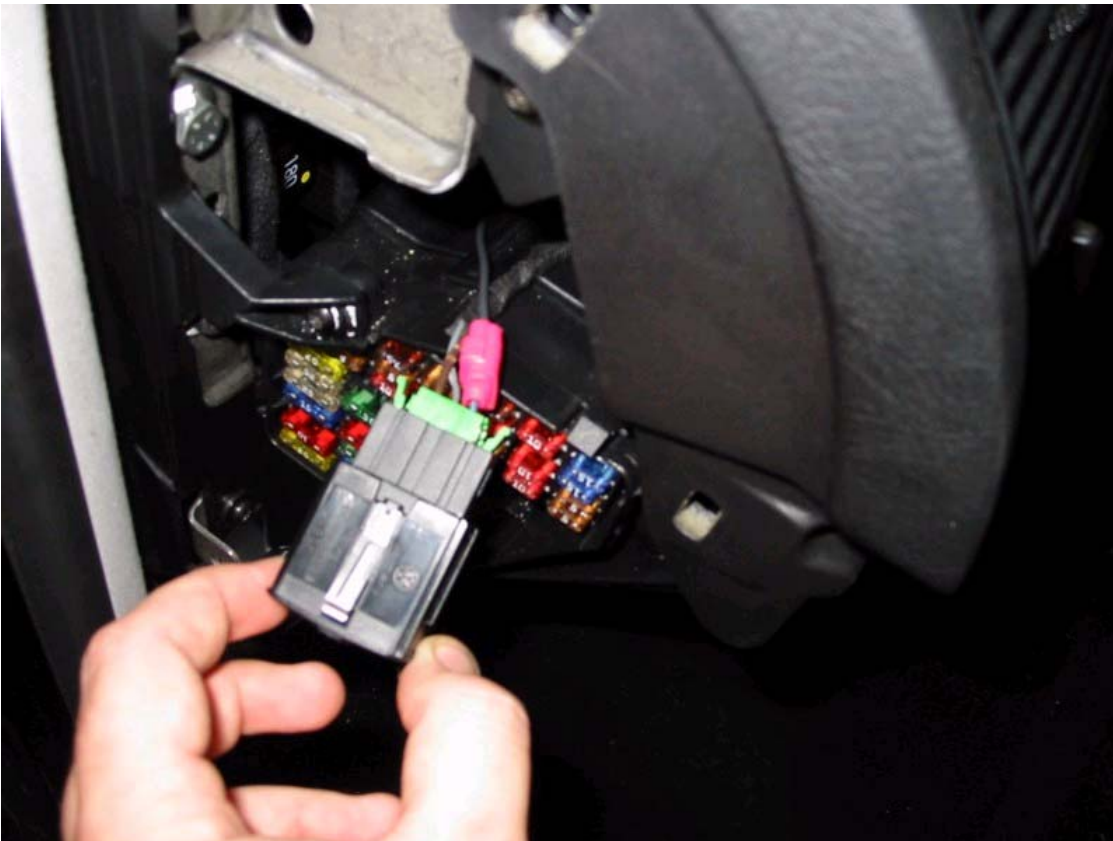
Hooking Things Up

Now, at this point, there should be 5 free wire ends. Two signal wires: oil pressure and oil temperature, and three harness wires: dimmer, power, and ground. The signal wires should be sticking out of the hole in the dash along with the spade ends of the harnesses. The three harness ends should be in the driver's footwell.

When you hook things up is when you cut all of the wires to the proper length. You could just leave the extra length on, but then you'd have to have coils of wire taped up underneath the dash. When routing the wires underneath the dash, pay attention to where they're going. Make sure they don't get near any moving parts, like the steering column or the pedals. Try to route them near other wires that you can zip-tie them to when you're all done.

