VW STEERING BOXES

I can offer some information about rebuilding steering boxes. I did hundreds of them when I worked for Kymco in the '90s. Warning: this is going to get long.

There is no 'kit' for a steering box. Period. End of story. The only commonly replaceable parts are two seals: one for the input shaft and the other for the sector. They are both available at bearing-supply houses. We bought them in bulk but you can buy them individually for a little more money.

Most--I would say more than 99 percent--of all Type I and III steering boxes are perfectly good inside and worthy of rebuilding. This of course was almost 20 years ago but even the worst looking boxes then were usually good inside.

There are five wear points: 1: from the sector shaft to the housing, 2: from the top of the sector shaft to the steering-box top, 3: between the roller and the sector shaft itself, 4: between the roller and the worm gear, and 5: in the input-shaft bearings.

It was exceedingly rare to find a box that had perceptible wear between the sector shaft and the housing or the sector shaft and the box top. The surface area is so great and the cars are so light that there's almost no real load there. If you want to then you can drop the sector shaft in the housing and check the lateral movement with a dial indicator but I could count the number of boxes that were worn in that way on a wood-shop teacher's hand. And those boxes usually had other problems that prevented their rebuilds.

It would take a really loose fit between the sector shaft and steering box to induce enough movement to wear the box top. That's a really rare case.

You can bore and sleeve worn steering boxes to tighten the fit between the shaft and box but you're just better off starting with another box. That type of wear is so rare that you're not likely to find another one worn that way.

Every once in a while we would come across a sector shaft with a loose roller. The rollers slop sideways when the sector is bad and you just throw those away. Still, that's really uncommon. Those usually came out of Baja bugs and buggies. We got them as loose cores but you could tell the ones that were in off-road cars because they were usually painted funny colors.

The wear between the roller and worm gear isn't exactly common but it's easy to wipe out the fit if you don't know what you're doing. The LAST thing you want to do is touch the screw and jam nut on the steering-box top when the box gets sloppy. That's a sure-fire way to wipe out a worm gear. Trust me on that one.

The fifth type of wear is what makes the boxes sloppy over time. Wear there alters the preload on the bearings on the worm gear (input shaft). Those bearings do wear but they almost never wear out (if water gets into the box it will rust them which destroys the box anyway). That great-big (I think 30mm broach) socket-head fastener is what preloads those bearings. You can't effectively set preload there with the box top and sector shaft in place so you have to remove those parts. You might as well just tear down the entire box while you're at it and replace the seals. Here's how to do it.

Remove the box from the car and clamp it in a vise. Remove the pitman arm and all the grime from the end of the sector shaft. Loosen the jam nut on the box top but don't try to turn the preload screw yet. Remove the four 8mm bolts that hold the box top on to

the steering-box housing. Put a drip pan under the steering box and lift the entire top/sector shaft assembly as one unit. Snot will ooze from it if there's any left.

Before you remove the set nut from the preload screw on the box top make sure the threads are good. Otherwise they'll booger up the threads in the box top. Remove the sector shaft from the box top by first removing the set nut and then screwing the set screw down and out of the hole. You'll likely have to grind a screwdriver to get it to go down into the 8mm hole all the way.

Before you go further feel how the input shaft feels in the steering box. It will likely feel loose and spin freely. It doesn't seem like much but even if it just spins freely chances are that's what's causing the box to feel sloppy. It's not uncommon for that shaft to actually feel a little bit sloppy. Those steering boxes feel spooky--you have to turn half a rotation to make the car steer. Usually they're just fine.

Here's how people who don't know what they're doing destroy boxes. They crank down on that jam nut on the top which tightens the fit between the roller and worm gear but it does not do anything about the slop in the input shaft. So they crank down even harder. That makes the steering box feel 'notchy'. After a while the excessive load just wipes out the parts. It doesn't help matters that the steering box is way down on oil at that point. All the while the input shaft moves back and forth making it feel as if the fit between the worm/roller is bad.

Use a big pair of channel-type (Channel Lock) pliers to remove the locking collar from that big ol' set nut. I did that for years and it works fine if you're careful. Then use your new 'tool' to remove that giant preloading fastener. The input shaft drops out through that hole.

You'll have to make your own tool to remove that gigantic set nut that preloads the input. We went down to the local industrial

hardware shop (McFadden-Dale's for you California and Las Vegas people) and ordered the right size nut. I just welded a 19mm or so nut to the nut face. The larger nut fits into the fastener and the 19mm or so nut welded to it makes it easy to use a common wrench on the tool.

Before you remove the input shaft, stop and remove the collar that's supposed to be on it. It's not always there but if it is it will tear up the input seal if you try to remove the shaft with the collar in place. There are cases when you can reuse the input seal. They're not always bad.

At this point you can remove the seals and take the parts to your local bearing shop and order new ones.

