

FJRForum → FJR Motorcycle Forums → Technical Discussions



Fork Seal & Bushing Replacement

Started by FJRed, Sep 17 2011 11:26 AM

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FJRed

Posted 17 September 2011 - 11:26 AM

One of my fork seals crapped out during the NERDS ride this year and started leaking oil pretty bad. I tried the "film hook" trick to clean it out, but it didn't work, so I needed to replace the seals. Dean (DJB) was kind enough to loan me his fork seal driver tool which he had brought along to NERDS for possible use at Tech Day. Having this tool, I figured that was all I needed, so I ordered all the parts and proceeded to tear the forks apart. Some advice; If you are going to take your forks apart to replace the seals, don't try to cheap out and skip ordering new bushings. Even if your bushings are perfectly fine before you start, they will likely be wrecked by the time you get the forks apart and they're not that expensive. Order all three bushings for each side (lower, middle, and upper).



I had about 22K miles on the original bushings and the lowers were definitely showing signs of wear. The Teflon coating was completely worn off on one side down to the metal.



I didn't take any pictures of the disassembly process, but it goes like this.

Put the bike on the center stand and jack up the front so the wheel is slightly off the ground.

Take the front wheel and fender off the bike.

Loosen the upper pinch bolts that are holding the very top of the fork legs by the caps. Use a 24mm wrench and loosen the fork caps. Just break them loose, don't take the caps off at this point. If you take the forks off the bike before you loosen the caps, you'll have a bitch of a time holding the fork tubes while you try to loosen the caps. (ask me how I know this...) 🤔

Loosen the lower pinch bolts and slide the forks down and out of the triple clamps. Getting the lower pinch bolts loose can be somewhat challenging. I ended up using an allen bit on a 3/8" socket wrench handle with a piece of pipe on the handle for more leverage. It's very tight, but you can get them loose without tearing the front fairing off the bike.

Now that the forks are off the bike, back off the preload adjuster, rebound damping knob (at the top), and the compression damping adjustment screw (on the fork leg) until they are all the way out.

Unscrew the top cap from the fork tube. Don't worry, it's attached to the damper rod assembly inside the fork and won't go flying anywhere when you unscrew it from the fork tube.

Use a 17mm wrench on the preload adjuster and a 14mm wrench on the nut below the cap to loosen the nut and then unscrew the cap from the damper rod assembly.

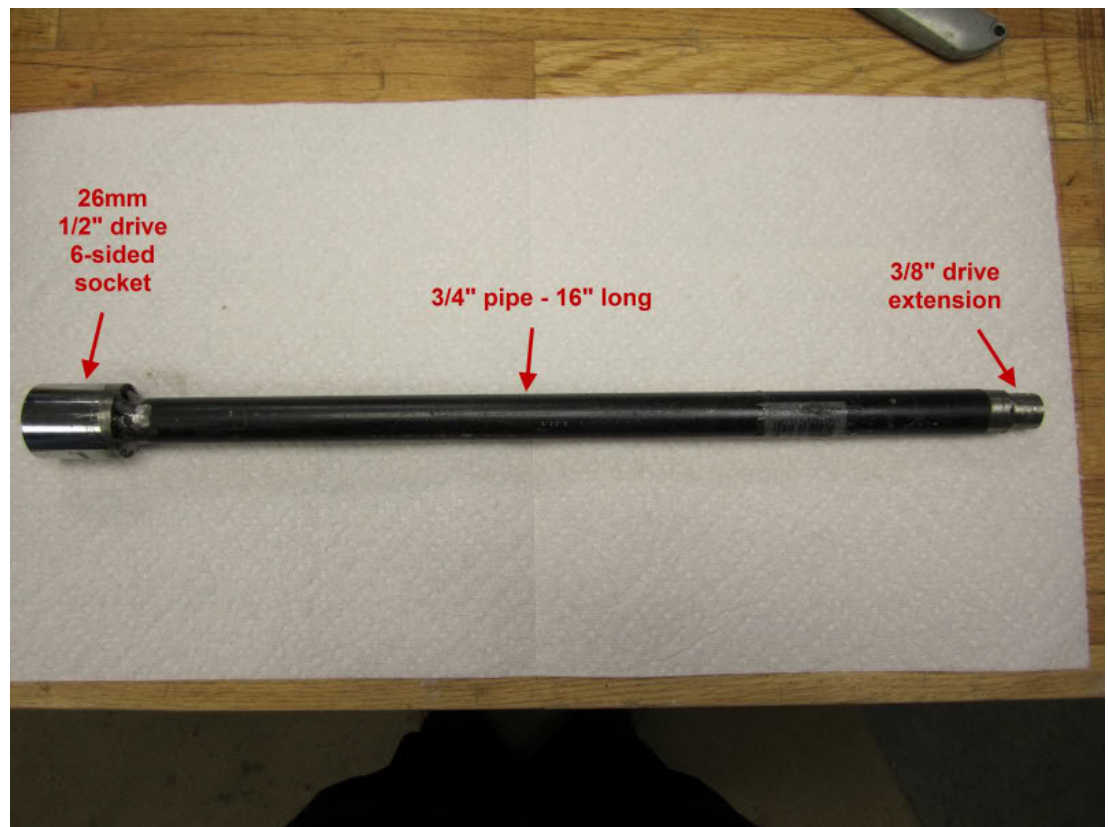
Carefully pull the long thin damper rod out of the damper assembly and set it aside where it won't get bent.

