Futura Fork Servicing.

This page will discuss the process for servicing the forks on an Aprilia Futura. For the most part, I have followed the steps in the service manual and included pictures.

First, removed the forks from the bike. This process will involve removing the brake callipers, front wheel, front fender, and the handlebars.

Some notes: I use a soft-jawed vice to protect the forks. I will remove only one fork at a time. When installing the fork, I use the axle to ensure that I get the height correct. When the forks are aligned up and and down, the axle will slide through the forks and twist easily.

Tools needed:

- 14mm wrench
- 17mm wrench
- 22mm wrench
- 32mm wrench
- small screwdriver
- 43mm fork seal driver
- fork compressor - There are ways to get around this requirement, but I have found a fork compressor makes the job go easier. Here is some information on the fork compressor I use.

Torque specs:

- Top cap to damping cylinder - 35 Nm/3.5 kgm
- Top cap to slider - 35 Nm/3.5 kgm

Here are the steps along with pictures to help define what is going on. Before you disassemble the forks you should note the settings on the preload adjustor and the damper. You will need these later when you assemble the forks.

1. Clamp the fork in a vice.
2. Turn the damping screw all the way counter-clockwise.
3. Remove the retaining ring at the top of the fork. Note: You may need to tighten the preload adjuster to see the clip.

4. Unscrew the preload adjuster and remove it.

5. Remove the preloading ring.

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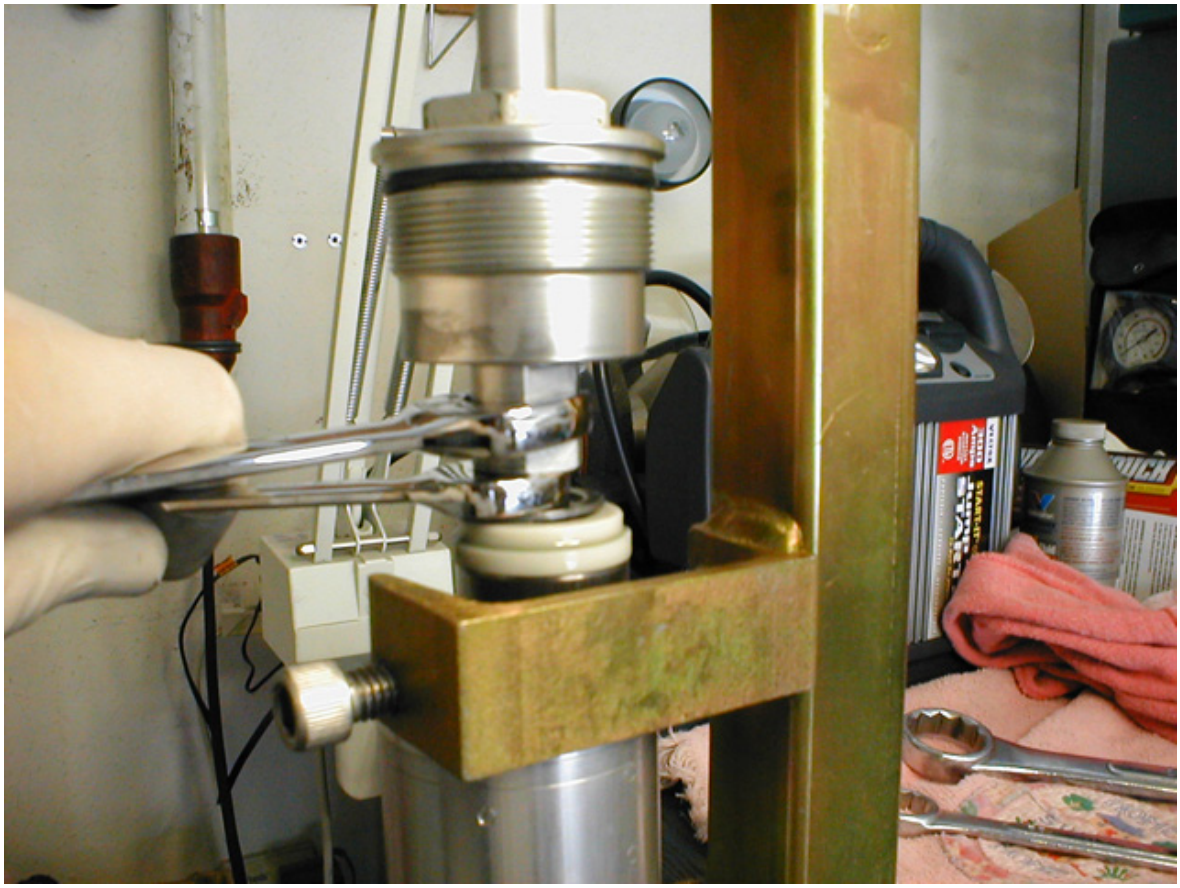
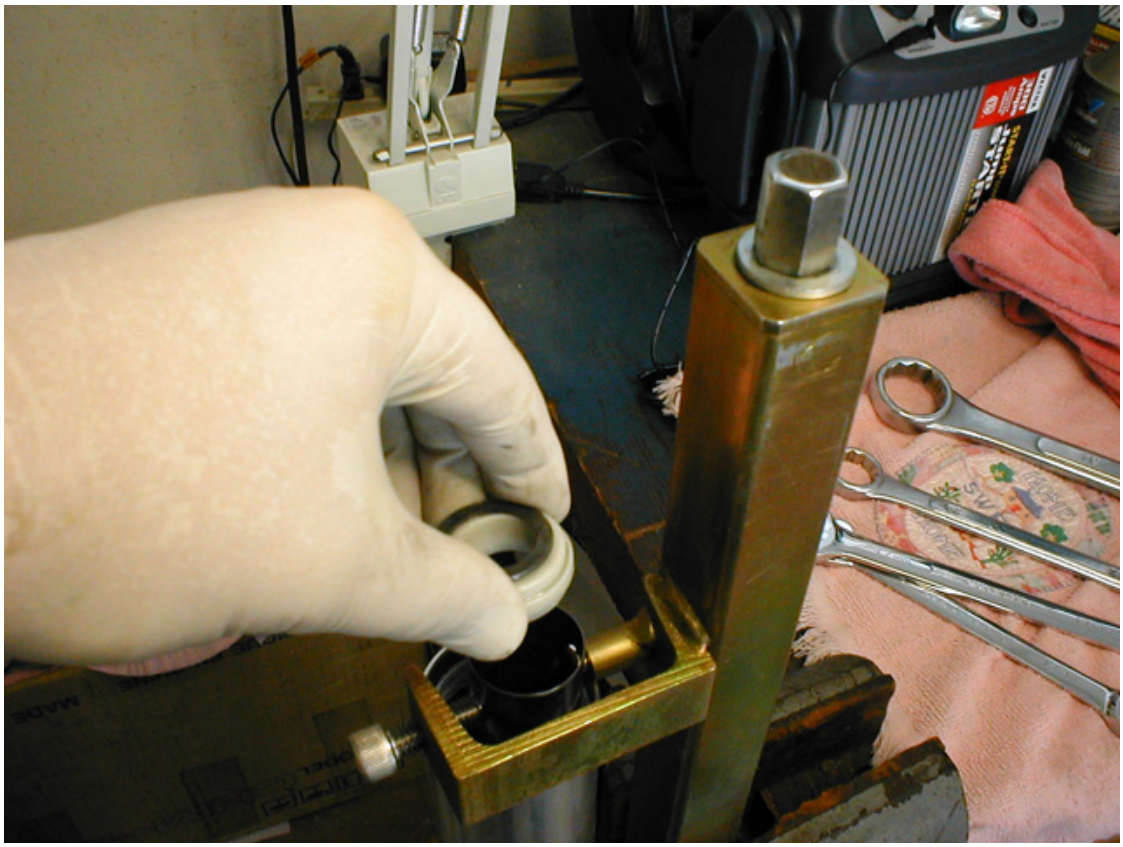
- Unscrew the top cap.

- Next, install the fork in a fork spring compressor and compress the spring so that you can loosen the top cap from the damping cylinder.



- Remove the top cap.

- Remove the slide bushing and washer.
- 
- Remove the fork from the fork compressor and remove the spacer tube.

- Remove the spring.