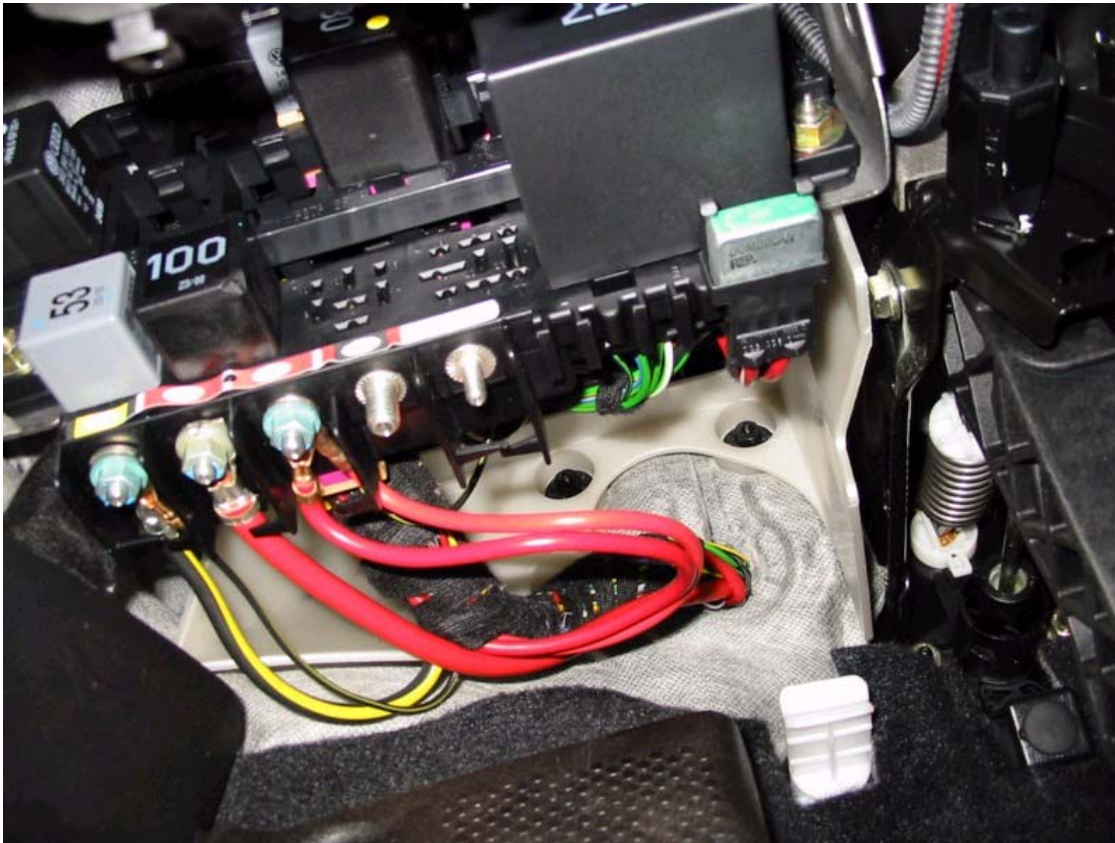


Start with the dimmer wire. Thread it across, up, and out the area above the fuse panel. Try to thread it through enough so that the harness is sticking out of the hole in the dash with enough slack for you to plug the wires into the gauges, but not so far that you'll have problems shoving all the extra wire in the space behind the gauges once they're installed. When the wire is routed, clip off any excess sticking out past the fuse panel, like in the picture above.



