

914 Shifting Improvements

Difficulty Level 2-3

Difficulty scale:
Adding air to your tires is level one
Rebuilding a 911 Motor is level ten

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We have gotten many requests for this article from our readers. By now, most people who own a 914 know that it's quite infamous for sloppy shifting. Coupled with some questionable design strategies is the fact that the cars are over 25 years old, and many owners have neglected them for many years. The shifter mechanism and transmission are often overlooked for periodic maintenance because a lot of components are hidden away from view. Many people who think that they need a transmission rebuild find renewed life with their car after performing a few minor maintenance procedures.

Before deciding that you need to rebuild your transmission, you should probably check through all the items listed on this page. While they won't guarantee that your tranny will shift like new, they will at least eliminate some of the possible causes of problems. I think that most people would like to avoid a transmission rebuild. One little note about transmission rebuilds: be cautious of people selling 'rebuilt' transmissions for \$400/exchange. In most cases, to properly rebuild the 901 transmission you need a minimum of \$400 in parts at wholesale costs. These 'rebuilt' often only include the replacement of the synchro rings - and sometimes only for 1st and 2nd gear. When buying a rebuilt transmission, make sure you know the condition of the sliders and the dog teeth before you spend your hard-earned cash.

I've separated this article into sections dealing with several parts of the shift linkages. I concentrated on the side-shifter linkage because I don't have easy access to a car with a tail-shifter. For more information on the tail shifter, please read Tim Polzin's guest article, [914 Tail-Shifter Linkage Improvements](#). It's good to attack the problem step-by-step,

replace worn parts, and then recheck to see if that improved the shifting. If I have missed something, or if you have any information to add to this article, then please let me know and I will include it asap.

Side-shifter Transmission Upgrade

The late model transmission (side-shifter) is a definite improvement over the tail-shifter model that shipped with early 914s. The reasoning is that the shift linkage bar is a lot shorter on the improved transmission, and supported slightly better. The internals of the two units are almost identical; almost all of the variation exists in the linkage setup.

In order to upgrade to the side-shifter transmission, you need the following:

- side-shift 901 transmission from a 1973 or later 914
- linkage setup from a 1973 or later 914
- late model engine mount bar

The upgrade is basically a bolt-on solution. Make sure that you have all the parts when you buy the linkage setup. This linkage is shown in our [parts diagrams section](#). Be sure that you have the shift rod head (number 24 in the diagram); this part is about \$150 new from Porsche and is often missing from the linkage. It is also recommended that you replace all the bushings documented in the following sections.

When you buy your transmission, try to make sure that it shifts well. I know that this is very difficult, as most transmissions are pulled from non-running cars. Very often the parts in the transmission will be very worn and will require some expensive replacement (sliders often cost in excess of \$300 each).



**Figure 1: Rear
Ball Cup
Bushings &
Shifter Rod
Bushings**

Rear Ball Cup Bushing

The rear ball cup bushing is placed inside the [shift rod head](#) (#24) and is often worn out from wear over the years. Shown on the left side of [Figure 1](#), this bushing fits around the ball lever that is attached to the side-shifter transmission. Wear on this bushing will lead to sloppy shifting. Replacement is relatively simple. Simply loosen **and remove** the [tapered screw](#) on the front of the linkage (#26), and the [tapered screw](#) (#23) from the rear of the

linkage and slide the 'universal joint' attached to the rear shift bar back from the front bar. You need to remove the tapered screws all the way as they are not normal set screws. Separating the rear linkage bar from the front may require some tugging as the fit is sometimes quite tight. Be sure to use the correct hex wrench to remove the tapered screws. Stripping them will require you to drill out and replace your rear linkage bar (been there, done that...).

Once you have the rear bar removed from the front, the shift rod head should simply slide off. Remove the ball cup bushing, and then 'snap on' another one. This may take some force, as the ball cup makes a nice air pocket that you are inevitably trying to compress as you put the bushing on. Be sure to use a little lithium grease inside the bushing to reduce the wear. The addition of grease, of course, makes the air seal better, making it increasingly difficult to snap the bushing onto the ball.

Replacement of the shift linkage is the opposite of disassembly. No adjustment is required because the tapered screws should line everything up perfectly. Before replacing the shift linkage, though I would recommend replacing the other shift bushings described below.

Tapered Screws

As described in the previous section, the [tapered screws](#) (#26 & #23) hold the rear half of the linkage together. If these screws are loose, missing or damaged, then the linkage will shift very sloppily. It is wise to remove and check the screws every once and awhile. Placing some locktite on the screws will also help to keep them from backing out.

Shift Rod Bushing

There is another bushing that the rear shift rod goes through at the very end of its length near the transmission. This bushing can be seen in the right side of [Figure 1](#). In this figure, the bushing has been replaced with a bronze bushing which, although expensive, will almost never wear out. At this time, we know of only one supplier of these and they cost around \$30. Regular plastic bushings are about \$10 each. The replacement of this bushing is similar to the ball cup bushing described above. Simply remove the rear shift linkage bar and snap out the bushing. The bronze



**Figure 2:
Firewall Shifter
Rod Bushing**

bushing comes with a snap ring which holds it in place. The plastic one snaps into place. Again, place a little grease on the bushing when you install it.

Firewall Bushing

This one is not as easy to replace. The bushing holds the shifter steady as it passes through the 914 firewall, as shown in [Figure 2](#). You need to disconnect the rear shifter bar as described above and remove it from the car. Then you need to pull the front shift rod forward out of the firewall, in order to remove and replace the bushing. There are two ways of doing this.