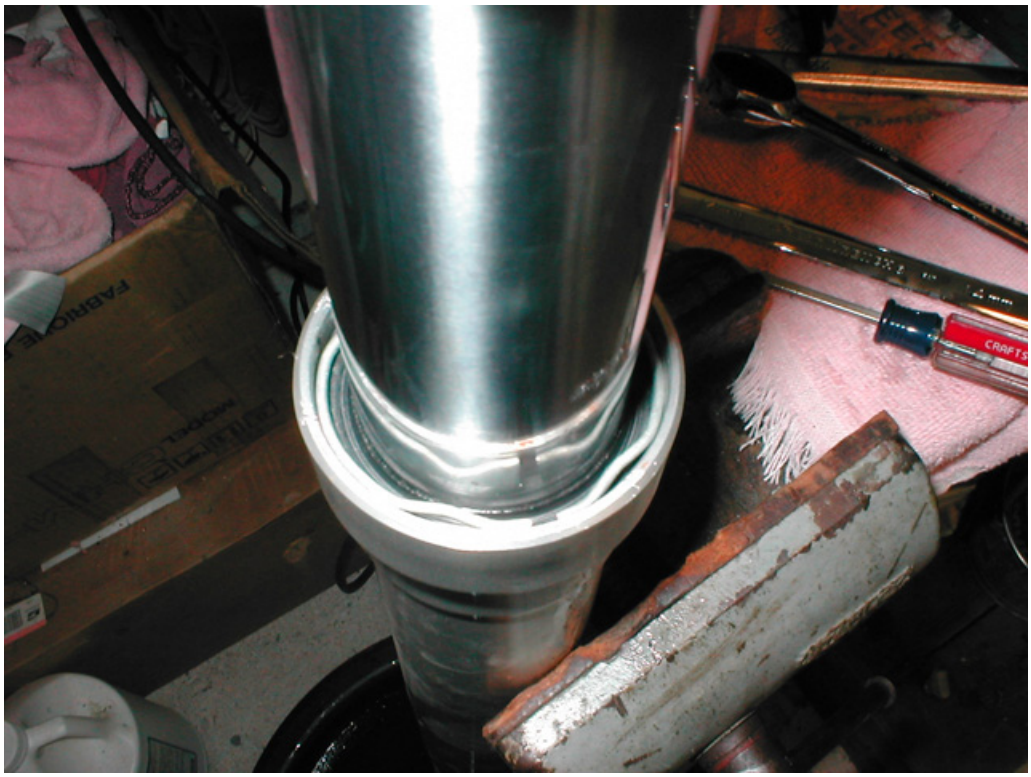
- At this point drain the oil into a container. While draining, the spring washer and bottom collar will probably fall out. Don't worry! Just set them aside. Also, pumping the damping cylinder up and down will help the oil drain.

Here is a picture of the washer.

- And here is a picture of the collar.

- Now we will begin the process of separating the tubes. First, pry the dust seal loose.

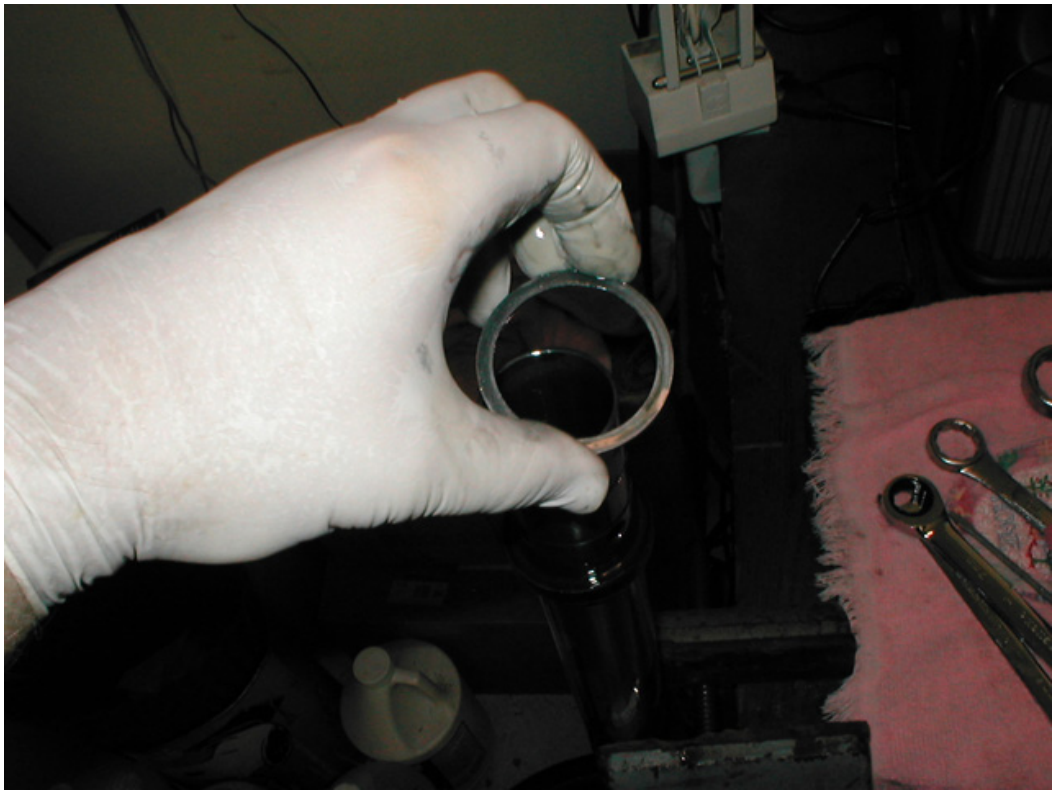
- Now remove the retaining ring.



- Now, separate the stanchion from the slider. I perform this task by mounting one part of the fork in a vice and then pulling, like with a slide hammer, on the other part until the fork seal pulls loose and the tubes separate.

- Using a screwdriver, carefully pry the ends of the slide bushing apart and remove it from the stanchion.

- Remove the guide bushing, stop ring, and seal.



I do not usually remove the damping cylinder when I service the forks, but if you would like to it can be taken out by removing the hex head bolt located on the bottom of the fork.

Clean all the parts and inspect them. If either of the bushings show copper colour through the Teflon or have any scratches, bare spots or pits, replace both of the bushings. As a rule, I replace the seals anytime they are removed.

Specs:

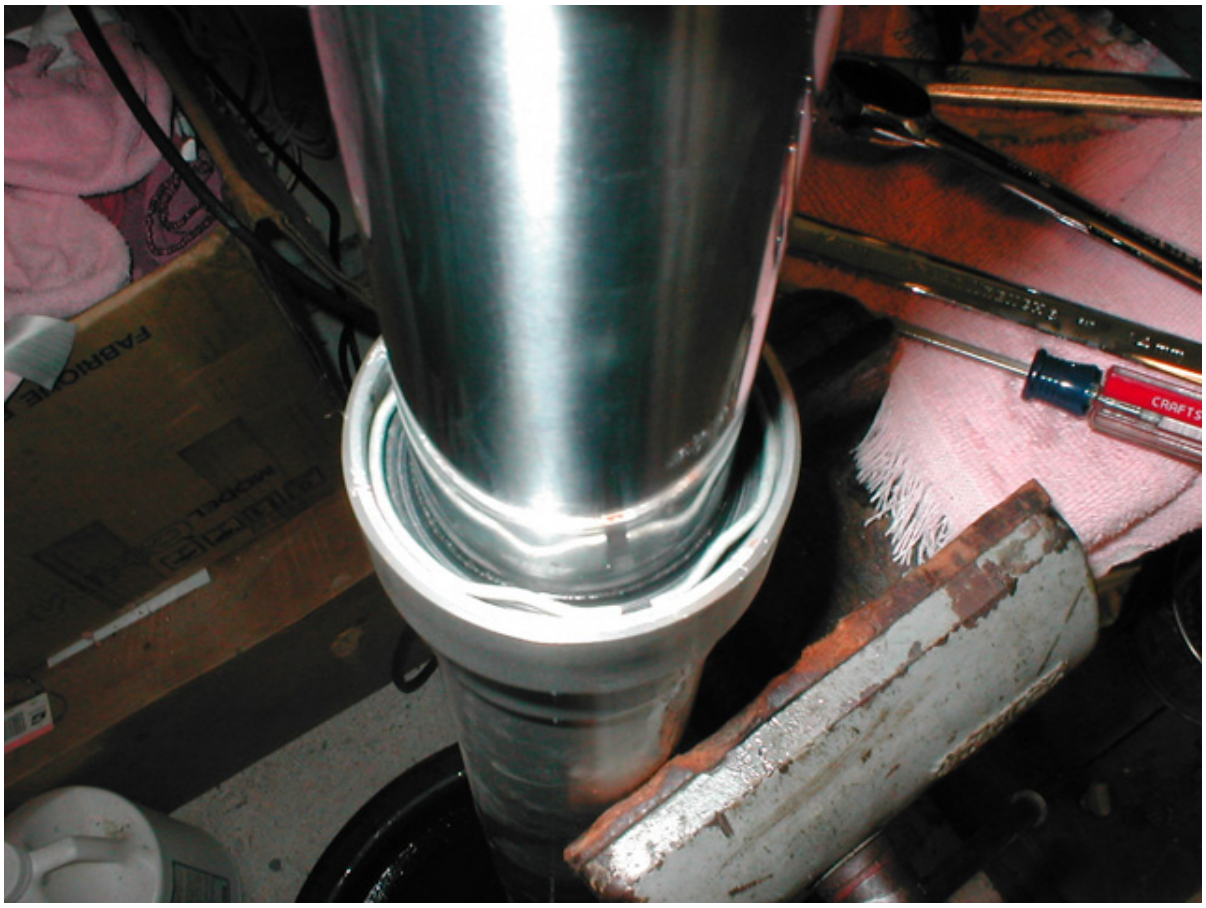
- Minimum spring length is 284mm.
- Runout for the stanchion tube is .2mm.

Assembly is basically the reverse of disassembly. You will need some sort of a fork seal driver to seat the seal in the slider. My page on Generic Fork Seal Replacement has some comments on different types of drivers and how you could make one.

Now for the assembly instructions. I will only provide photos for steps that are significantly different from disassembly. You can refer to the disassembly photos for details where I do not have a photo.

1. Install the damping cylinder into the stanchion if it was removed earlier.
2. Place some tape over the sharp edges where the slide bushing sits. The tape will prevent the shape edges from damaging the seal when it is installed. I use black electrical tape since the go left behind is fairly easy to clean up.