Remove the nut, spacer tube, washer, and spring from the fork tube.

Dump the old fork oil out into a drain pan. Pump the damper rod assembly several times to help get the oil out. It's best to let the forks sit upside down for a while to let the oil drain out completely.

The easiest way to get the damper rod assembly out of the lower fork leg is to use a 26mm, 1/2" drive, 6-sided socket welded to a piece of metal pipe. Using this tool to hold the top of the damper assembly, it's a simple matter of loosening the 8mm allen screw in the bottom of the fork leg and you'll be able to pull the whole assembly out the top of the tube. Make sure the aluminum cup at the bottom of the damper assembly comes out as well.

Here's a picture of the tool I made to hold the damper assembly. The pipe is 3/4" x 16" long. I welded a cheap 26mm 1/2" drive socket to one end and an old 3/8" extension to the other end so I could put a socket wrench on it.



Once you have all the guts out of the fork tube, the next step is to separate the upper tube from the lower fork leg.

Gently pry the dust cover off using a small screwdriver. It should come off fairly easily.

Use a very small screwdriver to pop the ring clip holding the oil seal in place out of its groove.

Now for the fun part... The Yamaha shop manual says you should fill the fork with oil, put the cap on and use a large press to force the oil seal out. Sounds like it would work, but I don't happen to have a large hydraulic press in my shop (yet). So, an alternative way to separate the tubes is to clamp the bottom of the lower fork leg in a vise (make sure to use some wood blocks or something to protect the aluminum from damage from the vise) and then just repeatedly attempt to forcibly slide the upper fork tube out of the fork leg. Each "whack" of the upper fork tube on the seal will bump it out slightly. It will probably take the first few slides to dislodge the middle bushing before you will actually have any effect on the oil seal. Don't get frustrated and give up if it doesn't come out right away. Keep at it and it eventually will pop out. Using this method will get the forks apart but will also most definitely trash the Teflon coating on the bushings so you will need to order new ones. You may find that the upper tube gets "stuck" when you try to slide it out. This is caused by the bushings sliding partially inside each other and wedging the tube inside the fork leg. Just gently tap on the top of the fork tube using a wood block and a rubber mallet to free the tube and try it again. I found that it seems to work better with smaller, shorter strokes, rather than big "as hard as you can" strokes.

Once you get the fork tubes separated, remove all of the loose bushings, washer, and seal from the tubes and clean everything out thoroughly. The washer will likely be slightly cone shaped from the force of the bushings slamming against it. It is supposed to be completely flat so you should use a new one when you put things back together.

Don't try to take the black plastic guard off of the top of the lower fork leg. You don't need to remove it and you'll likely mess it up trying to get it off.

Here's all the parts you'll need for a Gen-II (The Gen-I may have a different parts list)

(You'll need 2 of each)

4SV-23135-10-00 METAL, SLIDE 2 (Lower Bushing)

3P6-23135-00-00 METAL, SLIDE 2 (Middle Bushing)

4SV-23125-10-00 METAL, SLIDE 1 (Upper Bushing)

4SV-23115-00-00 GUIDE, COVER UPPER (Washer)

4SV-23145-01-00 OIL SEAL

4SV-23156-00-00 CLIP, OIL SEAL (Ring clip)

4SV-23144-00-00 SEAL, DUST (Dust seal)

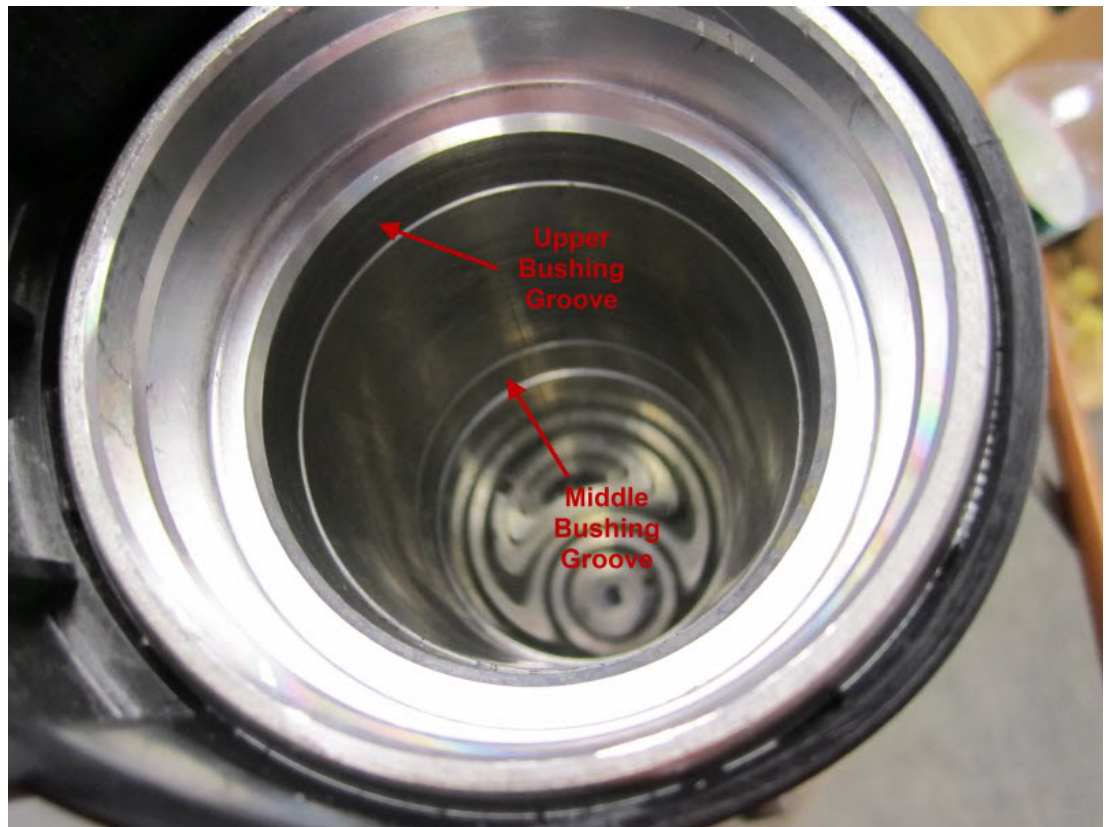
Total cost from CyclePartsWarehouse.com is \$58.10 (+shipping)