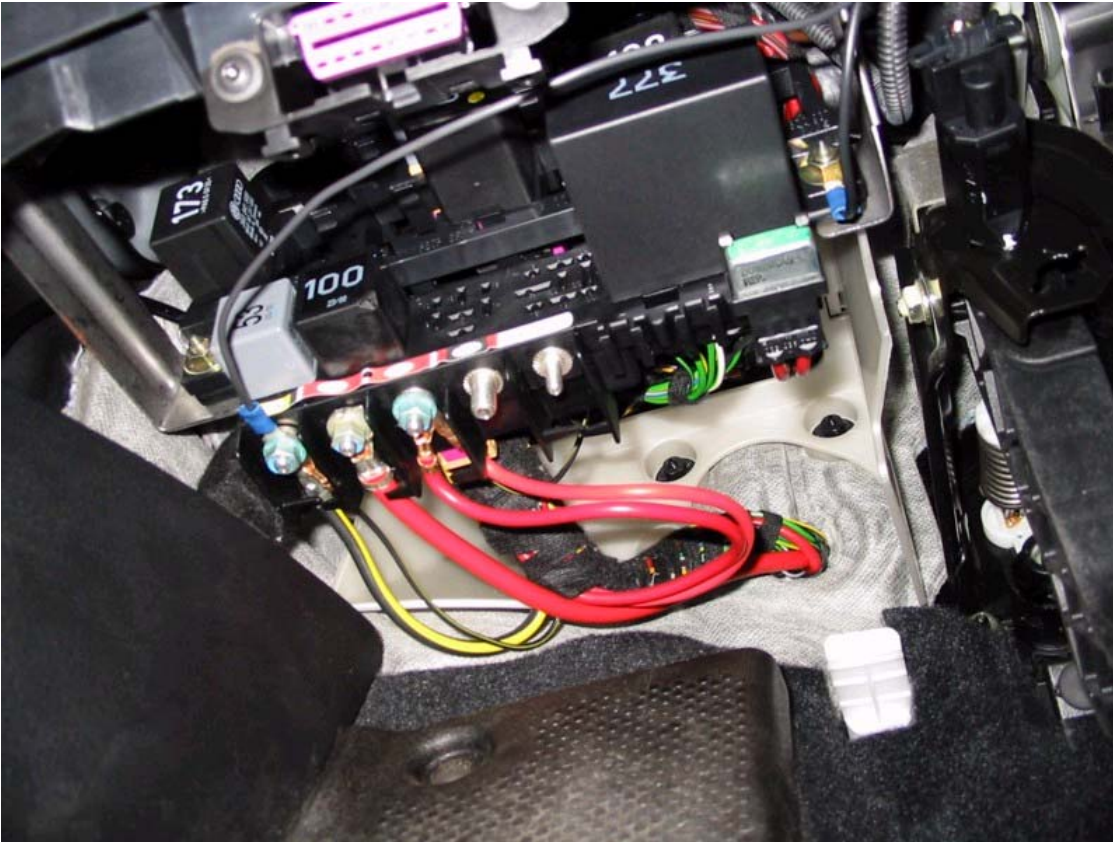
Look at the dimmer connector. There are three wires. The blue/grey wire is the one that is the source of the dimmer power. Use a quick-splice connector to

splice your harness wire to the blue wire in the dimmer connector. You can plug the dimmer back in at this point for testing once the gauges are hooked up. If you do this, DON'T SLAM THE DOOR SHUT! You'll crush something, and that would be bad.



Now the dimmer harness is connected. Next will be the power and ground connections. Wedge yourself under the dash with your trusty flashlight, your crimpers, wire strippers, and two ring connectors. Thankfully, VW has made it very simple to hook into power and ground connections. Find the relay panel underneath the dash on the left side. On the lower part of the panel, there are 5 screw terminals. The yellow terminal marked "75x" is switched power. I hooked the power harness to this connector. Route the free end of the power harness under the dash and near the 75x screw terminal. Just like with the dimmer harness, adjust the length coming out of the hole in the dash, and cut the remainder off. Crimp a 1/4" ring connector onto the end, remove the nut from the 75x screw, put the connector on, and tighten the nut back on.

I didn't do this, but it might be a good idea to put a fuse on the power harness, since this terminal is not fused. I will go back at some point and do this. There are two methods. The first is to just put an inline fuse along the power line; so, you would have: 75x terminal on relay panel - wire - inline fuse - wire harness to gauges. The other way is to use an empty spot on the stock fusebox. You can use VW repair wires (part number **000-979-126** should work) to connect to the fusebox. With this method, you would connect the 75x terminal to one side of an empty slot in the fusebox, then connect the power harness to the other side of the empty slot. Install a proper fuse in that spot, and you're set.



