



BOXEER

Instruction Manual V3.0

0- Before Teardown

1- Preinstallation on the Ground

2- Throw-out bearing fork stage2 Reinforcement

3- Engine Bay Preparation + Pedal

3.1 Multi-Mount

3.2 cab harness

3.3 pedal + OBDII wiring

4-The Moment of Mating: Bolting Engine + Trans

4.1 The Starter

4.2 Starter Adapter Plate

5-Installing Engine + Trans into Vanagon

5.1 starter cables

5.2 clutch slave hydraulic

5.3 CV's + driveshaft

5.4 mounts installation sequence

5.5 fuel hoses

5.6 coolant hoses

5.7 power steering hoses

5.8 vacuum hoses

5.9 cruise control

6-Sensor and Final Wiring

7-Fluid specifications

8-First Start

9- OBD2 and tach

0- Before Teardown

The Boxer TDI swap kit is designed for a waterboxer bellhousing!

Locate your coolant bottle level sensor and label it. These two wires will be used on the new coolant level sensor.

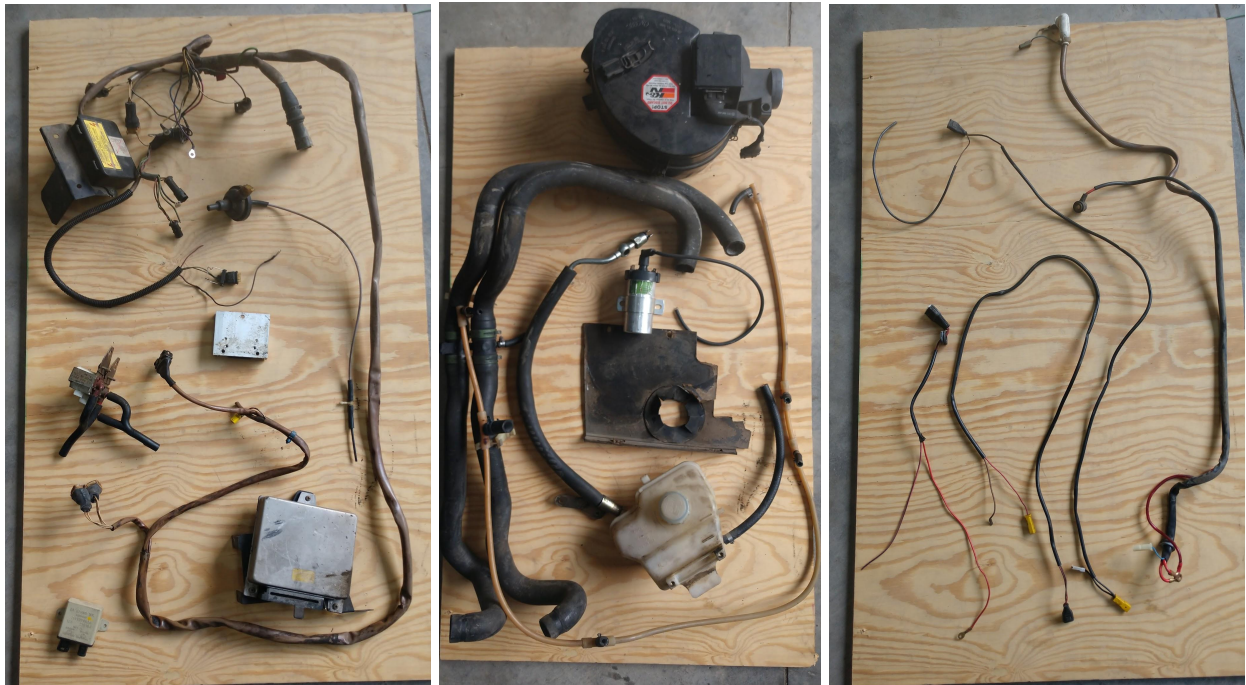
Oil pressure switch is not used anymore.

Locate blue alternator wire and label it (ALT). This will be used on the alternator connector.

Locate black fused wire from ignition and label it (Ignition).

Locate coolant temperature sensor and label it (COOL T).

That is all we use! The rest, as seen in these pictures, can be removed.