The best method is to remove the three mounting screws that hold the shift lever to the car chassis. When the lever is loose, simply slide the shifter forwards, and the bar should fall out of the firewall bushing. You need to remove the center console to do this, but more importantly, **you don't need to readjust the shifter linkage later on.**

Once you have the front shifter bar out of the way, the firewall bushing can be removed by prying it out of the firewall. The old one is usually quite worn and comes out pretty easily. Getting the new one pushed into the firewall takes some patience (what doesn't on a 914) and quite a bit of force. I found that vise grips helped to compress the bushing before I installed it into the firewall.

After the new bushing is installed, you then need to replace the front shifter bar. To insert the bar back through the firewall, you need to access the bar through the small access port located under the center cushion. Removing the small metal plate allows you to get a grip on the rod and guide it into the bushing. Now simply reinstall the center console, access plate, center cushion, and reattach the rear shifter bar. You may want to do some inspection and/or modification to your shifter lever (see below) before you replace your center console.



**Figure 3:
Broken Shifter
Lever**

Shifter Lever

It is possible to have the shifter lever fail that is located inside the cockpit of the car. Sometimes the lever breaks along the seal of the top shifter lever ball, as shown in [Figure](#)



**Figure 4:
Correct Shifter
Lever**

3. In most cases, this breakage will result in catastrophic of the shifter and you will not be able to drive the car at all. Additionally, the shift linkage sometimes breaks at the piece which connects to the front shift linkage. Be sure to inspect and check the shifter lever carefully, as damage may be hard to see. A good shifter lever is shown in [Figure 4](#).

There are springs located in the shifter lever which prevent the driver from 'knicking' reverse when going into second. You can replace these springs with heavier-duty type springs if they are worn out. However, the most important thing to check on the shift lever is the proper alignment with respect to the transmission. You will probably want to remove the center console and center cushion for this step. The front shifter bar is inserted into the bottom of the shifter lever and is clamped down with an [M8 bolt \(#1\)](#). If the shift bar is not properly aligned with the shifter lever, the car may easily 'knick' reverse when going into second. The best way to align the shifter mechanism is to place the transmission into reverse gear. Then loosen the M8 bolt and pull the lever down into 1st gear. You need to hold the shifter bar steady with your hand while you pull the lever down into first. To do this, hold it through the access hole underneath the center cushion. Now place the shift lever all the way to the left (as if you were going into first) and then insert the front bar back into the bottom of the shifter lever by pushing up into reverse. This is much easier said than done, and may take a few tries. The good news is that after this alignment is complete, you shouldn't have any more problems related to a misaligned linkage.

Some people also install what is called a short-shift kit into their 914s. This will not solve any problems, and will in most cases make a poorly shifting car shift even worse. The reason for this is that the torque arm on the shift lever is much shorter, giving you much less 'resolution' on your shifter. It's similar to having a gas pedal that only travels 1 inch over its range instead of 2-3 inches. You would have less precision in how much throttle you wanted to give the car. In a similar manner, you will have less precision on where the shift rod is placed.



Figure 5:

Transmission & Motor Mounts

Another source of sloppy shifting is bad transmission and motor mounts. The motor and transmission assembly are

Transmission Mounts

mounted to the car with rubber mounts that isolate shocks and vibration. Very often, these mounts deteriorate with age, and shifting becomes difficult as a result. One symptom of this failure is that the shifter lever jerks when the car is accelerating. This means that the entire engine/tranny assembly is jumping around in the rear of your car. One method of testing to see if your transmission mounts are failing is to jack up the car underneath the tranny. Place a floor jack under the middle section of the transmission and begin to jack up the car. If the engine/tranny rises significantly without raising the chassis along with it, your tranny mounts are shot. They often look fine until they are removed. Then you can often see that they are completely cracked through.

The solution is to replace the tranny and/or engine mounts. There are lower cost alternatives to the 914 transmission mounts (see [Q&A Section](#)). 911 motor mounts (shown in [Figure 5](#)) can be used as a direct replacement. The process of replacing them is relatively easy. Just jack up the car, support the transmission, detach the bolts that hold the tranny to the car, lower the engine assembly slightly, and then remove the mounts. This failure is so common, that I have not seen a 914 recently that didn't have bad transmission mounts.

The engine mounts can be replaced in a similar manner. Simply support the engine, and then drop the engine mount bar. You can then easily remove and replace the engine mounts.



**Figure 6:
Shifter Linkage
Weld**

Linkage Weld Failure

Several 914 owners have had the rear shift rod piece break the small weld which holds an inner rod inside of the shift bar. This weld is shown in [Figure 6](#). It is located on the rear of the rear shift rod on the side-shifter transmissions. If the weld breaks, it can be easily rewelded back together. It is a good idea to check to make sure that the weld looks solid. It may be difficult to see though, as it is often covered by the dust boot that covers the rod.

Transmission Ears Failure

The 914 [transmission end covers](#) are often prone to breaking their ears off. These can be rewelded or simply

replaced with a good used one. If the ears break, you probably will not be able to shift too well, and you will notice immediately. This failure is caused by fatigue, and may be related to increased stress due to bad transmission mounts.

Other Checks and Improvements

Some other things to think about:

- Is your transmission fluid fresh, or 25 years old?
- Is there even transmission oil in there?
- Is the clutch adjusted properly (tech article coming soon)
- Is the clutch tube at the firewall broken?
- Is the clutch slipping