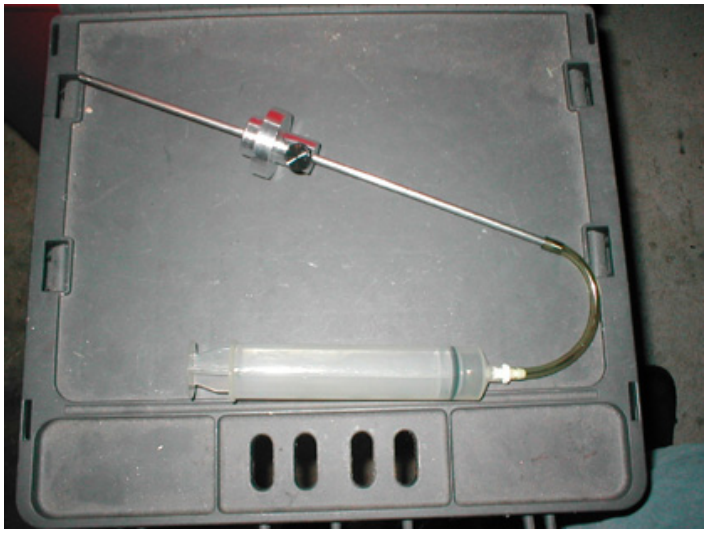
- Put some fork oil on the seal wiper and slide the fork seal onto the stanchion. Optionally, you can use seal grease available from places like Race Tech.
- Put the stop ring onto the stanchion tube.
- Put the guide bushing onto the stanchion tube.
- Remove the tape installed earlier on the stanchion tube.
- Slide the slide bushing into place on the stanchion tube.
- Place the stanchion tube into the slider.
- Use a fork seal driver to install the fork seal into the slider. The seal must go in far enough to allow installation of the retaining ring.



- Slide the dust seal into place. It can be installed by pressing it into place with your fingers. No need to hammer on this part!

- Mount the fork upright in a vice and add oil. The service manual calls for 520 cu cm plus or minus 2.5 cu cm. optionally, you can set the oil height by fully compressing the fork and setting the oil level so that it is 118 mm, plus or minus 2 mm, from the top of the slider.

I use the tool pictured below to set the oil level. Similar tools are available from companies like Race Tech and Progressive Suspension.



Note: Before setting the fork oil level, be sure to bleed the damper by pulling it up and down until all the trapped air is released. Bleed tools are available for doing this, but a long pair of needle nose or similar pliers will work just as well. All you are doing is moving the damper up and down until the air is removed from the damper. For those interested, here is a picture of my bleed tool attached to the damper. The brass tool is the bleeder. It simply screws onto the damper and has holes drilled in it which allow the air to escape.

- Install, in this order, the bottom collar, bottom spring washer, spring, spacer tube, slide bushing and its washer.
- Place the fork into a fork compressor and compress the spring enough to be able to attach the top cap.
- Attach the top cap to the damping cylinder. Note: You can change the amount of adjustment that the damper has by changing how far you screw the top cap onto the damping cylinder. I found out the hard way that it is possible to have only 1/2 a turn of adjustment on the damper if you screw it on too far.
- Remove the fork from the fork spring compressor and tighten the top cap.
- Install the spring preloading ring.
- Install the preload adjustor and screw it in far enough to be able to install the retaining ring.
- Install the retaining ring.
- Set the preload and damping to where they should be.
- Install the fork onto the bike! :)

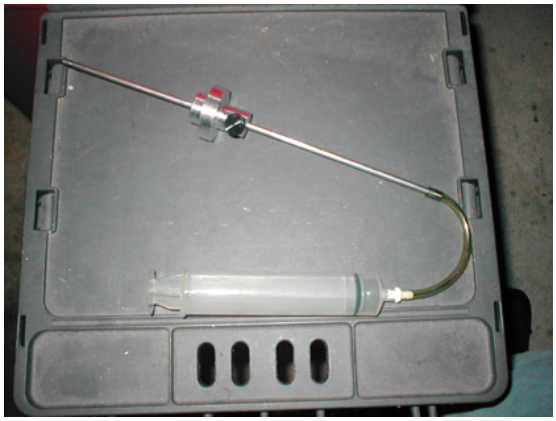
Generic Fork Seal Replacement.

The procedures for replacing fork seals is similar for many bikes. If you have right side up forks with a simple, non-adjustable damping mechanism, which most less expensive bikes do, then follow this link for a good description on how to replace the seals. The only significant difference between most bikes is how you remove the forks from the triple clamps.

The only real problem I have run into while disassembling the forks is removing the bolt that holds on the damper. What can happen is that the damper will simply spin inside the fork while you try to loosen the bolt that holds it on. To combat this issue, I took a broomstick handle and whittled one end down to a point. I then drive the broomhandle into the damper and use it to prevent the damper from spinning.

One other tip. If the service manual provides the height of the oil in the fork tube as a measurement, as opposed to simply adding in so many cc's of oil, then use the measurement. The measurement method is much more accurate than simply adding some quantity of oil. Depending on how far you disassemble the fork while servicing it, you may not get all the old oil out of the fork and this will cause the oil height to potentially be different between the forks. The oil height difference can cause handling issues.

The tool pictured below is the one I use for setting the fork oil height. The metal tube has a slide that you adjust to the fork oil height indicated in the service manual. Then you slightly overfill the fork and suck out the excess. Using a tool like this ensures that the oil height will be identical in both forks.



Another question I run into from time to time is whether or not the expensive seal drivers are really required. The answer is a qualified "No." If you can afford a seal driver it makes the process a bit easier.

If you are a cheap Scot like myself, you can find a hollow round object, such as PVC pipe. that is the same diameter as the fork tube and use it to drive the seal into place. Split the pipe in half and then use hose clamps to hold the two pieces together. Ensure that the part of the tool that will touch the fork seal is flat and that it does not have any sharp edges that could damage the seal.

These pictures compare a Motion Pro fork seal driver to a PVC one I used on my Kawasaki Concours.

The Motion Pro driver is very heavy and is simply slid up the tube and then down onto the seal to drive the seal into place. For the PVC driver it is necessary to tap it with a hammer to drive the seal in. While tapping the PVC driver, it is important not to strike the fork tube.

This aluminium fork seal driver is a much less expensive alternative to the Motion Pro model. Its disadvantage is that it is very light and you must use a hammer to help drive the seal into place. In terms of both price and function, this makes it a cross between the PVC driver and the Motion Pro one.

If you have upside down forks or regular forks with external damper adjustments you should consult the service manual for your bike for specific instructions.

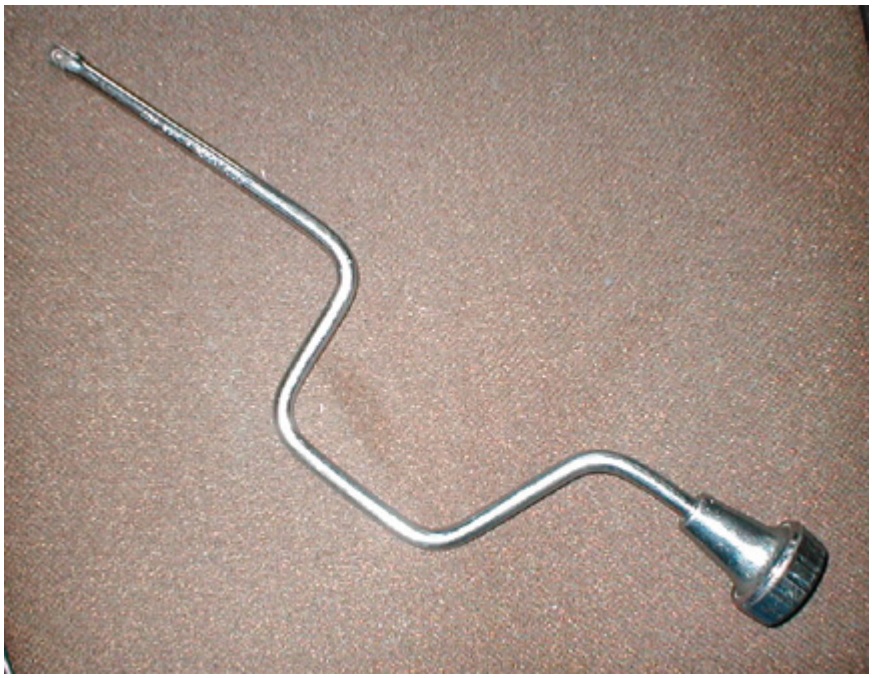
Tools

Harbor Freights Tire Changer - I won't say that this is the cat's meow but for the price it's a darn good tool. It's much easier than using tire spoons! I purchased this one for $80 from Harbor Freight. There are actually two parts that make it up. First is a base unit that is used for changing automotive tires. The base unit includes the bead breaker and and the long lever for prying the tire on/off. The second piece is the motorcycle tire attachment. It sits on top of the base unit.

Here are a few pictures of the tire changer in use so that you have a better idea of how it works.

Here is the tire changers manual in PDF format.

Speed Wrench - I recommend using a speed wrench when installing fork caps on most bikes. But, the models out today are not as easy to use as some older models. Below is a picture of one that I have had for a number of years and really like. It's an older Craftsman tool. Having the wide handle to push on provides lots of leverage when compressing the fork spring.