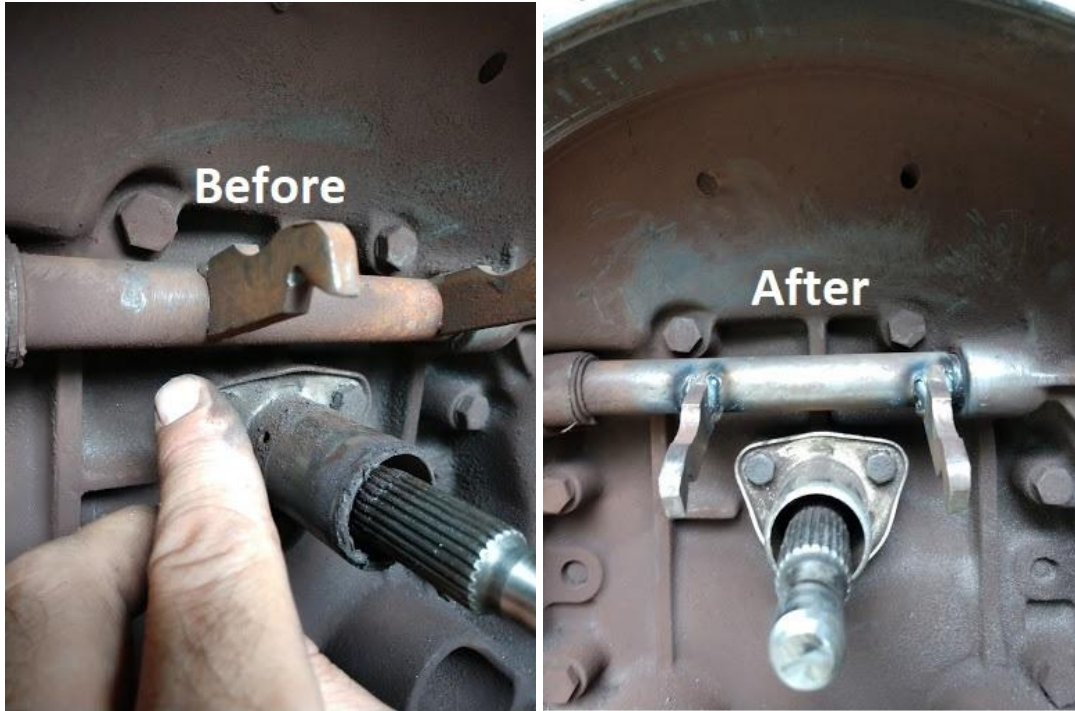
1- Preinstallation on the Ground

On Gasoline transmissions the input shaft of the transmission has to be shortened $\frac{3}{8}$ " on diesel transmissions you dont ned to cut te shaft because it is already he shot version but you will need to swap bellhousing to the gasoline one.. If your transmission is getting rebuilt, now is a good time to get the input shaft shortened. Get a new short diesel one from weddle or modify your existing gasoline , the rebuilder can cut it on a lathe. The surface in contact with the needle bearing should not be scratched or damaged. Here are pictures of the shaft cut and tapered in place:



2- Throw-out Bearing fork stage2 Reinforcement.

Every stage 2 clutch will put more force on the clutch fork. It is a good idea to reinforce the two spot welds put in by VW. Traditionally, we use a MIG welder to weld 360° around each of the fingers of the clutch fork



3- Engine Bay Preparation

3.1 Multi-Mount

The **Multi-Mount** can now be installed. It serves as an attachment for the coolant bottle and fuel filter



The **Multi-Mount** uses the two holes on the right side of the engine bay, near the suspension.