(You'll also need 2L of fork oil)



Once I had everything apart and cleaned up, I realized that I had no way to reseal the new middle bushing that lives about 4" down inside the lower fork leg. Because of the way the forks have to go back together, you need to be able to slide the middle bushing down between the upper tube and the lower fork leg and seat it in its groove. This is impossible unless you have the right tool. (which I didn't).

Looking down the fork leg you can see where the upper and middle bushings are seated. The lower bushing attaches to the bottom of the upper fork tube.



I figured that I needed a piece of relatively thin-walled metal tubing that was exactly the right diameter so that it would slide over the upper fork tube and inside the lower fork leg. Amazingly, I found the perfect sized tube at the local Advanced Auto Parts store for \$8.99. It's a chrome exhaust pipe tip.



Here's a closeup of the label.



The exhaust tip has a rounded end and screws to hold it on to the exhaust pipe that need to be cut off in order for it to slide in where it needs to go to seat the bushing. I marked the tube and carefully cut off both ends. The length is not critical. Just cut off enough to make it a straight smooth tube the whole way.



Here's the tube with the ends cut-off.



Make sure you're careful when you cut the ends off so that you have a straight end that's perpendicular to the tube (not at an angle). A straight end is important to make sure the bushing is seated correctly and not at an angle inside the fork leg. Take a file and some fine emery cloth to the cut-off ends so you don't have any burrs or sharp edges.



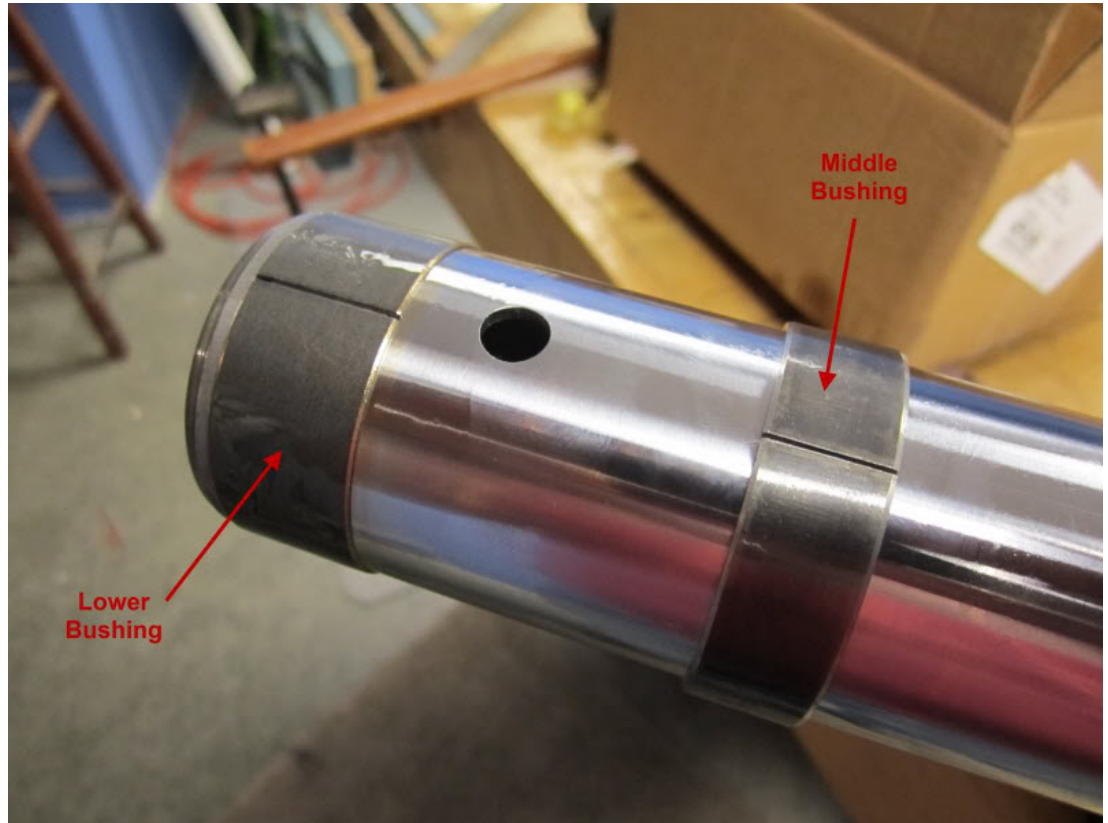
Before you start reassembling the forks, slide the exhaust tip down inside the lower fork leg until it rests on the top of the groove where the middle bushing will go and make a mark on the tube at the top of the fork leg. This mark will give you an idea of how far you have to push the bushing down into the fork leg until it's fully seated.