Do the same thing for the ground wire. The two lower nuts attaching the relay panel to the frame are grounded, and I used the passenger-side one for the ground harness. The photo above shows the power and ground wires attached to the relay panel. Once all three electrical connections (dimmer, power, ground) have been made, clean up underneath the dash. Gather the wires together, make sure they're not routed near the pedals or steering column, make sure they won't get pinched or crimped by the dash panels when they are reinstalled, and zip-tie them to something so that they aren't moving around loose. Be sure to do this for the two signal wires coming out of the engine compartment at this point, too.

While under there with access to the relay panel, it might be a good idea to replace your relay 109 if you have the old style (and a TDI). The older ones can cause intermittent no-start conditions. See [Steve Porter's explanation of replacing relay 109 on Fred's TDIClub](#).

Now, you should have the two signal wires hanging out of the hole in the dash along with the multiple harness connectors. Trim these to length, and crimp spade connectors on to their ends. I marked the pressure wire with a "P" and the temperature wire with a "T".

Testing your Handiwork



Now, hook up the gauges, and stick them in the hole in the dash. Test the dimmer connection by turning on the lights. The lights should come on in the gauges. Operate the dimmer switch and see if they dim along with the rest of the dash lights. If they don't, check all your wiring. If they do, go ahead and unplug the dimmer switch from the connector, reinstall it in the space in the dash, and reinstall the connector.

Turn on the ignition, but don't start the engine. The voltmeter should show 12-12.5 volts or so. If it does, you know that your power and ground connections are good. If it doesn't, check your wiring. Assuming you have power, it's time for a test drive! Make sure that there are no tools or anything else in the engine compartment, and start the engine. Make sure that no oil is shooting out of your sender connections and that there are no serious leaks. There shouldn't be. If there are, you will need to tighten things down some more.

If there are no leaks, close the hood, get in the car, and drive off. **Make sure that the wires under the dash are completely secured before driving!** They should be, assuming that your routing and zip-tying was done well. The oil pressure gauge should be pegged at the right at about 75 psi assuming that the engine is cool. Drive around a bit. As the oil warms, oil pressure will start to drop, and will eventually roughly follow the RPMs of the engine. Volts should be 14-14.5 while the engine is running. The oil takes a long time to heat up on the TD! Once the water temp indicator on the dash reads 190°F, the oil temp may still be pegged left. Drive around awhile and make sure that the oil temp eventually does start to rise. Idle oil pressure will get as low as 15 psi or so when the oil is hot (>200°F).

After your test drive, check for leaks. You might have a slight amount of weeping from one or more of the senders. Tighten them down. Be sure to recheck the connections the next few times you drive to make sure there's no leakage.

There you go! The gauges work! Now to mount them...

The Mounting Panel

I used the VW OEM Radio Blank panel (VW part # **1J0-857-231-1QA**) to house the three gauges in the dash. This panel is just a flat empty cover panel that fits in the hole above the radio. I cut three 2 1/16" holes in the panel, equally spaced, and very slightly below the centerline (I'll explain why in a moment). I used a compass to scribe a 2 1/16" ring on the face of the panel about each center point.

To cut the holes, I used a Dremel tool. The four clips on the back of the panel must be removed with the Dremel. For the holes, I used a cutting wheel to notch out each of the holes. Once I did this, I had a rough hole with straight edges. I then used a Dremel sanding wheel to remove the remainder of the material and extend the hole to where my scribe mark was. I then tried putting the gauge in the hole, and if it didn't fit, I used the sanding wheel to take off a little more material. I did this for each of the three gauges. I sanded down whatever was left of the clips and the little connector boxes to be level with the rear edge of the panel.

There will be four empty parts on the flange where the clips used to be. These need to be filled, or you will be able to see the gauges through the edges of the panel once it's installed. Also, the empty spots make the panel very weak and flexible at those points. If the gauges are installed without filling these gaps, the edges of the panel may bend out. I put a piece of tape over each and filled them with plastic epoxy. Once it dried, I sanded and cut the filling down to be level with the edges of the panel. The epoxy I had was white, so I colored the outside edges in with a black Sharpie.



