

Project Volksmogen

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After the front ring and pinion calved on my LT 4x4 and I discovered how expensive it will be to repair, I decided to go big or go home. Considering how much money I have into my LT at this moment with the initial purchase, transportation from Germany, new injector pump, rebuilt transfer case, etc etc etc, it's gonna have to be a keeper for now.

LT ring and pinion is about 1200 EUR which is about 1800 CAD and by the time I get that installed the bill will be in the \$3500 range. Unimog 406 axles, a pair of them, with some careful searching cost about the same amount. The benefits of using Unimog axles are many. Parts are available in North America, larger brakes if you go with the disc brake version and most of all 14cm / 5.5" more ground clearance due to [port hole gearing](#) in the ends of the axles with the ability to keep my existing wheels.

After a lot of research I decided not to go with the common 404 Unimog axles. Few reasons for this:

- They are narrower than the LT axles
- Drum brakes on all four corners
- Long pinion housing
- 7.56:1 final drive

The less common and more expensive 406 / 416 axles are a lot better

- Same width as the LT axles
- Disc brakes on all four corners with two calipers per disc up front
- Relatively short pinion housing
- 6.52:1 final drive

The LT 4x4 has a 5.38:1 final drive and my 285/65R20 tires give me a 3250 100 km/h rpm which is about perfect for the output of the engine and noise level of the cab. Unimog axles will bring the final drive to 6.52:1 which is quite tall - good thing that Ted from Granville's Coffee in Quesnel gave me a set of 12.5R20 (335/85R20) tires from his Unimog 406 which he upgraded to 14.5R20. These 104.1cm / 41" tall tires will give me 3310 rpm which is pretty much spot on! With the 14cm of additional ground clearance the port hole gearing gives me I will be able to run 14.5R20s if I wanted to.... hmmm....

One of the big issues with Unimog axles is that they don't use a conventional drive shaft like just about every other vehicle out there. Instead they use a torque tube.



U1300 Torque Tube

Essentially the drive shaft is encased in a hollow tube that acts as part of the suspension with the front having a constant velocity joint as opposed to a universal joint. To make these axles work on a conventional 4WD system like the LT 4x4 the torque tube needs to be cut down and the internal drive shaft must be shorted and have a flange attached to it. At the end of the cut down torque tube a bearing and oil seal is installed.



Unimog 406 pinion conversion - courtesy of <http://www.halle15.com>

The search for Unimog axles had a turn for the worse...



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Rusty 406 axle

I got a "good deal" on some 406 axles from Vermont - problem was they were sitting for seven years and both axles were full water... [lots of water](#)... thousands of dollars later I found another set in Germany... currently they are enroute and due here the first part of April.