Marc Parnes Tire Balancer - I recently found a static type tire balancer that has adapters for the Aprilia Futura. I played with it and it seems to be accurate to about 1/8th of an ounce. When I was balancing my rear wheel I found that 1/4 (or 2/8's) of an ounce was not enough but 1/2 (or 4/8's) ounce was too much. Splitting a 1/4 ounce weight in half so that I could add 3/8's of an ounce balanced the wheel nicely. That is accurate enough for me! The balancer is designed to be used with some sort of prop to hold it. You can see from the pictures below that I use

automotive jack stands. The other picture shows all the parts that come with the Futura version of the balancer. With the cones provided you can balance both the front and rear wheels. In fact, with the provided cones you can balance pretty much any wheel that does not require special adapters. You can order the balancer from MarkParnes.com or RL Motorcycles. Here are some pictures showing the Futura's rear wheel setup in the balancer.

Fork Spring Compressor - A fork spring compressor is not 100% necessary, but it can be a very helpful tool when disassembling upside down forks. This is a reasonably priced unit available from Race Tech.

Other

Some motorcycle related books that I own and what they cover.

Clothing. Here is a list of some of the things I have learned and what I look for.

Here is a great collection of articles describing how to setup your suspension.

Some basic thoughts on adjusting suspension that I put together.

Fork seal replacement is similar between many different types of motorcycles. The previous link has a few thoughts on the process. In the Kawasaki section I have some more detailed notes on how to replace the seals on a Concours.

Tomahawk Tires - I am not usually one to make negative comments about products, but I feel rather strongly about a product that I tried in November 2004. I was looking for inexpensive tires that would hold me for about a year. Dresser Tire & Rubber Co. sells Tomahawk remanufactured tires in the U.S. for about half the price of similar new tires so I figured I would try them and ordered a set of the T3's.

My first thoughts were that the tires made the bike more difficult to steer. The steering initially required quite a bit of handle bar pressure to initiate a turn. Then it would suddenly tip into the turn very quickly. This behaviour was caused by the shape of the tread area. Instead of being triangular or rounded like most tires, the T3's profile was more square. As far as dry traction was concerned, the Tomahawk T3 tires seemed to have about the same amount as the Metzler Z6's I had been using.

The real issue that I had with the tires came the first time I used them on wet roads. There are not any words that can describe the fear I felt during my 20 minute ride to work that day. Both the front and rear wheels slid sideways through every turn. While riding in a strait line, I could spin up the rear wheel by simply cracking open the throttle, and forget braking. The tires simply had almost no traction in the wet. The feeling was very similar to driving on wet clay or mud. I do not know if the issue was caused by a problem with the rubber compound they used or something else, but it was serious enough that I removed the tires that night and put some worn out Metzlers back on.

I sent the tires back to Dresser the next day and, to their credit, I was provided a full refund. If you are looking for an inexpensive tire for use on dry roads or track days, it would not hurt to try the Tomahawk tires. However, if you are looking for a tire that can be used in all weather conditions, I suggest avoiding them unless Dresser can pin down what caused the set of tires I used to be so slick in the wet.

On a lighter side, here are some, mostly, motorcycle related videos and pictures I've collected over the years. Watch at your own risk!

Suspension adjustments.

Oh, man. That's a wide open topic! There are a number of books on the topic that I'd recommend but no single one really covers everything fully. The three I refer to the most are:

- How and Why: Motorcycle Design and Technology by Gaetano Cocco.
- Sportbike Performance Handbook by Keven Cameron.
- Motorcycle Tuning (Chassis) 2nd edition by John Robinson.

Some of these are out of print but you might find them if you look around.

To begin, make sure that the sag is set correctly for you. What is sag? Sag is the distance the bike's suspension compresses with you on the bike.

The sag is normally set so that the suspension is compressed about 20-30% of its total travel with you on the bike. This takes a couple of people (at least!) to do. There are a mess of articles on the internet on how to set the sag but here's a summary of the steps.

1. Jack up the front of the bike so that the front wheel is just touching the floor and measure from the floor to a fixed point on the front suspension. The bottom triple clamp, the bottom of the outer fork tube, or something like that will work nicely. This is the extended suspension measurement.
2. Now, have a buddy support the bike while you sit on it in your normal riding position. Measure from the floor to the fixed point again. Subtract the two and you'll know your sag.
3. If the bike is sinking down too much increase preload. If it is sitting too high remove some preload.
4. Repeat 1-3 until the sag is correct for you.

Then do the same with the rear suspension. Measure from the floor to a fixed point. The bottom of the seat or one of the mounting points for the saddle bags will work nicely.

Damping settings change how the suspension uses up the energy that a spring gets as it is compressed/extended. Without damping the spring would just keep going up and down like cars you see with worn out shocks. If you increase the damping the springs movement will be slowed more quickly. If you decrease it the spring will move/bounce more.

There are a number of ways to use damping to your advantage but that's another whole discussion. Not to mention the fact that suspension adjustment is still somewhat a black art since a setup that works wonderfully for one person probably won't feel right for someone else of the same weight and build. It's all in the riding style.

Moving the forks up/down. This changes the geometry of the front end. In a nut shell, if you raise the forks in the triple clamps you decrease the rake and trail. This makes the bike steer easier. But, it also reduces the bikes stability (hence it's easier to steer!). It also reduces your ground clearance somewhat.

Lowering the forks in the triple clamps increases the bikes rake and trail. This makes the bike more stable and the steering a bit harder.

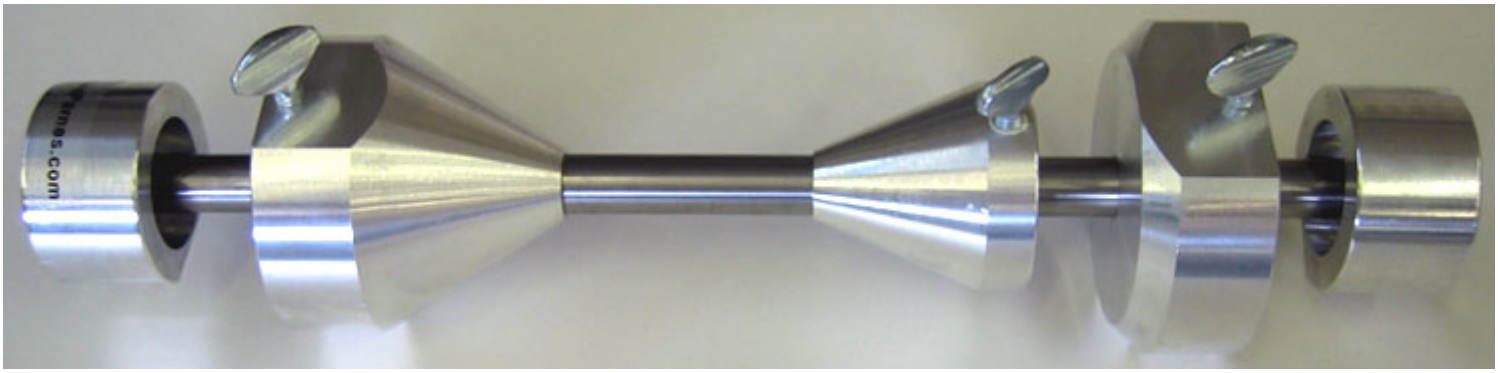
Raising and lower the forks also changes the distribution of weight front to back. Raising the forks in the triple clamps puts a bit more weight on the front tire. Lowering them moves a small amount of weight towards the rear of the bike. A small amount of weight transfer can be a big difference though.

The same applies to the rear suspension. If you raise the rear of the bike (by applying additional preload or with a shock that allows height adjustments) you effectively reduce rake and trail. If you lower the rear of the bike you increase rake and trail.

The next task is to air up the tire and balance it. I use the balancer unit sold by Mark Parnes. Here are a couple of pictures that show a Futura's rear tire setup in the balancer. I have a short write up of the balancer here.

Aprilia Motorcycle Wheel Balancer

by Marc Parnes Products



Futura Wheel Balancer Shown

Futura Wheel Balancer Now In Stock.

There can be a tremendous savings when installing tires yourself. Tires can be purchased at lower prices over the internet or by mail order as well as the savings that can be had by mounting and balancing them yourself. Besides that, you will know it has been done right.

One of the challenges encountered doing it yourself is being able to balance the wheel assembly easily and effectively. A motorcycle tire balancer is often expensive, takes up a lot of room and in the case of a single-sided swingarm, requires a special rear wheel adaptor which is available from the dealer at a premium price.

The Aprilia Portable Motorcycle Wheel Balancer pictured above addresses all of these problems.

- Extremely accurate running on precision low friction shielded ball bearings.
- Simple to use. Please review the Motorcycle Wheel Balancer Setup Instructions.
- **Futura single-sided swingarm wheels** DO NOT require a Dealer supplied rear wheel adaptor.
- Portable, it fits in your tool box drawer or tankbag.
- Durable, CNC machined from billet 6061-T6 aircraft aluminum with a tool steel axle
- And cost effective.

Technical specs

- Overall size - 12" x 1¾"
- Weight - Approx. 1½ lbs (Universal Model)
- Bearings - Double shielded ball bearings
- Axle - Tool Steel 12" x ½"
- Material - 6061-T6 aircraft aluminum

Please click on the pictures below to view the balancer in operation.