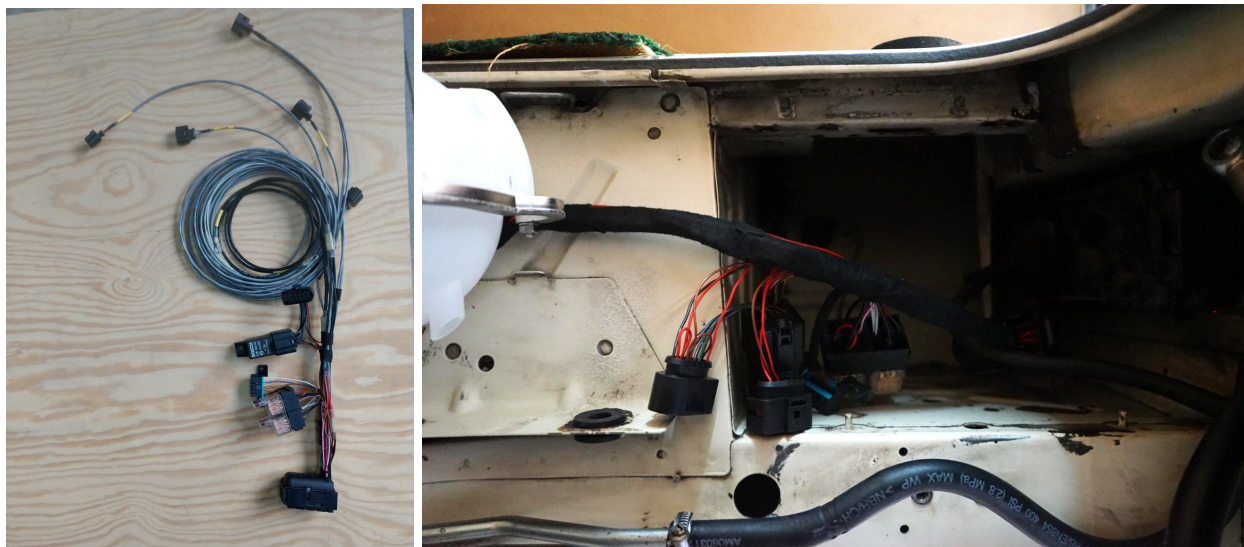
3.2 Cab Harness

Start by screwing the N75 valve to the firewall. There are two small indents that work perfectly with two self tapping screws. Due to the placement of the Syncro fuel tank, be sure to use screws no longer than $\frac{3}{4}$ ".



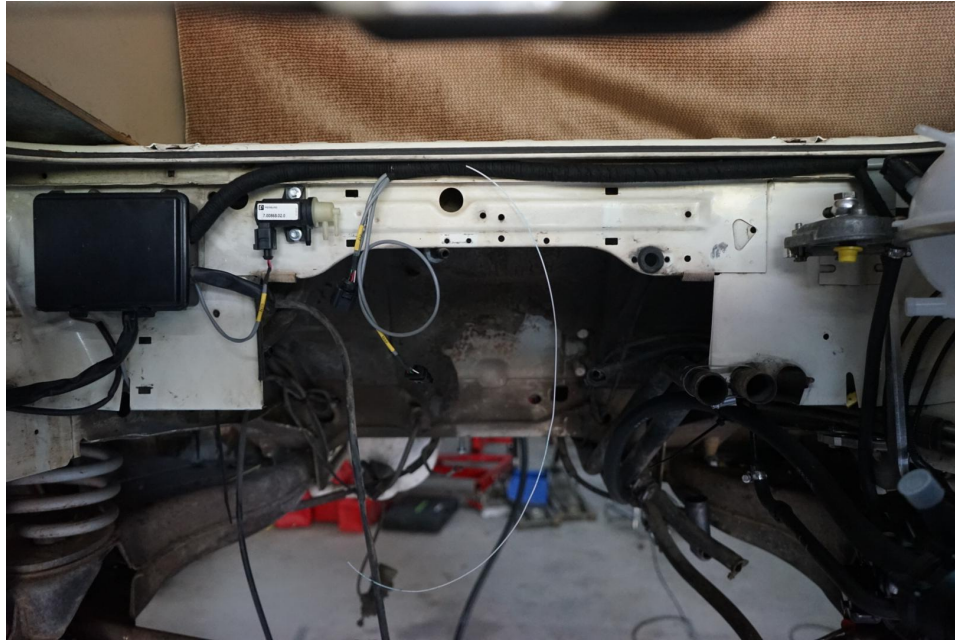
It should look like this when installed.

It is now a good time to install the cab harness. The cab harness is the harness with the large ECU connector.



The ECU connector can be laid down in the **rear passenger tail light compartment**. The harness can go around the coolant tank and tuck into the upper section of the engine bay.

Be sure to insulate the wiring harness of any sharp edges of the MULTIMOUNT otherwise it will cut it through. We found that some $\frac{5}{8}$ " hose with a zip tie works great.