Clean all of the parts. We ran everything through the washer. We ran everything through the glass-bead cabinet but i have a few tips. First, tape off the part of the sector shaft that fits into the steering box and blast ONLY the area outside the steering box (on the outside of the seal where the pitman arm fits). Sometimes the seal deposits itself on the shaft. In that case POLISH that area to remove the residue. Also blast ONLY the area of the input shaft that's outside the input seal. Again, polish the seal area if it's not squeaky clean. There's no need to blast the bearing races and/or worm gear or roller. That does more harm than good.

You'll likely want to blast the area where the seals were. That's fine but try not to blast the part of the box where the sector shaft fits. It's inevitable that you'll hit that part but just don't sit there blasting. And blast only the topside of the cover. The bottom side of the cover has the precision-machined bore and blasting that area can wear it prematurely. Carefully knock out the filler seal in the box top. Don't try to pry it out because it will likely fall apart. Just punch it out from the bottom.

A circlip holds the set screw in the top of the sector shaft. You don't

need to remove it and i don't advise it unless grit has gotten in there. Kymla made me do that and cut out shim stock to go between the set screw and sector to take up the slop but that's wholly unnecessary. Just don't go there if you don't have to.

Reassemble the worm gear with the bearings and the preload fastener. I did the following without the input-shaft seal in place so i could better feel the preload. You can slip the seal over the shaft at a later point but you'll need a thick-walled tube to do seat the seal. Otherwise install the seal with a larger drift and then assemble the input shaft. Squirt some engine oil on the bearings for the time being.

Hokay, the VW manual called out a very specific preload on the input-shaft bearings. It called for a scale in pounds-inches and an arm bolted to a rag-joint coupler. We found that largely unnecessary and i can't remember the specs anyway. Instead, bolt a rag-joint coupler to the input and tighten that preload nut until the slop goes away. Then tighten it more until you can feel the resistance in the input shaft. Then tighten it some more until it gets unnaturally tight and notchy. Now loosen that preload until it takes a bit of wrist effort to rotate the shaft by turning the joint coupler. It shouldn't feel notchy but it shouldn't spin freely either. You should feel a bit of resistance in the bearings. Install the locking collar nut on that giant fastener, hold the fastener in place with your special tool, and check the preload again. You might have to do this a few times if you're working alone.

Now thread the sector-shaft set screw ALL THE WAY UP into the steering-box top. Don't just stop at one point because you can damage things if you try to bolt it all together. Pour some engine oil on the roller and the worm gear.

You don't need the paper gasket to seal the lid to the housing; just use some plain ol' RTV (I use T0y0ta FIP Form in Place and it works awesome). Verify that nothing binds as you tighten the lid. If it

binds, take it apart and check for interference. Use the engine specs for the torque on those fasteners.

Now slowly turn the preload screw clockwise as you turn the input shaft back and forth through the whole range. At one point it will get tight enough to feel very slightly notchy at center. You want to go just a little bit beyond that point. It should get almost tight at that point but you shouldn't feel any more than the slightest notchiness in a stock-sized steering wheel. That's absolute center and you want to make a note of that orientation with a mark on the shaft and housing. Now install/tighten the set nut on the preload shaft.

You should now have a properly set steering box. If you haven't installed the seals then do so at this point.

Now you have to fill the box with OIL. NOT GREASE--OIL! And don't try regular gear oil. Those old gearboxes used really thick oil--like 600 weight in early Fords. You can get similar weight oil at industrial shops but there's an easier way. The oil additive STP is super thick--about 500 or 600 weight (at least it used to be). Fill the box through the hole in the top. Fill it all the way and punch the plug back in.

You have a rebuilt box but you're not done yet. The following step is critical and always overlooked.

Remember the 'notchy' part when the steering box is at center? Install the steering box in the car and align it so it's dead-nuts center. Now install the steering shaft and wheel so the steering wheel is perfectly straight and not off to one side or the other when the steering box is centered. Now have the car aligned so the wheels point straight when the steering wheel is pointed straight.

The alignment goes to hell when people lower their cars and align them themselves. They often get the toe in set right but they don't always get the steering wheel centered when the wheels are toed properly. When confronted with that scenario people usually just

remove/reinstall the wheel to straighten it out. Well the crooked steering wheel was saying that the steering box wasn't set straight and re-positioning the wheel only covered up the problem instead of correcting it.

That tightness when the box is straight preloads the steering ever so slightly when the wheels are straight. I can guarantee that a good number of you have your steering boxes installed ever so slightly off center--that's really common on lowered or raised cars. An off-center box will feel like junk even if it's perfect. This is experience talking here. I can almost guarantee that those 'junk' TRW boxes were installed that way. At least when I was doing boxes those TRW pieces were top-shelf parts. Preparation and installation are key to a good steering setup.

This may or may not work for you but it worked for me hundreds of times. The steering box in my Thing is one of my rebuilds and 15 years later it's as tight as the day it was made.