Aprilia Futura Rear Drive Side	Aprilia Futura Rear Non-Drive Side

Showa Inverted Fork Service and Gold Valve Installation

Directions Use clean Showa inverted forks to perform the following. Some steps can be omitted if Gold Valves are not being installed. Remove the forks from the bike before starting the work sheet. Gold Valves are a registered name from Race Tech. If Gold Valves are not installed on your forks, substitute the words Gold Valve with Base Valve or compression valve since that is what they are called on stock forks. This worksheet can be used for most Showa inverted forks with stock base valves or Race Tech's Gold Valves. It cannot be used on Twin Chamber Showa forks. Know your limits. If you have any problems, contact a suspension specialist. Perform the work at your own risk.

1. Remove and clean the forks using mild soap and a sponge. **Turn the rebound adjuster all the way out**.

2. Put the spacer (Suzuki part number 09940-54850 or Honda part number 07KMZ-KZ30108)) on the bottom of the inner tube, **fig 1**. This spacer prevents the dust seal from damage while the inner tube is compressed). A spacer can be made from PVC pipe, **fig 2**.

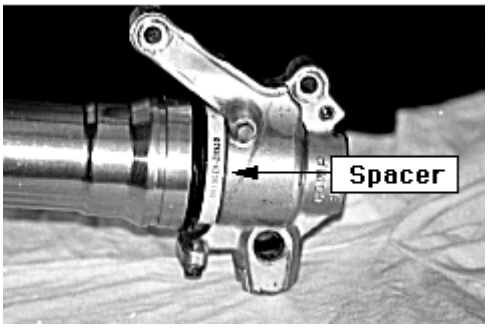


Fig 1

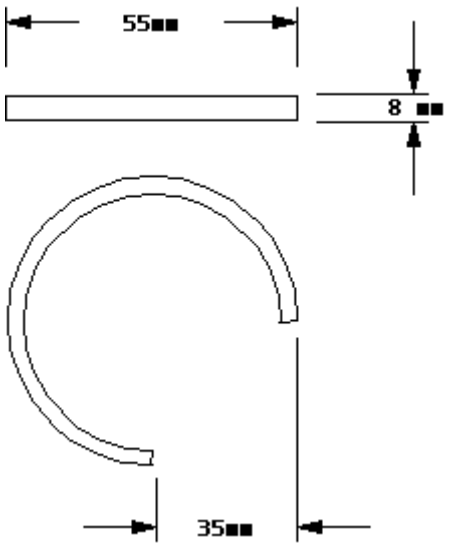


Fig 2

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3. Remove the fork cap from the outer tube and let the outer tube slide down slowly.

4. Push down the spring and put a 17 mm open end wrench on the lock nut. Remove the fork cap while holding on to the 17 mm wrench, **fig 3**. Remove the fork spring.

Note: If the 17 mm wrench will not fit over the nut check to see if the wrench is too wide. If it is, you can grind your wrench thinner until it will fit. Do not overheat it while grinding it.

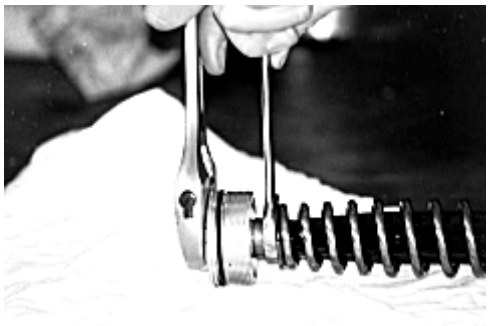

Fig 3

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5. While holding your hand over the end of the fork cylinder (this is where the fork cap threads to), turn the fork upside down to drain the oil out. While you are pumping the forks in and out, the push rod, needle, and spring will fall into your hands, **fig 4** (some Showa forks do not have a spring).

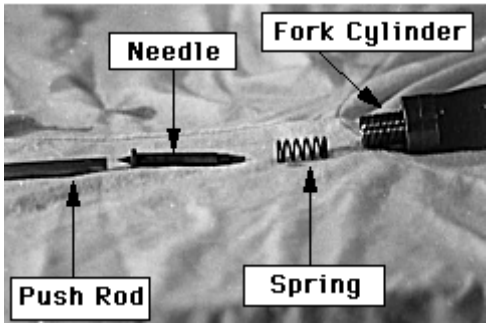

Fig 4

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6. Remove the lock nut and spring guide, **fig 5**.

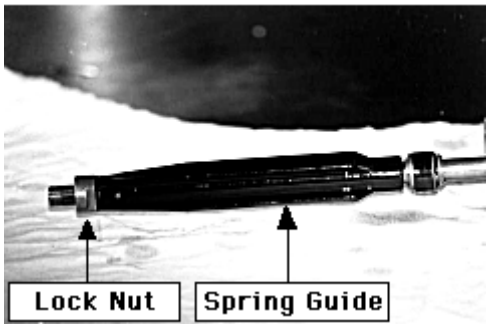

Fig 5

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7. Clamp the fork in a **padded** vise. Clamp the right fork on the axle holder and the left fork on the caliper bracket.

8. Stroke the fork through checking for any binds in the fork. It should move smoothly.

9. Slide the dust seal up and remove the retainer clip, **fig 6**.

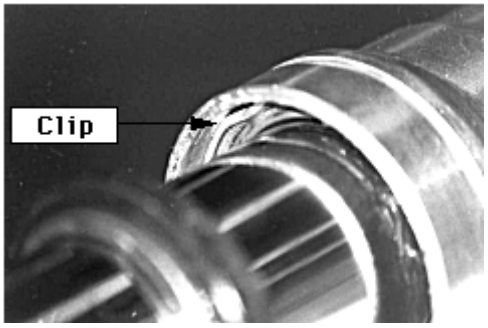

Fig 6

Caution: Do not scratch the inner tube. If the tube is scratched it can cause the fork seals to leak.

10. Remove the outer tube by compressing and then quickly pulling the tube until the inner and outer tubes come apart.

11. Remove the circlip from the bottom of the fork, **fig 7** (if installed).

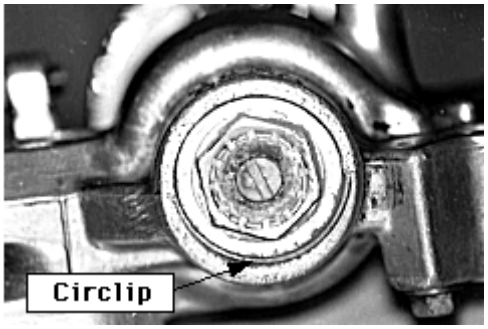

Fig 7

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12. Install the fork assembly tool (Suzuki part number 09940-30220) on the fork cylinder and remove the compression damping assembly and sealing washer, **fig 8**.

Caution: Do not use an air impact to remove or install the compression adjuster. The threads may be damaged.

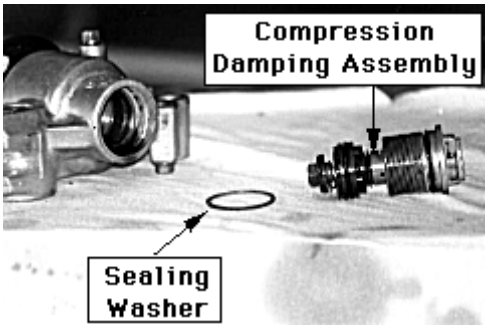

Fig 8

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13. Remove the fork cylinder from the inner fork, **fig 9**.

Note: Showa fork cylinders are made so that the rebound valving cannot be serviced. There is a peened on retainer that cannot be removed without a special kit from Race Tech. Contact Race Tech for the needed parts if the fork cylinder needs additional repairs.

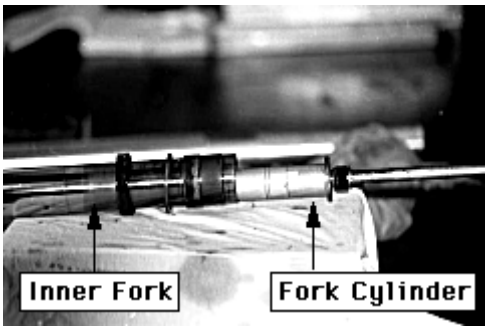

Fig 9

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14. Use a flat tipped screwdriver and open the slide bushing. Slide the bushing off. Remove the guide bushing, washer, oil seal, retainer, and dust seal, **fig 10**.

Caution: Do not open the slide bushing more than is needed. Do not scratch the slide bushing or it will have to be replaced.

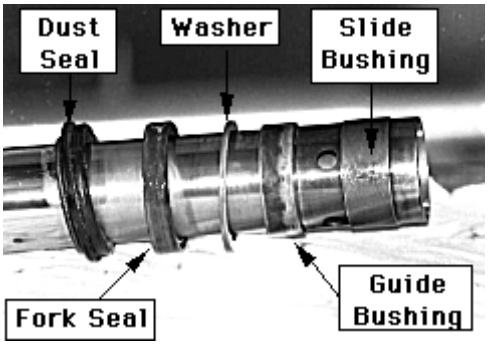

Fig 10

15. The stock compression valve assembly is very restrictive and causes harshness in the forks. Race Tech's Gold Valves vastly improves the forks ability to absorb bumps and jumps. Contact Race Tech for Gold Valves. If you are not installing Gold Valves, continue on to step 28 after cleaning all of the parts. The following instructions should be used along with the instruction sheet supplied with each Gold Valve kit. There are slight differences in kits an these instructions are only a guide.