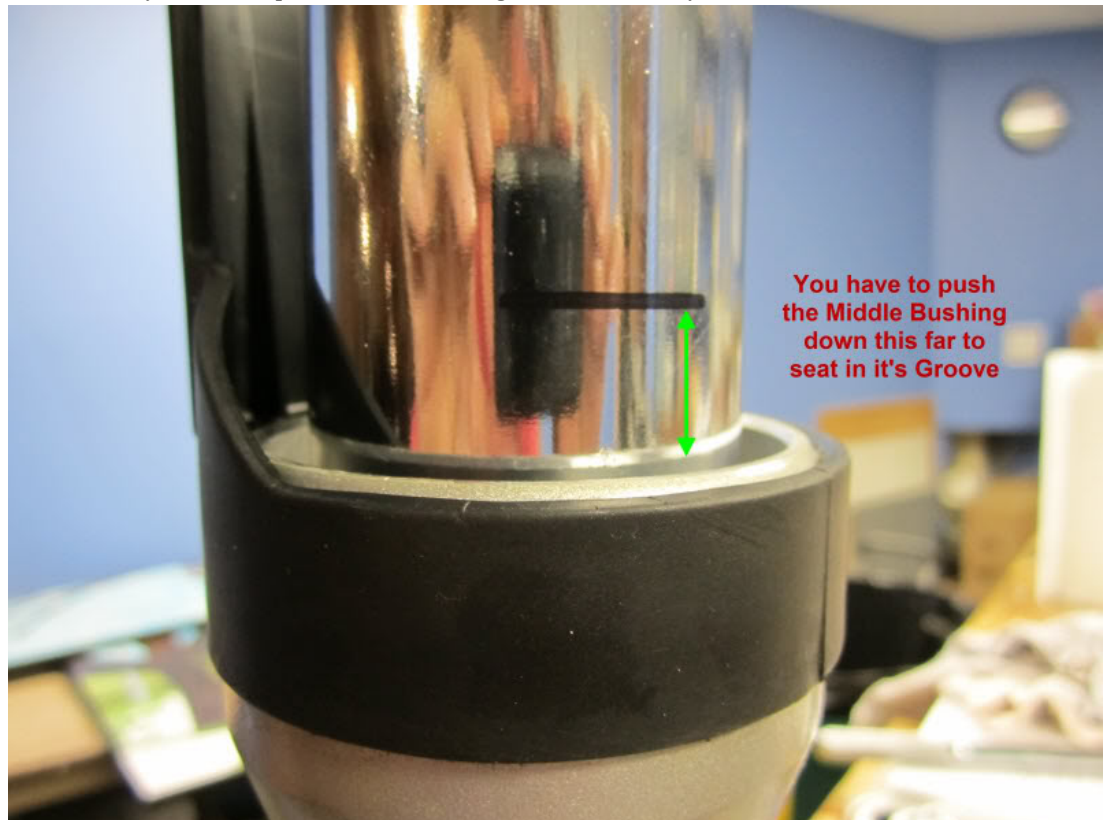
Make sure that the upper fork leg and the lower fork tube are completely clean before you put things back together. When I took mine apart, there was all kind of crud down in the bottom of the fork leg.

Slide the middle bushing onto the upper fork tube and install the lower bushing in the groove at the bottom. Lube

everything up with fork oil.