I then installed the gauges into the panel with the mounting rings that came with them. When I first put the panel into the dash area, I had to really wedge them in there under the cupholder, and unfortunately there was too much pressure on the bottom of the cupholder and it would not slide out on its own.

To fix this, I marked the tops of the mounting rings with a sharpie (seen in the photo) and sanded down the tops of the mounting rings with the Dremel between the lines. Now, the whole assembly fits in and the cupholder works fine.



This photo shows the bottom edge of the gauge panel. Notice that the mounting rings slightly protrude from the bottom of the panel. This is why I set the holes slightly below the centerline; I wanted a little bit of overlap. The radio faceplate protrudes very slightly above the surface of its metal casing, so when the gauge panel is slipped into the empty space, the panel seats in with a satisfying click as the edges of the mounting rings slip behind the radio panel. This keeps them in place, and the panel stays in place very flush and level without any additional fasteners. My original plan was to use Velcro to keep the panel in place, but after I installed it I discovered that I didn't need to. To remove the panel, I push up and back on the bottom part of the panel, pushing the gauges up slightly until the rings clear the radio faceplate. Then it slides right out.



This photo shows the completed panel installed in the dash. There's no light leakage around the panel, and it looks very good in my opinion. The slight white spots above the side gauges are parts of the white epoxy filler that the Sharpie didn't take to. I will eventually get a fine-point felt-tip pen and black the spots out. Also, as you can tell, my car could use a good vacuuming.

Boost Tubing

After installing the above three gauges, I installed a boost gauge. I won't cover wiring for this, as I've covered that above. Just tap into the dimmer and ground harnesses for the boost gauge (mechanical boost gauges don't require power.) I mounted my gauge in a pod above the round left-side defroster vent. I cut a notch into the vent, used a self-tapping screw to connect a homemade bracket to the defroster duct, replaced the vent, and attached the gauge pod to the bracket. Wiring and boost tubing were routed along the A-pillar between the dash and the A-pillar, and out in the open to the back of the gauge pod. It doesn't look great, but it works. I plan on eventually replacing it with a proper A-pillar gauge pod, which should be simple as the wiring and tubing is already routed to the right spot.

I used a VDO Vision mechanical boost gauge (VDO part # **150-104**) and a VDO 16-foot nylon tubing kit (**150-855**). The tubing needs to be connected to the intake post-intercooler, and then routed through the same grommet we used for the sender wires for the other gauges.

I used the 1/8-27 NPT fitting that came with the tubing kit. I removed the upper intercooler pipe from the engine. This is a real pain, as the clamp that connects the pipe to the intercooler is very difficult to get to. You could remove the wheel and fender liner to get to it, but I ended up taking out the windshield washer reservoir. It's most convenient to do this if the reservoir is empty; if you do it while it's full, it's easy to spill fluid all over. Don't ask me how I know this. Be especially careful of the level sender on the fore side of the reservoir... it will just pull out if you yank it hard enough. OK, so that's how I know.

I advise taking the tube off to drill and tap the hole for the boost line. This will let you remove all shavings from the drill and tap operation so that they aren't ingested into the engine.