HasenWerk

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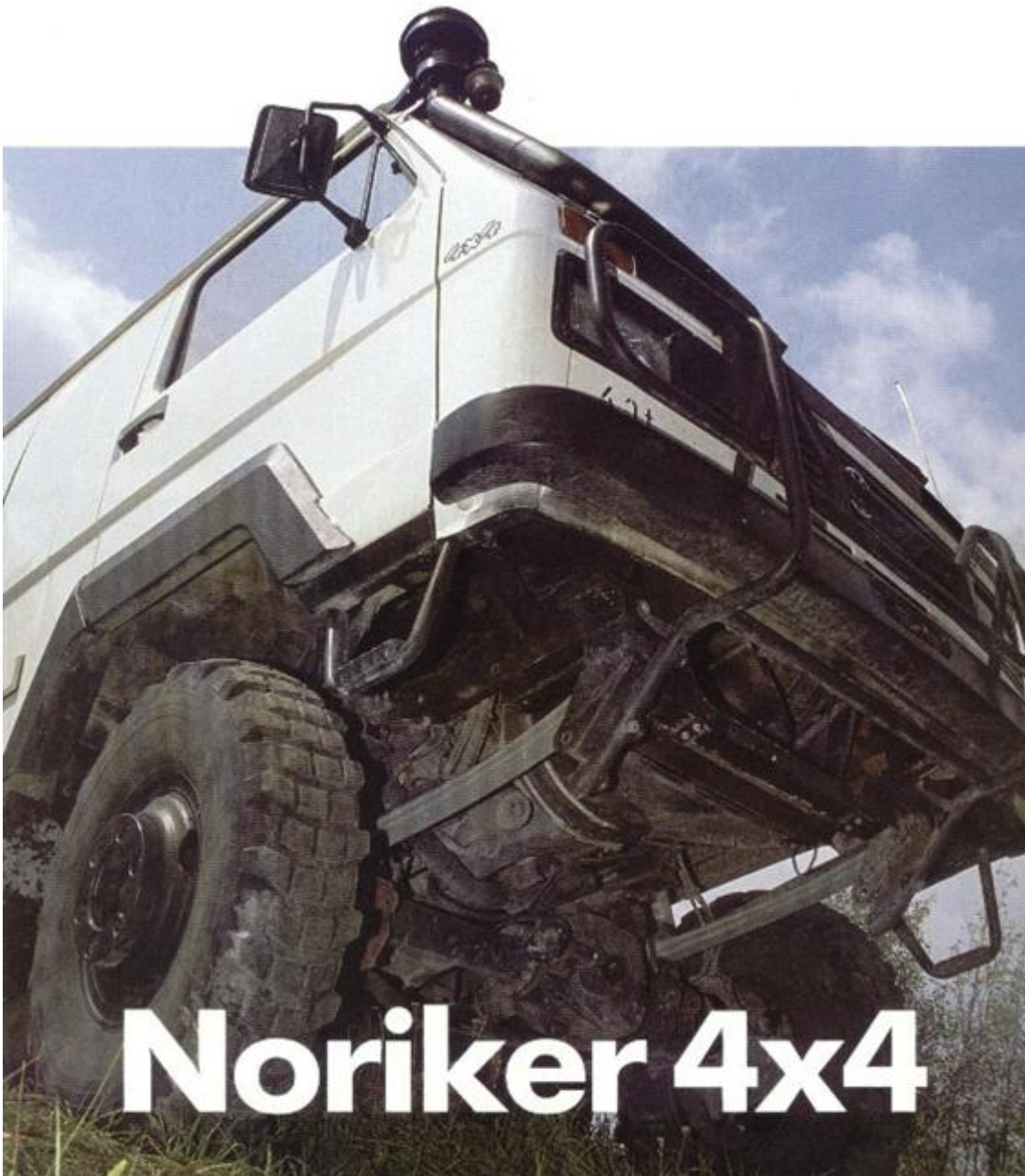
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Part two - hasn't this been done before? - the Noriker

I have to admit that this idea of installing some Unimog axles had some help. Back in 1992 when the Canadian Forces were looking for a new Light Support vehicle ([LSVW](#)), Steyr-Daimler-Puch in Austria built and submitted the Noriker prototype based on the Volkswagen LT 4x4 - unfortunately Steyr Puch lost out to Fiat for some strange reason and only 22 Noriker's exist...

Steyr-Daimler-Puch Fahrzeugtechnik

Graz / Austria



Noriker 4x4 - Modellvarianten:

Zivilausführungen:

- Fahrerhaus mit Pritsche
(Nutzlast 1,5/2,0 t, Radstand 2600/2950 mm)
- Doppelkabine mit Pritsche
(Nutzlast 1,5/2,0 t, Radstand 2600/2950 mm)
- Kastenwagen
(Nutzlast 1,5 t, Radstand 2950 mm)
- Kombi
(Nutzlast 1,5 t, Radstand 2950 mm)

Militärausführungen:

- Mannschaftswagen
(Nutzlast 1,5/2,0 t, Radstand 2600/2950 mm, Aufbau mit Planenverdeck und unterteilten klappbaren Längssitzbänken zum Transport von 8/12 ausgerüsteten Soldaten)
- Kastenwagen
(Nutzlast 1,5 t, Radstand 2950 mm)
- Fahrgestell mit Fahrerhaus oder Doppelkabine mit 1,5 oder 2,0 t Nutzlast für Spezialaufbauten

Änderungen vorbehalten!