16. Clean all of the parts in cleaning solvent and let dry. Inspect all of the parts.

17. Before removing the nut on the compression valve, the threads above the nut must be filed off. Use a file and file lightly the end of the threads until they are flush with the top of the nut.

18. Remove the nut, spring cup, check valve sleeve, check valve plate, base valve, low speed valve stack, high speed valve stack, and base plate, **fig 11**. **Lay out the pieces in the order they came of the shaft**. Clean and inspect the pieces.

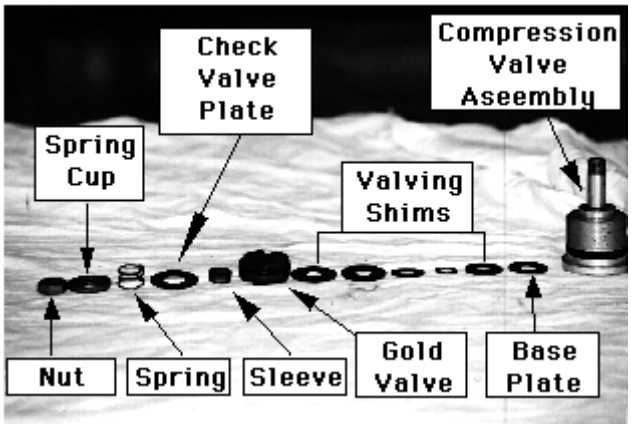

Fig 11

19. Using the chart supplied with the Gold Valve, select the low and high speed valving.

20. Place the original base plate(s) (**this is the very thick washer**) on the shaft of the compression valve body.

21. Install the high speed valving starting with the smallest diameter and ending with the largest diameter shim.

22. Install the low speed valving (on the high speed valving) starting with the smallest diameter and ending with the largest diameter shim.

23. Install the o-ring on the outside of the Gold Valve and install the Gold Valve on the shaft with the recess on the piston facing up, **fig 12**.

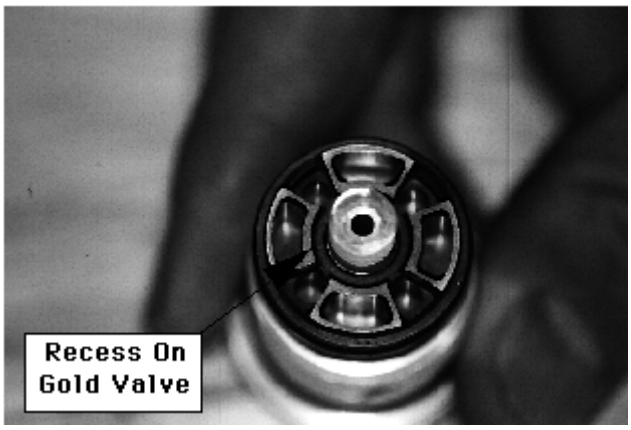

Fig 12

24. Install the check valve sleeve, **fig 13**, on the shaft making sure it fits into the recess in the Gold Valve. Install the check valve plate and spring.

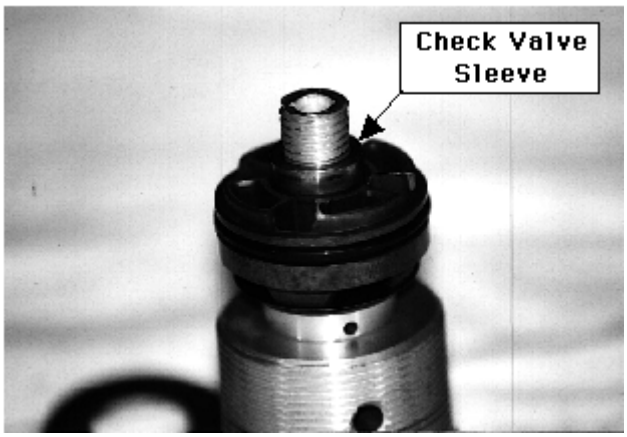

Fig 13

25. Install the spring cup on the shaft with the dished part facing down. Look at the threads on the shaft and make sure the check valve plate is higher than the end of the threads, **fig 14**. **This**

is very critical. If the nut runs out of threads before tightening down the check valve plate and base valve, the nut may loosen and cause damage. Shims can be added **beneath the base plate** to make sure the nut will tighten down. Make sure the nut will tighten down and not run out of threads.

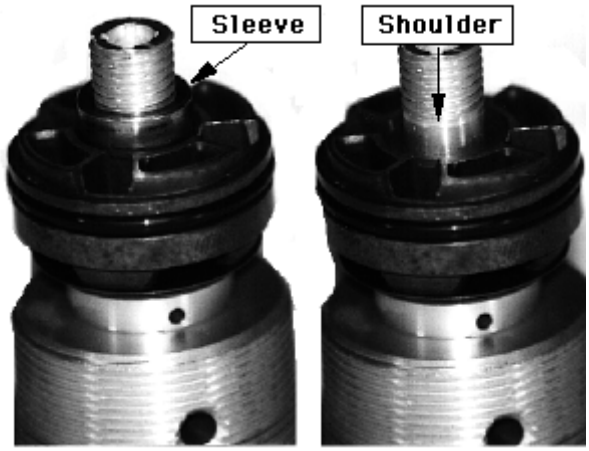

Fig 14

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26. Use blue Locktight 242 on the shaft threads and carefully install the nut. Torque it to 48 inch/lbs. **Do not torque it to more than 48 inch/lbs**.

Caution: The threads are made of aluminum and strip easily. Race Tech sell kits that can repair damaged threads on the compression damping asembly.

27. Inspect your work by holding the compression assembly up to the light and look for the cross-over between the low and high speed stacks (the small shim near the top of the stack). The gap should be visible and if it isn't, disassemble the valve stack and look for burrs or dirt in the valving.

Note: Most 1995 thru 1997 use a "mid valve" located on the rebound piston (located inside the fork cylinder assembly). This works for supercross and some very aggressive pro riders but is too harsh for outdoor use. Race Tech recommends converting the "mid valve" back to the standard check plate design (just like the compression assembly). Remove the existing "mid valve" parts and reinstall the cupped washer, sleeve, check spring, check valve plate, rebound piston (recess towards check plate), rebound valving, base plate, and nut.

28. Inspect the inner tube for scratches, dents, and straightness. The tube must be replaced if there is any damage.

29. Inspect the outer tube for damage. Replace tube if there is any damage.

30. Inspect the fork cylinder, piston rod, and spring guide for scratches and bending. Replace them if they are damaged.

31. Inspect the guide and slide bushings for wear or damage. Look for metal chips and clean them off with a nylon brush and for oil.

32. Measure the length of the fork spring and compare it to the specifications listed in the service manual.

33. Place a piece of plastic over the end of the inner tube, oil the seals with fork oil, and slide the dust seal, retainer clip, and fork seal over the end of the tube, **fig 15**. The side of the fork seal that has the writing on it should face our or toward the dust seal.

Caution: The plastic will stop the seals from being damaged while installing them. A damaged seal will cause oil leaks.

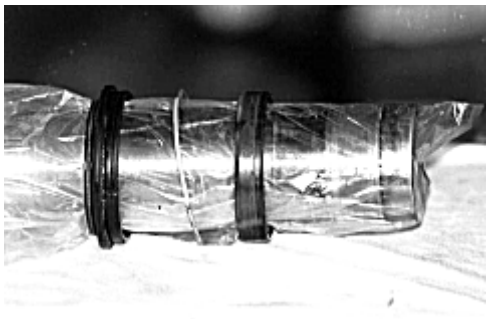

Fig 15

34. Remove the piece of plastic and install the washer, guide bushing, and slide bushing **fig 10**.

35. Insert the inner tube in the outer tube. Slide the fork seal in place and use a fork seal driver, **fig 16**, (Suzuki part number 09940-32720) to install the seal until the retainer clip groove is showing. A fork seal driver can be made from PVC pipe. Find a section of pipe that has the same inside diameter as the fork tube, then cut it in half lengthwise. Sand the cut line smooth until the outside diameter fits into the outer fork tube.

Fig 16

36. Install the retainer clip making sure it fits into the groove.

37. Push the dust seal into place.

38. Attach the spacer on the bottom of the inner tube and lower the outer tube down, **fig 1**.

39. Put the fork cylinder into the inner tube, **fig 9**, making sure that it is securely in the hole at the bottom of the axle holder. The easy way to check this is by looking through where the compression adjuster goes and looking to see if it is bottomed out.

40. Apply blue thread lock to the compression adjuster.

41. Install a new sealing washer on the compression adjuster. Install the compression adjuster in the fork and torque it to 54-62 ft/lbs or 75-85 Nm while using the holding tool.

42. Install the circlip over the compression adjuster making sure it is in the groove.

43. Install the spring guide on the fork cylinder with the long tapered end facing up. Install the lock nut and install by hand until it stops (the wrench flats should face down), **fig 17**. There should be at least 14 mm (.551 inch) of threads exposed above the nut.