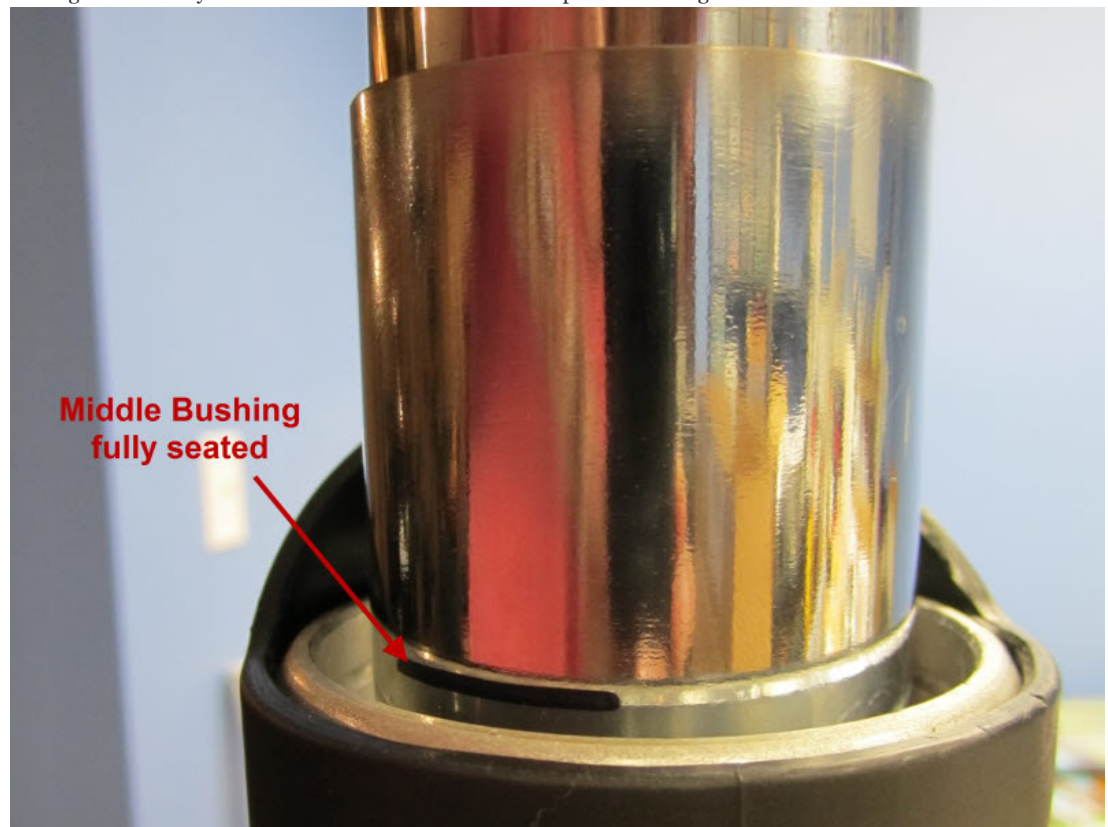


Carefully slide the upper tube into the lower fork leg and let the middle bushing slide down until it hits the top of its groove. Slide the exhaust tip down over the upper tube and inside the lower fork leg until it's resting on top of the middle bushing. You'll see that the mark you made on the tube earlier is now about $\frac{3}{4}$ " above the top of the fork leg. That's how far you'll need to push the middle bushing down until it is fully seated.



On one of my fork legs, I was able to just use the exhaust tip to push the bushing down into place. I just slid the exhaust tip tube up and down and used the weight of the tip itself to tap the bushing into place. You can tell when it's

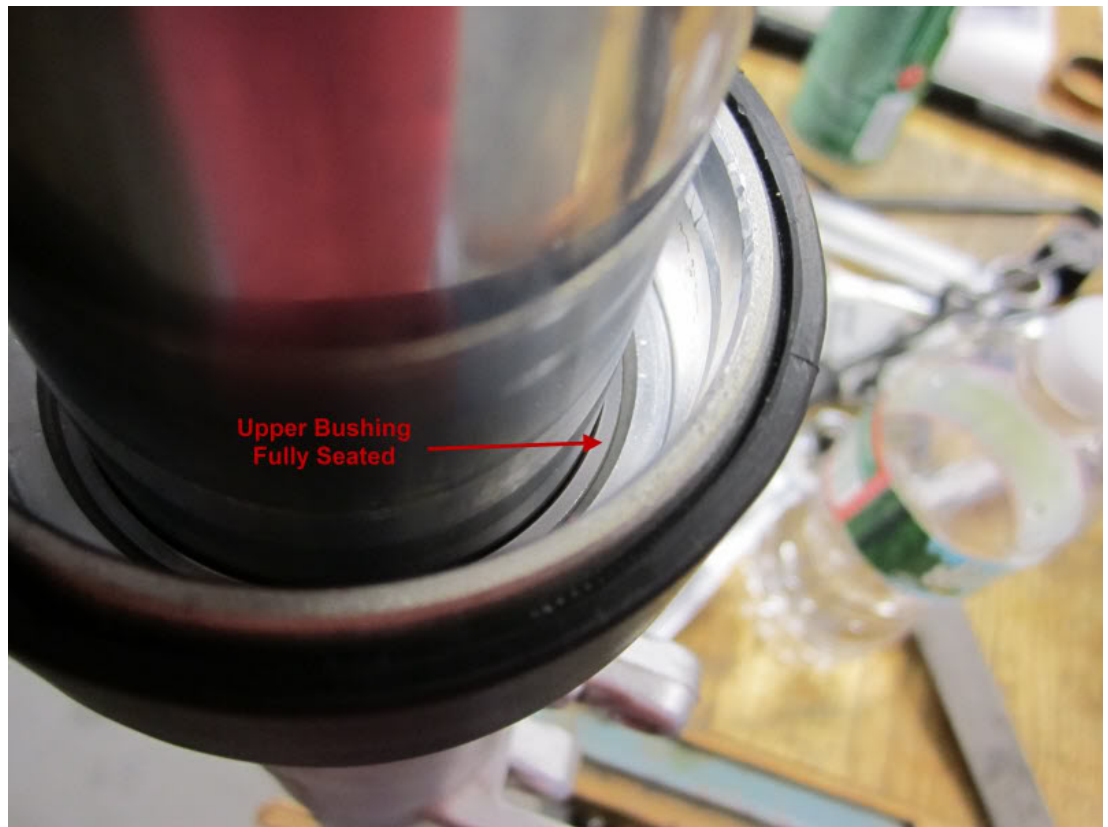
fully seated by the sound it makes when you tap it and it's against the bottom of the groove. You can also tell by looking at the mark you made. It should be level with the top of the fork leg.