-Labeled Ignition wire: connect to black fused wire in junction box.

-Coolant level: splice with new coolant bottle level connector. Wire color does not apply in this instance. (To me, this is the most important indicator if I am good to go for a drive! If I have coolant!)

-Coolant temperature: connect to the brass sensor on the back of the engine. This wire will need to be shortened and a new spade terminal crimped onto the end.



3.3 Pedal + OBDII Wiring

Accelerator pedal for driver:

We have found a good way to integrate the pedal into the cab is to JBweld 3x m8 screws as seen in the photos below. Next, drill 3 holes in the floor to secure the pedal. This method has been working very well for our installs.



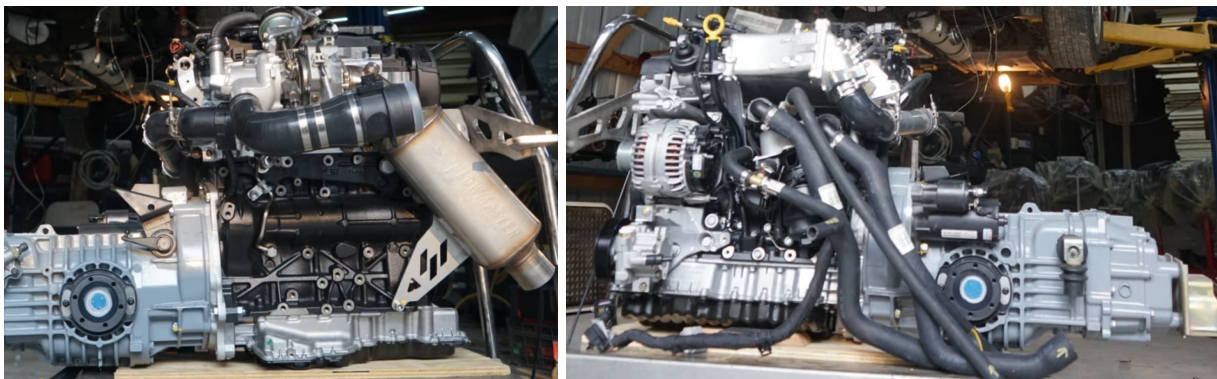
On the cab harness you will find a labeled pedal wire that is 17ft long. This is to allow the wire to reach the front of the vehicle. This wire will need to be zip tied along the left side of the vehicle.

For our newest run of harnesses, we also include a long OBDII wire. This will need to be run along the underside of the vehicle with the pedal wire. This long OBDII wire allows you to mount the OBDII under the dashboard for easier access. The OBDII connector may also have a short length of unterminated four core wire. These four extra wires can be connected to a CanBus box and programmed to make the factory Vanagon tachometer work with the new engine. This is not mandatory for the install.

For cruise control applications using aftermarket cruise control, the “cable actuated” is necessary. In that case the fly by wire pedal can be located in engine bay and actuated by both the accelerator pedal cable and the cruise control simply drill X cables holes on the fly by wire pedal and attach all cables to it.

4-The Moment of Mating Bolting Engine + Trans

Now that you have your clutch fork welded and your input shaft shortened, it is time to marry the engine and trans! Apply some grease on the input shaft of the transmission to make sure it slides easily through the clutch disc and into the pilot bearing.