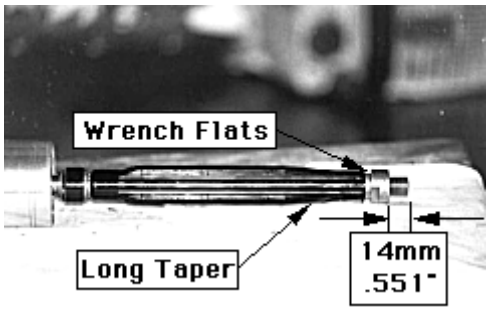

Fig 17

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44. Install the return spring, needle (long taper faces down), and push rod into the rod pipe, **fig 4**.

45. Fill the fork with the correct oil until it almost is full and stroke the inner tube a few times. Pull the piston rod up and down to bleed the rod assembly. Set the fork oil height using a fork oil height gauge tool to your specification, **fig 18**. Make the forks are bottomed and the spacer is still install on the inner tube while checking fork oil height.

46. Pull the piston rod up and install the fork spring and fork cap. Torque the fork cap to 14.5-17.5 ft/lbs (20-24 Nm). Showa piston rods are easy to strip while installing the fork cap to it. Race Tech makes a kit that repairs the rod and makes it stronger. Contact Race Tech for these parts.

47. Install the fork cap to the outer fork tube making sure the o-ring on the cap is not damaged. Torque the cap to 3.0-4.0 Kg-m.

Fig 18

Motion Pro Fork Seal Drivers
Features CAD-II plated carbon steel with a split design. Many sizes available. Each driver is approximately 25 oz. Sold individually.
08-0170 (39mm) $66.60
08-0123 (41mm) $66.60
08-0124 (43mm) $66.60
08-0125 (45mm) $66.60
08-0138 (46/47mm combo) $66.60
08-0171 (49/50mm combo) $67.80
08-0221 (35/36mm combo) $64.00

Ok I have done a few mods... None that haven't been done before... But talk about make a big difference in the way the bikes works/handles.... HOLY CRAP.... Like night and day....

First off the rear shock was not up to riding two 200 lb people with bags full..Aprox 50 lbs. So I started saving up for a rear shock... The best one so far available is the Wilbers. And it is worth it.... Second... The forks... I thought of sending them off to Race Tech. I have had forks done there before and was VERY pleased with what they did. But I happen to see a set of 02 Milles forks on e-bay and started to compare what it would take to get these to work. The set I was looking at on e-bay had Ohlins damping... Not much to change. Had to change the rotors as to match the mounts on the the forks. The Futura has 300 mm dia disks and the Milie has 320

mm. So off again to e-bay as I had seen many rotors on sale there. Just so happen there was a forum member here who had a set for sale. Done... Now to get this all together... No problem.. It all just bolted on together... Very straight forward... Next install... the shock.. Kinda time consuming but pretty easy if you are mech inclined.
Now for the test ride.. As mentioned before, the difference between night and day. I wish Aprilia could have done this in the begining.
Decided to go up to Monterey, about a 4 hr ride for us. Did a couple of changes but... No more "purposing" (sic?). Even the P'mate noticed the difference. She said it felt more "planted" in the turns. The fast sweepers with the old shock, were very scary at times, like the rear shock was loosing dampening... Now look at the pics....
Well I was going to wait until I got the rear shock but now that there is a thread... Here is my newest addition. Installed last weekend...
I am still playing with the settings. Fork from a Mille and the disks from a Touno. What a difference though.. Just need to dial in the settings now for two-up riding.
And it came in under budget. $480.00....
Installed new forks and brakes

For those of you who have been unhappy with the front suspension and brakes there is hope. A few weeks ago I installed the front end from a 996 Ducati. The forks are Tin coated and fully adjustable. My spring and valving from race tech fit right in, so now I have a Tin coated fully adjustable front end and man does it work great. I also at the same time installed Brake Tech 320mm cast iron rotors and used the stock callipers. I may at a later time go to the 4 pad callipers. I already had steel lines. This a big improvement over stock and the power and feel are excellent. I don’t have pictures but Jeff Connor I believe does have a couple of pictures. Jeff, myself and couple other guys just did about 1500 miles over the memorial day weekend thru the Calif. Sierras wearing a new set tires in the process.
This is a great modification and makes a big improvement in feel and handling. I bought the forks off ebay.
AF1 has a set of bottom tubes from a 2004 RSVR for anyone that wants to add compression damping. I wanted to buy them but I can't afford to right now as I am about to become unemployed for a couple months Give them a call if you're interested.
The forks are the very same as the Futura except for the calliper placement. I just bolted up the forks and installed a set of 320 mm rotors. The stock calls bolted right up, no mods there. No spacing except for the stock stuff encl the axle. In my case even the spring rate (1.0kg) worked better. I did have to replace the rotor bolts but found some grade 8 hex and they worked great. The stock bolts have a shoulder on them and the rotors have a recess as to not allow the bolt to set flush. The fender is a Mille but I had that on with the Futura forks. I have Heli-Bars and may end up lowering the forks a little more, the heli-bars bring the forks up into the triples a little more than stock. I will enclose a pic later on today.
I used only the forks. I purchased them off e-bay and they were is very nice shape. I used the stock upper and lower triple clamps. Everything was a bolt on deal except a couple of items. #1 new spacers had to be machined for the front wheel spacing.#2 The places where the calipers bolted to the forks had to be machined for proper spacing to the rotor.
The stopping quality of these brakes with the cast iron rotors is VERY good. Excellent feel and the harder you squeeze the harder they brake, very strong but predictable and you only need one finger. It just doesn’t take much to stop this bike now.
The ride quality and compliance of the front end is much better. It really works nice. The forks are 1inch Shorter than the stock forks but I have my front end dropped anyway so it is not a issue and the bike is very stable.
Do the Ohlins from the RSVR(non radial) go straight onto the Fut frame/headstock??
Can anyone advise on how good a standard set of Mille forks are if you get them done the Ohlins way?
Cheers
Bailey.

I have a 02 set of Milles forks with Ohlins internals. They work GREAT....

All you need is a set of 320mm rotors. Everything bolts right up.

There is no CONMPRESSION DAMPNING adj... You backed off the REBOUND adjustment. That wont make it feel softer going down but faster coming up.
Where is the spring preload set at. I found that to get a decent quality(SPORTY) ride I'm set at 3 turns out from max on the spring preload and 1.75 turns out from max on the rebound. I weigh 185 lbs wet ride mostly alone with the bags on. If you weigh more at pinch more spring and a touch less rebound..
Dave

Finally got around to doing the fork swap last night. Didn't think to take pics of the job until the lions share of the work was done. So here are some pics of the outcome.
One thing I found that I hadn't seen mentioned in the previous posts on this subject is that the Mille fork is 13mm shorter than the Futura. Not a Problem just an observance. I was going to pull the forks up 4mm anyhow so I just had to calculate how much fork tube to be above the top triple clamp. Wound up being 19mm or 4.5 scribes. The stock distance on my bike was 28mm. So 28-13+4=19. Did a quick run last night to bed the brakes ,felt good but needs some fine tuning.
I bought the forks for $450 from a guy on the RS250 forum. They were just rebuild with OEM parts minus dust seals. I may at some point need to add those but not an easy thing. Used 5wt Motul fork oil with 100mm air gap.
Added the Braking wave rotors just to add some "BLING" to the ride. Changed the pads with Ferodo Sinter XR pads.
Now its off to test
I just changed my forks to Mille models ,swapped to Braketech wave rotors.
I'll sell you my used (9k miles) real cheap. I hate to have good parts laying around that I know I'll never use.
I'm talking Shipping being more that cost cheap.

Well the fork isn’t "non adjustable" .It does have adjustment for Preload and rebound. This allows you to adjust for weight .Rider and or passenger. Unfortunately I couldn’t get enough preload when running two up with gear. The adjustment it is missing is for compression. That allows you to (in simple terms) change the feel of the forks. Tight on the twisties/smooth on the freeway/also two up with gear gets better.

I must have spoken to the Racetech person w/o a brain that day. I was surprised at the answer I got. They told me to take the forks apart/measure them/call them back to see if they can do anything. I've had very good experiences with the shocks/forks I've sent them before. The thing I've heard about ,really all of the suspension experts, is that during race season racers have priority. So if you just an average street rider you may get bumped. I was never under the gun for time so that plays into my level of satisfaction with them
They ARE adjustable, Aprilia just combine the compression and rebound into a single adjuster. This is quite normal on sports/tourers. And as you correctly point out, having adjusters does not mean you have good forks, just as not having adjusters does not mean the forks are bad.