The other fork leg wasn't quite as cooperative and needed a little "encouragement" to fully seat the bushing. I used the old metal washer from below the fork seal and a piece of 2" PVC pipe slightly longer than the upper fork tube along with some gentle taps from a rubber mallet to push the bushing down into place.



Once you have the middle bushing seated, the rest is easy. Slide the upper bushing down over the fork tube and press it down into its groove using the exhaust tip. Make sure it's all the way down. It should look like this.



Next, put the washer in.



Next is the oil seal. Be sure to lube up both the inside lip of the oil seal and the outside of the upper fork tube with plenty of fork oil. CAREFULLY work the oil seal over the top edge of the upper fork tube and then slowly slide it down the tube to the lower fork leg. The inner lip of the oil seal can be easily damaged so take your time.



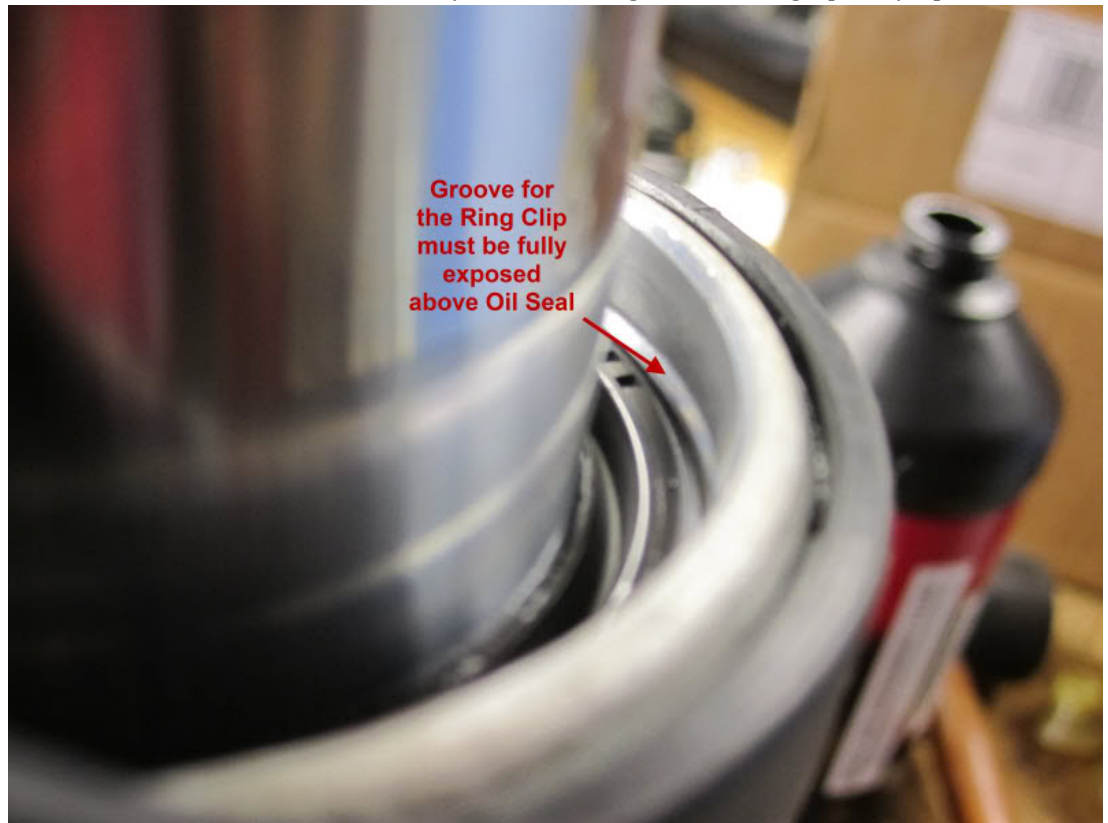
This is where the fork seal installation tool comes in handy. It makes easy work of pushing the seal down into place in the lower fork leg.