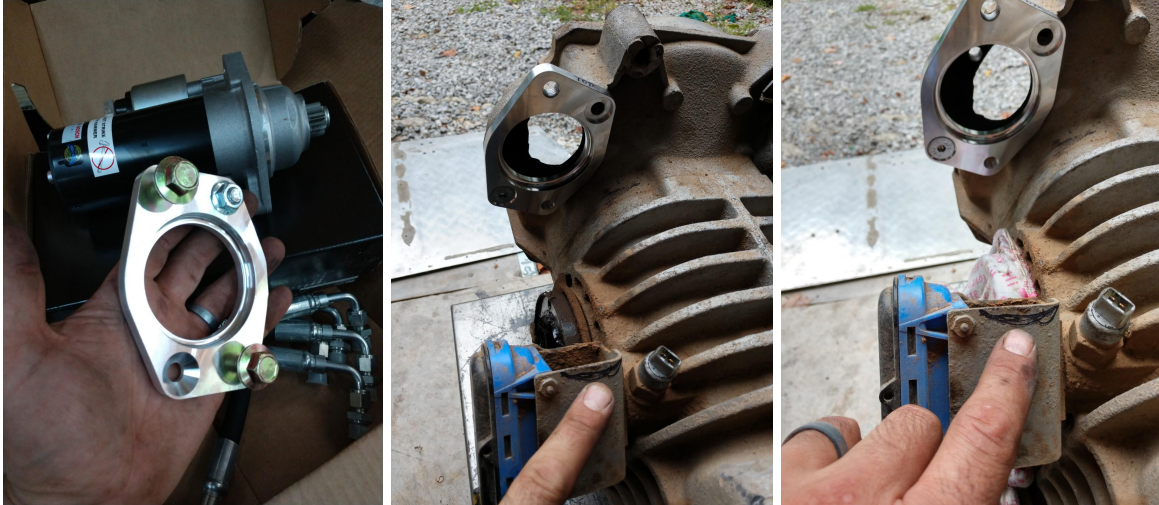


Tighten all 4 M10 bellhousing bolts to 32Nm.

Now is a great time to install a new clutch slave cylinder and shifter parts, such as the shifter boot or plastic ball.

4.1 The Starter

We recommend using a tdi starter (PN: SR0408X) because it is a 2.0KW starter and is very commonly used. This starter is the best upgrade available for the Vanagon. For our in-house installs, we source the adapters from Vancafé. If your Vanagon has a rear locker, there is a large amount of clearancing needed to make the larger starter clear.



4.2 Starter Adapter Plate

Remove the old starter and lower mounting stud from the bellhousing

Clearance the difflock bracket (if applicable)

Install adapter loosely on the starter

Slide in original upper starter bolt and mark the spot on the starter that needs to be clearanced

Remove the adapter plate and file or grind a small recess in the upper corner of the starter to make room for the bolt head.

This will make sure the starter will fit properly before fitting it to the bellhousing.

5-Installing Engine + Trans into Van

5.1 Starter Cables

After working on Vanagons for many years, I learned it is **MUCH** easier to install the starter cables with the engine about 6 inches away from its final position. Do not forget to install a jumper wire to connect the positive pole of the starter with the positive pole of the alternator.

For syncro only :It is also much easier to attach the transaxle vent tube before the engine is fully in place. Make sure the banjo bolt is clocked so it will not kink when the engine is lifted further.

Locate your heater core hoses and prepare them so it is easy to connect them when the engine is in place.

5.2-Clutch Hydraulics

For Syncros we suggest removing the clutch slave cylinder from the transmission and spinning it 180°. This allows more room for the charge pipe that runs along the back of the engine. Now is the perfect time to replace the clutch slave cylinder.

After the slave cylinder is rotated, reattach the hydraulic line. Do not forget the copper washers on BOTH sides of the banjo fitting.

5.3-CV's and Driveshaft

Now, attach the driveshaft to the front output on the transaxle. The driveshaft will help with placement of the engine and transmission, making the engine mounts easier to install.

After the driveshaft is in place, attach the CV axles to the transmission. Be sure to check the CV axle seals inside the output flanges of the transmission. These have a tendency to fall out and start leaking transmission fluid into the CV joints.

5.4-Mounts installation sequence

Finish jacking engine and trans into place. Loosely secure the transmission mounts so it is suspended safely but can still move slightly. Next, attach the rear mounts. These mounts only go on one way, so it is not possible to mismatch them.

Inside the hardware kit there are two $\frac{3}{4}$ " spacers to go in between the engine crossover bar and the hydraulic mounts. This will raise the engine up $\frac{3}{4}$ " and help improve ground clearance.



There is room to move the engine and transmission around in the engine bay to make sure it is level, and also lined up with the firewall.

When it looks good, tighten the 2x m8 to 25Nm.

Bolt driver and passenger mounts to the chassis with m8 bolts tightened to 25Nm.

At this point, you should have all of your bolts finger tight everywhere, so now you can start securing all M8 hardware to 25Nm.

Now that the engine and trans is in, remove the engine hoist so you have more room to work.

5.5- Fuel Lines

New fuel filter to be used is RACOR/PARKER 2 micron



I suggest FULLY draining the fuel tank before attaching any new fuel lines. This will make the job a little quicker and easier when it is time to cycle some diesel through the pump to clean out the tank.