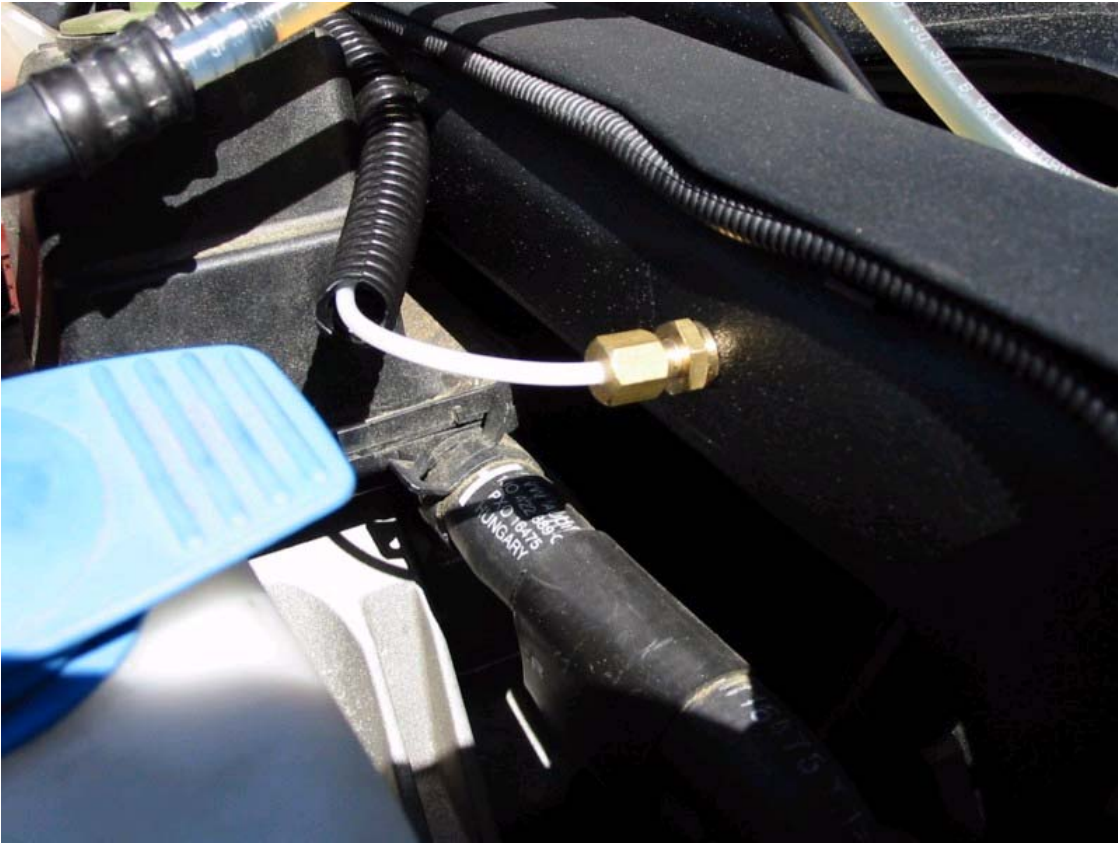
Use a 1/8-27 NPT tap. Don't try to make something else work here, **get the proper tap!** You'll already be dealing with drilling and tapping plastic, which is never fun, so have the right tool for the job. They can be hard to find, but I found one at a local Ace Hardware. Drill a pilot hole with a small bit, then use the correct size bit as recommended on the tap to enlarge the hole. Then tap the threads. If you've never tapped before, it's not that bad since we're dealing with plastic. Just go slow and remember to back out every 1/4 turn to break the chip.

Once the hole is tapped, make sure the hole is deburred and any debris is cleaned out of the pipe. This can be difficult, as there will likely be a coating of oil in the pipe (unless you've modified the CCV system for off-road use only). Clean it out well. If you use water and/or solvent, make sure it's completely dry before reinstalling.

Install the fitting that came with the tubing kit into the tapped hole, and then reinstall the pipe. Follow the directions on the tubing kit packaging to connect the tubing to the installed fitting using the included compression fitting. **IMPORTANT!!!:** Be SURE to counterhold the fitting installed in the intercooler pipe with a wrench while you're tightening things up. You DON'T want to overtorque the fitting into the pipe and strip the threads! You've got metal-into-metal-into-plastic... the plastic will be the first thing to give if you don't counterhold the fitting.

Now, route the tubing around the engine compartment and through the firewall. BE CAREFUL not to kink the tubing... be gentle with it. And voila! I recommend using wiring loom around the tubing like I did with the other sender wires.





The above photos show my installed boost line.