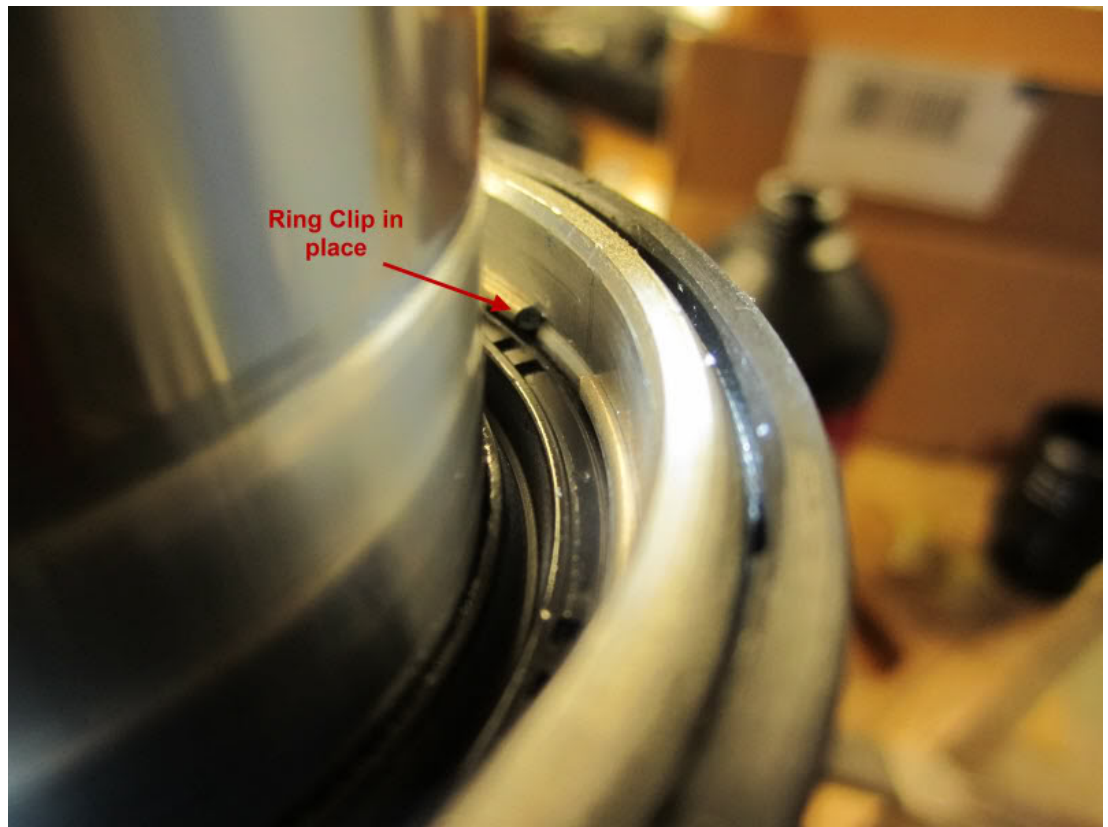
If you don't happen to have an actual fork seal installation tool, you can substitute a piece of 2" PVC pipe. It works nearly as well for pushing the oil seal into place.



You need to make sure that the seal is all the way down so that the groove for the ring clip is fully exposed.



Next, install the ring clip in the groove to hold the oil seal in place. Make sure it's fully in the groove all the way around.



The last thing to install is the dust seal. I was able to push these into place just by using my fingers. They should slide in fairly easily.



Now that the seals are all done, the rest is pretty straight forward. Put the aluminum cup on the bottom of the damper assembly and use the "socket on the pipe" tool to carefully slide the damper assembly all the way into the fork tube until it bottoms out. It's much easier to do this if you have the forks sideways rather than up-and-down. Put some locktite on the bottom 8mm allen bolt and start threading it into the damper assembly. Slide the upper fork

tube in and out a little to make sure everything is lined up correctly and then tighten the allen bolt using a torque wrench to 25 ft/lbs.

Fill the forks with the correct amount of oil. Make sure you pump the damper rod multiple times to get all of the air bubbles out so the oil level can be correctly measured. The oil you use and the level you set it at are suspension tuning adjustments that will likely differ from person to person so I'm not going to tell you what to do here. There are numerous other threads on the forum that talk about suspension adjustments that you should refer to if you're not sure. Or you could just ask our resident suspension expert, Jeff Ashe. He worked his magic on the valves and springs in my forks and I must say, they are way, way, way, better than the stock setup now. I highly recommend his "HaulinAshe" fork upgrade. 🙌

Install the spring, washer, spacer tube, and nut. For now, just screw the nut on as far as it will go by hand.

Slide the long thin damper control rod inside the damper assembly and then screw the cap on to the top of the damper. Screw the cap on until it bottoms out. Just finger tight, don't force it. Then turn the nut back up into the cap and use a wrench to tighten it against the cap.

Slide the upper tube up and screw the cap on. Don't bother trying to tighten the cap yet. Just screw it all the way on by hand. Re-install the forks on the bike. Tighten the lower pinch bolts to hold the fork tubes, tighten the cap using a 24mm wrench, and then tighten the upper pinch bolts.

Put the front wheel and fender back on, re-adjust the pre-load, compression, and rebound settings back to where you had them and go ridin'.

Ed.

escapefjrtist

Posted 17 September 2011 - 11:40 AM

Nice write up and pics Ed! Looks like it's time for me to make up a couple *special* tools.

Thanks for taking time to document the project! 😊

--G

Bustanut joker

Posted 17 September 2011 - 11:56 AM

Great write up Ed! We've been scratching our heads trying to find a piece of pipe like that exhaust tip you used..

Next month's tech weekend's biggest problem is now solved. 🙌🔧

Thanks!

RossKean

Posted 17 September 2011 - 12:18 PM

An exceptional pictorial "how-to"! Thanks, Ed.

May be a winter works project for me. No leaks or other issues but with over 50,000 miles, the bushings and seals are about due for replacement. Did the fork oil this season and the oil was UGLY. All the crap has to come from something that is wearing!

Ross

o8FJR4ME

Posted 17 September 2011 - 01:06 PM

Excellent write up and thanks muchly, 🙌🔧

Overdue and hope to accomplish this task after returning from EOM. Praying for no problems while attending the meet.

Thanks

Dave

Stephen

Posted 17 September 2011 - 01:47 PM

Thank you for your time & explanations. Great job!

ahchiu

Posted 17 September 2011 - 02:34 PM

Great writeup and great pictures, we need to get some special tools for our PNW tech meet.