The engine has the fuel lines already sorted on the engine. There is an "IN" arrow and an "OUT" arrow.

Your fuel line install must be as follows,

Feed line

From tank, to fuel pump, to fuel filter, to "IN" on the fuel rail.

Return line

From engine "OUT" arrow, to fuel tank return hose.

It is very simple, there is no evaporator or canister.

Any amount of dust or dirt that gets past the filter can cause serious damage to the high pressure pump.

5.6-Coolant Hoses

Connect the 2 large hoses to your crossover coolant hard lines.

Connect the two heater core hoses to your heater core. Labeled "HC." One heater hose comes from underneath the intake manifold, and the other comes off the billet aluminum housing that holds the coolant temp sensor.

Connect the two hoses for the coolant bottle to the reservoir. Labeled "BOTTLE" The hose with the brass T goes to the bottom of the coolant reservoir, and the vent hose goes to the small connection next to the coolant temp sensor.

Intercooler system:

The intercooler uses its own coolant system ($\frac{5}{8}$ " hoses closed coolant system). This means one hose will go from the intercooler (connection farthest from engine block) to the heat exchanger in the front of the vehicle minimum requirement for heat exchanger [link here](#) The bigger the better but its up to your fabrication skills) , then return to the pump, then back to the intercooler (inlet closest to the engine block).

It is very important to keep the coolant level in the system full at all times. A new way is to install a TEE that connects the coolant tank to the intercooler hose that is $\frac{5}{8}$ " $\frac{5}{8}$ " $\frac{1}{4}$ " the $\frac{1}{4}$ " side is used to maintain coolant while not allowing flow to be mixed up as the intercooler fluids are much cooler in temperature than the engine.

5.7 Power Steering System

Due to the placement of the new engine, the power steering reservoir must be relocated. Bolt the relocation bracket included in the swap kit to the factory power steering reservoir mount.

Next, refit the low pressure return line from the metal hose mounted on the passenger side of the engine bay back to the top of the power steering reservoir.

Finally, attach the new high pressure power steering hose to the top of the pump to the metal power steering hose with the compression fitting, located on the passenger side of the engine compartment.

Finally, fill the power steering reservoir with Dex III ATF.

5.8 Vacuum hoses

The N75 has three connections.



- 1- vent
- 2- to turbo VGT actuator
- 3- to vacuum line on engine

The vacuum hose for the brake booster must be cut (the vehicle hose) about two inches behind the check valve to avoid any extreme angles on the hose. The check valve must be reused.



Attach the other end of the Brake booster line to the yellow cap in the middle of the above photo.

5.9 ECU Cruise Control

ECU Cruise control is currently not supported; We are working on a way to make it work with the new factory Volkswagen ECU.

6-Sensors and Final Wiring

With the engine bolted in place and all the plumbing completed, you can now begin plugging in all the connectors for the engine sensors. It is as simple as reading the label on the connector and matching it with the appropriate connector. Remember to keep the N75 and O2 sensor wires away from the heat of the turbo.

The kit comes with a mini-harness that connects to both the fuel pump and the intercooler pump. The grounds for both connections can be put under the mounting hardware for the pumps. The long red wire with the spade connector must be run up the firewall and alongside the cab harness. The single spade connection will plug into the one open terminal in the relay block. This will trigger the fuel pump and intercooler pump when the key is turned.

The alternator connector must be spliced in with the blue wire labeled ALT. The alternator connector has several extra inches of length, so do not be afraid to cut it to your desired length.

Do not forget to reattach the transmission ground strap, reverse light switch connector, and locker vacuum hoses (if applicable) on the transmission.

The 12V wire from the cab harness can be connected directly to the battery, or on the positive pole on the back of the alternator. Whichever works in your application is great.

The ground wire from the cab harness can be connected to the engine block. There are several empty threaded holes on the block behind the AC compressor.

7-Fluid Specifications

For engine oil, we suggest Shell Rotella 5w-40 diesel oil. These new engines DO NOT come from Volkswagen pre-filled to the proper level; We do suggest checking it to make sure everything is safe for the first start.

For clutch fluid, DOT 3 brake fluid is perfect for Vanagons.