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Printed in Austria



SDP Noriker - Courtesy of <http://www.lt-4x4.de>



Closeup of the Noriker port hole axle - Courtesy of <http://www.lt-4x4.de>

The hand built Noriker got a lot of it's styling cues such as the black plastic fender protectors from the hand built Syncro 16" which SPD also designed. The axles were custom built in the UK and have smaller brakes than the Unimog in order to fit 16" wheels. The Noriker has a 5000kg GVW where as the Unimog 406 has 7490kg. I suspect that the Noriker was a modified 2WD LT as there was a short wheel base version of it available and they didn't use a New Process 241V transfer case. There are many differences between the Noriker and Unimog axles - for this project the 406 axles are just easier to get so that's what I got!

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Project Volksmogen part three - the steering

One of the biggest problems with installing port hole axles on an LT is how to handle the steering. As the Unimog 406 axles are as wide as the LT axles, the steering pivot point is closer to the center of the vehicle. The steering input for a Unimog is on the passenger side of the vehicle and the steering input for the LT is on the driver side. A steering arm has to be fabricated for the Unimog axles that is above the leaf spring and will extend 18cm / 7" from the pivot point. The LT has a low profile two dimensional part that attaches to the wheel hub - if one was to do this on the Unimog axle it would hit the leaf spring so it has to be made so it is above the leaf spring like it is in the Puch Noriker prototype.



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LT 4x4 Steering Arm



Puch Noriker Steering Arm - courtesy of <http://www.lt-4x4.de>

As I don't like to under engineer anything and I don't want to see anyone hurt, I decided to do it right and farm this project out to an industrial logging equipment fabricator here in town. Here are the results:



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Volkswagen steering arm built from a Ford F350 steering arm and heavy plate steel



Volksmogen steering arm built from a Ford F350 steering arm and heavy plate steel

As you can see... enough clearance for the leaf spring and it's built 10x stronger than it needs to be... I don't have the invoice for this masterpiece yet... I am afraid to ask!

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Part Four

Leaf spring adaptation

One of the biggest differences between a Volkswagen LT and a Mercedes Unimog is the type of suspension they use. The Unimog uses coil over springs and the LT uses leaf springs. In my opinion the Unimog has the better suspension because the coil overs allow a much greater range of suspension travel. I don't have the time or resources to install springs on all four corners of my LT so adapting the Unimog axles to use leaf springs is what I did. Also, as you will see in some of the photos, the Unimog axle pinion is close to the oil pan of the LT which required me to build the spring platforms 2.5" taller than the original VW spring platforms so there would be sufficient clearance between the pinion and oil pan under full suspension compression.

The first thing done was remove the Unimog spring platforms and shock mounts from the axles.



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First step was to make sparks fly and remove the Unimog spring platforms.

Then I duplicated the spring platforms that Volkswagen built for the original axles only better. 1/2" plate steel and 6.5" high at the front instead of 4" in order to have enough clearance for the oil pan. The upper torque arm mounting points were installed later. The lower torque arms will be installed at a later date as I will be using a slightly different angle than stock.



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Next make a spring platforms by copying what Volkswagen did on the original LT axles.

Next with the help of my frau and my friend Mike (THANK YOU MIKE!!!) we installed the Unimog axle in place under the front of the truck. A word to the wise here... make sure you have lots of brownie points to burn and some beer to make everyone happy when you are done as it's a lot of work moving an axle with a top heavy ring and pinion. I think I have to go help Mike do some roofing this weekend! After the axle was in place and the weight of the truck was on the axle I adjusted the pinion angle.



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Setting pinion angle

Once the pinion angle was dialed in, a phone call to a trusty certified welder made the spring platforms and axles one piece. I can weld, but I just wanted the certification behind these ones!



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Have your certified welder attach the spring platforms to the axles.

Next, the rear axle went into place as seen here without the U bolts and welding holding everything in place. Ground clearance went from 25 to 41cm under the differential - it will be a sight to see with the 11.00R20s I have ready to go on there when this project is done! Because of the additional lift and the port hole axles I will be installing torque arms at the rear even though Volkswagen didn't do this originally on the LT.



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Rear spring platforms in place.

The only issue that I am going to have is the rear drive shaft - with the drive flanges parallel the universal joint angle will be 24 degrees, which is too much... we'll see how we solve this problem in the next section!

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