SilverStag

Posted 17 September 2011 - 07:45 PM

Appreciate the detailed explanation and pics.....Thank You

hppants

Posted 18 September 2011 - 05:17 PM

This is very helpful - thanks for taking the time to write this up. Couple of questions for the group:

1. Can anyone confirm that the forks on the Gen I are the same as the Gen II?
2. I don't have easy access to a welder. I do have a 26mm 1/2 drive socket, and a 3/8 (female) to 1/2" (male) adapter. Couldn't I just use a very long (16" or longer) 3/8" extension to accomplish the same thing? Or am I missing something.
3. The 2" PVC seal driver is something I'm familiar with - can you tell me if you used schedule 40 (thin wall) or 80 for your driver?
4. Are any of the bushings indexed? I couldn't see if there was a groove or indexing pin to be concerned with.

(and I know I'm going to get slammed for this one)

Which brand of fork oil is the consensus for the FJR? It would appear that stock is 10W - please confirm.

Thanks again - your photographs are really high quality.

RossKean

Posted 18 September 2011 - 07:30 PM

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No complete answers but I can confirm that the Gen I forks are quite different. Two bushings instead of three and the Gen I is easier to service (so I am told). Don't want to start anything that will get this sent to NEPRT so do a search on fork oil and be prepared to spend an hour reading (I used Bel-ray 5wt).

Ross

Posted 23 September 2011 - 09:23 PM

WTF FJRed? How many miles you got on that thing? So with all the other things we have to service, now we have to rebuild the forks every 3-4 year? I don't have time for this crap. 🙄

GP

FJRGuy

Posted 23 September 2011 - 09:54 PM

Friggin Awesome! I've noticed a little leakage on my forks and was thinking i'd had to have this done this winter. If I don't get a GP Suspension upgrade, I may just tackle this myself! 🌟🔧🌟

FJRed

Posted 26 September 2011 - 06:30 PM

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Thanks again - your photographs are really high quality.

You can't just use a long extension on the socket. The nut that you need to get the socket on is in the middle of the damper assembly. The 1/2" drive and the 3/4" pipe are important to allow enough room for the upper part of the damper assembly to slide inside the socket and up into the pipe so the socket can reach the nut. I would try to find a local mechanic or garage that has a welder and pay them a few bucks to weld the socket on to the pipe for you. An alternative method I've heard about to break the bottom allen bolt loose is to use an air wrench on the bolt while the forks are still together so that the internal spring pressure holds the damper assembly while you loosen the bolt. I can't vouch for how well this method works, since I've never tried it.

I used schedule 40 PVC for the seal driver I made.

The bushings are not indexed. The orientation of the bushings inside the fork tube doesn't matter. Just make sure you don't mix up the upper and middle bushings. (The upper one is thicker)

Ed.

Bustanut joker

Posted 26 September 2011 - 07:48 PM

The impact works fine Ed (or was that Fred?) I was in a quandary doing mine and said "Biker Geek it!" and did just that. No problems.

As re-assembly was done using the same technique I'm sure I might suffer harm as the bolts weren't torqued to spec.. 😊

hppants

Posted 28 September 2011 - 06:57 PM

Thank you for this info. Further research has confirmed tha the Gen I forks only have 2 bushings in each side. But it looks like the concept for disassembly and re-assembly is the same and I am going to try it when the I return from my trip next month.

Also, I would imagine the Gen I lower fork has the same "nut" like device on the inside requiring the same special welded tool? I have a welder friend and can make the tool without any trouble.

Good info on this thread.

spike747

Posted 29 September 2011 - 08:29 PM

Great write up. I have this exact problem at home right now. I'll be heading over to the local muffler shop to find the right diameter piece. My bottom bushing looked completed stripped of teflon. I thought maybe it just wore off, but the separating of the stanchion tubes must have tore the teflon off.

Thanks again.

Roadstar

Posted 02 October 2011 - 06:28 PM

Boy i`m so glad you did this write up at the perfect time (as riding time is getting closer to the end of the year here in PA) After going over my bike (i do this every other week & tire pressure every week) i noticed on the left fork some oil film 😊 then i look at the right and more oil film 😊 (more than the left). So it looks like i`m going to have to rip apart the front end & rebuild the both forks & might as well put some better springs in it also. Maybe i`ll try this first , to get me to the end of the season <http://www.sealmate....structions.html> (<http://www.sealmate.net/instructions.html>)

FJRGuy

Posted 03 October 2011 - 12:03 PM

Also, I would imagine the Gen I lower fork has the same "nut" like device on the inside requiring the same special welded tool?

Mr. FJR and I changed out the fork seal on his '05 yesterday. The special welded tool is of no value on Gen 1 forks (at least not his Gen 1.) The 26mm nut that is used in the assembly of the damping assembly is covered by a flange on the top. (maybe I'll post a pic when I get a chance.) We were able to remove, and later re-install, the lower cap screw by using the spring force to hold the internal damper assy.

dcarver

Posted 03 October 2011 - 01:21 PM

Excellent, thanks for taking time to document the process. I've pinned this page in my mechanical section..

hppants

Posted 03 October 2011 - 09:44 PM

We were able to remove, and later re-install, the lower cap screw by using the spring force to hold the internal damper assy.

Excellent information - thanks again.