Use traditional green antifreeze for engine coolant. Adjust the mixture ratio of the antifreeze based on the climate of your location. Even though you may live on the equator, I do suggest adding at least 50% antifreeze to help eliminate corrosion.

Do not forget to fill the intercooler system as well. It will need the same antifreeze mixture as the engine coolant. This will prevent any damage to the pump or cooler if temperatures go below freezing.

In the power steering system, I suggest Dexron III ATF.

8-First Start

Pre-Start check

To properly clean the gasoline out of the fuel tank, drain the tank completely. Once the tank is drained, pour a few gallons of fresh diesel into the tank. With the first diesel in the tank, shake the van some to make sure it reach all the possibles corners of the fuel tank, remove the fuel feed hose from the engine and turn the key to the accessory position. This will turn the fuel pump on and pump out the diesel and gasoline mixture. I suggest catching the fuel in an extra fuel can. After the pump has been running for a couple minutes. Pour another few gallons of fresh diesel into the tank and reconnect the fuel line to the fuel rail.

Be sure to check all fluids. (oil, engine and intercooler coolant, clutch fluid, and power steering fluid)

Make sure all engine and transmission mounts are torqued.

Recheck all hose clamps to make sure nothing will leak during the first fire up.

The most important thing to check before the first start of the engine is to make sure no tools are on or around the engine. If fluids are all filled to the proper level, no wiring is left unconnected, and all bolts are torqued, then it is time to turn the key. Congratulations!

First Start

For the first start, I suggest running the engine for a short amount of time. After it has run for several seconds, check and make sure nothing is leaking or rubbing on the belt.

These new crate engines from Volkswagen **DO NOT** need to be broken. They come from the factory ready to run.

After the first start, you will need to bleed the cooling system to ensure proper coolant temps while driving. I suggest placing ramps under the rear wheels, or backing it onto a hill, this will help the air bubbles out of the system.

Bleed the power steering system by turning the wheel lock to lock with the engine running. Do not be alarmed if the power steering system is noisy when you turn the wheel. This simply means you need to add more fluid.

9-OBD2 and Tach

First you can connect a OBD2 device to the OBD2 port and display all the necessary informations to a tablet Wirelessly.

The OBD2 device ELM327 is \$13 online and does a great job for this purpose along with the free APP torque Light in the Google play store. [Link here](#)



Mini Bluetooth OBD2 Scanner OBATOR ELM327
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- **【Excellent Compatibility】** - Compatible with all Gasoline vehicles in OBDII interface, which support 9 OBDII protocols: 1.SAE J1850 PWM(41.6Kbaud) 2.SAE J1850 VPW(10.4Kbaud) 3.ISO9141-2(5 baud init,10.4Kbaud) 4.ISO14230-4 KWP(5 baud init,10.4 Kbaud) 5.ISO14230-4 KWP(fast init,10.4 Kbaud) 6.ISO15765-4 CAN(11bit ID,500 Kbaud) 7.ISO15765-4 CAN(29bit ID,500 Kbaud) 8.ISO15765-4 CAN(11bit ID,250 Kbaud) 9.ISO15765-4 CAN(29bit ID,250 Kbaud). (Not support Hybrid or electric vehicles)
- **【Suitable for system】** Mainly used with Android system phones, also supports Symbian system phones, Windows system PCs and laptops. Compatible App: Recommended Apps are Torque Pro, Torque Lite (free), OBD Car Doctor (free), etc. on Google Play.
- **【Smart Scanning】** Read diagnostic trouble codes, nonspecific and manufacturer-specific, and



Torque Lite (OBD2 & Car)

by Ian Hawkins Communication
 ★★★★★ 41,830 ratings

Everyone
 Contains Ads
 This app is available for all of your devices

Installed

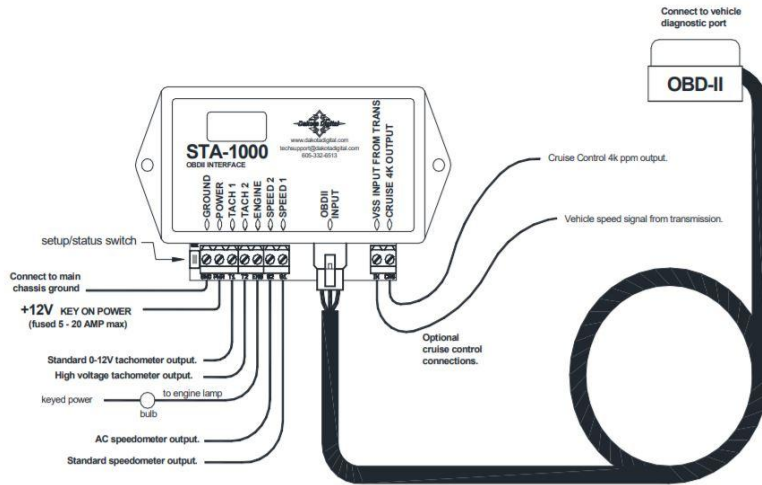


See what your car is doing in realtime, get fault codes, sensor data and more!

For Vanagon Tach operation a variety of options are available. The Speedhut can tach will display RPM with just connecting can high and can low. [Link here](#)

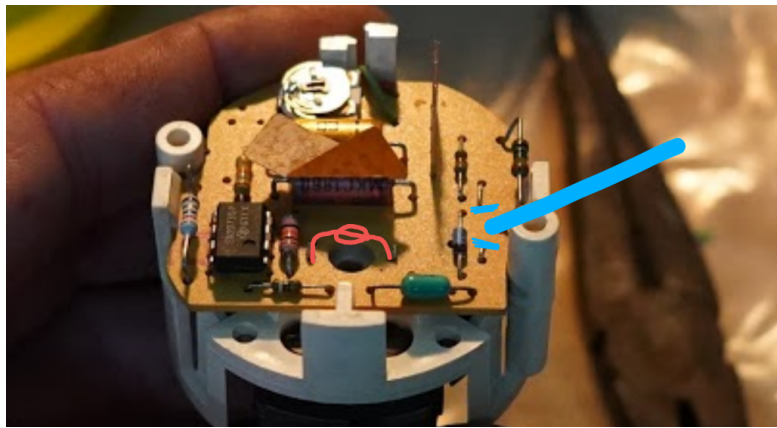
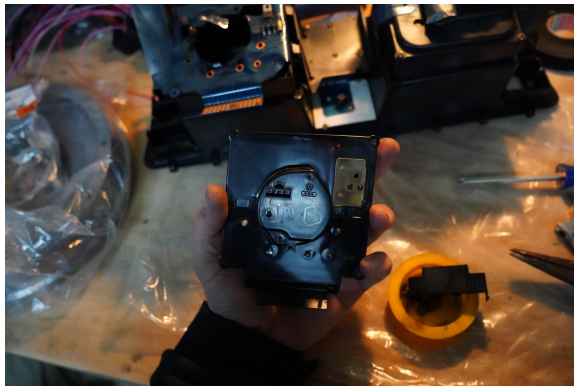
Otherwise to keep the Vintage vanagon tach a device is needed to convert the Can Bus tach signal into analog tach signal. We have been using the Dakota Digital STA 1000 to achieve this. It hooks to the OBD2 port and automatically pick up the can tach signal and turns it into a analog signal for your tach. There is one thing to do from opening the box is to change from 8cylinders to 4Cylinders. Only hook the 12V ground ,CAN HI and CAN LO and the device will send tach signal. [Link here](#)

STA-1000
Speed/Tach Interface Module for OBD-II vehicle interface



Note up to 1985 Vanagon tach will work great at receiving the info from Dakota STA 1000 For 1986 and 1986+ there is an other step to do for the tach to work. This step is a very common modification to do in the Conversion world, it has been discussed and done many times on thesamba.com and is necessary to be completed to make the tach work with all conversions (subaru etc...)

The tachometer needs to be disassembled to the resistors, one resistor has to be cut and an other one replaced with a 220Kohms resistor.



The blue line represent the resistor that has to be cut and permanently removed.

The red represent the resistor that has to be replaced with the 220Kohms (for 1986+)

Resistor can be mailed on request. I have a handful of them here for the vehicle installs that we do in house.

10-Oil pressure switch

If you desire to equip the oil pressure switch of the vanagon, the best approach is to **TEE** one of the existing oil pressure sensors. On the TDI there is 2x a green and a brown. One can be TEED that would allow the addition of the original vanagon oil pressure switch part number **028-919-081D**