For most people, the Futuras forks are pretty good. But if you want even better, then you spend the money to upgrade them. In my case, I simply used the 'sport' settings from the handbook, increasing preload to show five rings, and increasing compression/rebound one quarter turn clockwise. Since then, I have never needed to think about what my forks are doing.
The only adjustment (on the top part of the fork) is for rebound as per Aprilia USA. The compression has a stack of washers that you can adjust but will require taking them apart (which is what Race Tech mentioned also) to change the compression. This doesn't allow for changes like what I am up against ie; riding two-up with gear totalling around 500 lbs. Then when I ride solo the figure is around 200 lbs. Talking to Race Tech this is a pretty large gap that under stock condition, the non-adjustable compression setting may not be suited for me. Hence buying the adj forks (which was suggested even by Race Tech) and trying to set them up with what I will be riding with. R/T mentioned that if I couldn't get out of the forks what I wanted, send them in to them and they could revalve BOTH rebound and compression (for a good chunk of money I might add). Bottom line is the stock forks do not allow me enough rebound (or even compression) for my needs.
People... This just works great, installing adjustment to the forks.... Both rebound and compression... You can tune them to what ever you are doing....
It made a BIG difference in how the bike handles (mostly with two-up) and I felt the the $250.00 was well worth the money. Even some of the BMW's K1200R/GT guys are installing better shocks on their new bikes... Why because the stock OEM stuff just doesn't take EVERYONE into account when they fit shocks on. One guy put as "they must have 115 lb test riders to come up with this shock.
It would stand to reason that the Mille forks are shorter. In fact, I think it's the Futura forks that are longer than the Mille's since it came later. Different rake so slightly longer forks.
There's a few of them. It wasn't so much that they were more than a week late with the forks, it was that the gal in service dept tried to blame it on my credit card to cover her ass. That's what actually torqued my nuts... so to speak .Fortunately though, they did do a good job on the forks except I had to go to a slightly higher visc fluid (7.5wt) to keep them from an occasional bottoming out.

Ride 200 miles: Did you try talking to PPS (Peterson Pro Suspension)? He comes highly recommended by a lot of SoCal racers...
You can buy Futura replacement 300mm F/F rotors from Brembo, Braketech,
Spiegler & possibily others.
Hey David, if I were in the USA I would go for the Braketechs because of their Axis design which is sweet. Just contact Bikpaintr and I think AF1 also has them. Dunno about the 916 discs. Maybe the holes are not the same.

Nobby, in the UK, PVM are awesome I believe. Look for FZR600 brake disc replacements. They're the same. RickyJ has them from Brembo (and he has the part number), I have them from Spiegler. The 916 rotors surely will be 320 mm while ours are 300. The Yam's are 296 mm from what they tell me.

I'm using the EBC HH RACE PADS with them. The normal HH will ruine the cast iron rotors according to my dealer.

Edit: RSV forks will give you a compression damping *adjuster*. The Futura forks have compression damping as well, only not so adjustable. I was told by the people at Technoflex that when you adjust the rebound, the compression is also adjusted. Something in the range of 70% rebound and 30% compression. That's what they told me anyway. My forks are as good as the RSV forks, no doubt about that. Maybe the likes of Rossi can feel the difference but I sure can't.

Did you change your fork oil? I would be curious to hear from someone whose forks have gone as to how long it really takes the forks to go on these bikes. I don't think I've had my fork oil changed yet (even during the 4860 service) and, as a novice, I'm curious as to how they feel when they go like yours have.

How many times can you change the fork oil and get a decent improvement before the actual springs go? Is the shock just "soft" or does it really bottom out and cause a safety issue? Because if the shock's bottomed out and you hit a bump, the tire's probably going to leave the ground. Am I right?

I'd understand why you'd want to fix the Futura rather than get another bike anyway---the seat's too damn comfy!
hat's cool, man, the Ohlins SS re-valve and some springs for your weight would be a good choice as well as new oil of course.

What you're going to do is going to make the bike so much better handling, more comfortable and stable, you're not going to believe it.

As for those other liter bikes, they're all good, but no Futura. I don't want a gixxer 1000 that'll do 100mph in 1st gear. Crap, I'm too old, and I need my license and would like to keep the insurance down somewhere reasonable.

and this would be the PERFECT time to change the fork lowers and get some 320 mm. rotors for that bad boy.

I got a set of Falco forks on e-bay for $250.00. It had the Ohlins stuff in them already. I had to change to 320mm disk's also. I have seen a couple of forks on e-bay but you will have to keep a close eye out for them. Dugkim has a great set-up if you can find someone to do them...
Here is a pic of mine.

Mille forks work too.Mine were rebuilt with stock Aprilia parts and work very well. And you get to use the big rotors al well.

A: I have the same problem with the fork top legs being badly corroded. I would opt for having them anodized. Sadly, I can't ride without them so this will have to wait until I get another bike. K-Tech in the UK can revalve your forks with their own race valve kit they developed. Supposed to be very good. They showed it to me when I was at Technoflex but I didn't have the dosh. It's about £400 for the valve kit alone!

B. You would need top and bottom yoke for a set of Ohlins forks. They're a different diameter. I suppose they fit as quite a lot of people have done the conversion on Falco's and lots of Futura people have put Falco forks into Futs.
AF1 sells a top yoke for the Mille Ohlins IIRC and it's very INexpensive.
You can get a top and bottom yoke with adjustable offset from BKG. Billet and made for the Factory Ohlins set. I had the yokes in my hands and they're sweet. And not too expensive, around 1k Euro.

I had my shop locally do it (www.detroiteurocycles.com). $680 for the fork work and $1100 for the rear shock.

Vidanger la fourche

Pour vidanger la fourche, 2 techniques:

Sans demonter les tubes:

-  Mettre la moto sur une centrale , ou sur un pied élévateur.
- Ensuite pour vidanger il va falloir devisser aux 2 bouts de la fourche.
-  En haut: devisser les 2 capuchons de fourches, et laisser descendre la moto "délicatement" à fond.
-  En bas: proteger les disques et la jante avec un chiffon, devisser les bouchons contenant la vis de detente, et laisser couler en évitant d'en mettre partout !
- Une fois bien vide, remettre les bouchons en bas, laisser la fourche en bas et remplir la fourche de liquide neuf, remonter les tubes et revisser les bouchons progressivement. Pour la quantité et qualité voir ici.

En démontant les tubes:

- A mon avis la technique offrant le meilleur travail, car elle permet de faire un nettoyage facile des tubes , étriers, jante, tés...
- On y va, démonter le garde boue, démonter les étriers de frein et les sortir du disque (si, si ca passe en rentrant un peu les pistons)
- Démonter la roue, j'explique un peu, desserer les 4 vis maintenant l'axe de roue, puis desserer l'axe de roue, sortir l'axe de roue en maintenant la roue.

- Déposer, le cache fixé sous le té inferieur.
- Repérer la hauteur de fixation des tubes, maintenant vous pouver liberer les tubes des tés en desserant les vis, mais maintenir chaque tube pour évieet qu'il ne glisse.
- Voilà, les tubes sont sortis, reste plus qu'a ouvrir le haut des tubes, les retourner pour vidanger.
- Une fois bien vidés, remplir avec de la belle huile neuve, pour la qualité et quantité voir ici
- Remonter dans l'ordre inverse, la seule difficulté est de remonter facilement le cache sous le té inferieur, pour faciliter, graisser légérement les tubes de freins pour coulisser les bagues en cahoutchouc, les inserer sur le cache et remonter l'ensemble en position, mettre les vis bien droites dans leur logement.

Huile de fourche:

- Qualité: préconisées par aprilia 5 W ou 20W, conseillée 5W
- Quantité: 455 à 460 ml, mais il est préférable de mesurer le niveau, fourche compressée à fond, l'huile doit etre à 87 mm du bord du tube, pas facile mais faisable. ATTENTION, ne pas mettre trop d'huile (mon conss me l'avais remplit à ras bord, casse gueule) vous reduirer la course de la fourche et inversement , si vous en mettez pas assez, la fourche talonera.Avec 87 mm votre fourche aura ce débattement, pile poil quoi..

Martin

Publié le: 2003-01-05 (1505 lecture(s))

[Retour]

Maintenance - Fourche inversée

Régis (Shaft Racing) nous décortique ici les étapes de démontage et remontage d'une fourche inversée pour sa maintenance :*(ici une showa de Honda 450CRF)*

Changement des joint, de l'huile et vérification des éléments internes de la fourche.

ATTENTION : Ce type d'intervention n'est pas à la portée de tout le monde. Cet article n'a vocation que de support pour les lecteurs interressés par ce type d'intervention et ne remplace en rien l'expèrience d'un professionnel. Si vous tentez de faire vous même cette opération, veuillez à le faire sous la supervision d'un pro ou d'un mécanicien expérimenté. Le site 17pouces.net ne peut en aucun cas être tenu responsable d'une déterioration de votre matèriel ou d'un défaut de fonctionnement ultèrieur.

(JPG, 163.3 ko)

Etape n° 1

Préparez l'outillage nécessaire a l'opération :

- Ruban adhésif
- Clé a pipe ou a douille de 21mm
- Clé plate de 17 mm
- Clé spéciale pour bouchon de fourche supérieur
- Tournevis plat
- Papier d'essuyage
- Bac pour récupérer l'huile

(JPG, 108.3 ko)

Etape n° 2

Notez les réglages présents par rapport à la position vissée a fond, puis desserrez complètement la vis de réglage de **détente** (située en bas du tube)

(JPG, 111.2 ko)

Notez les réglages présents par rapport à la position vissée a fond, puis desserrez complètement la vis de réglage de **compression** (située en haut du fourreau)

(JPG, 79.6 ko)

Etape n° 3

Débloquez le bouchon supérieur a l'aide d'une clé spécifique ou a défaut, aidez-vous d'une clé a molette en bon état

(JPG, 100.3 ko)

Débloquez le bouchon inférieur a l'aide d'une clé a douille de 21 mm

(JPG, 123.2 ko)

Décollez le cache poussière a l'aide d'un tournevis plat et fin

(JPG, 120.2 ko)

Puis declipsez le a l'aide d'un autre tournevis plat a lame plus large

(JPG, 100.6 ko)

Faites sortir le jonc d'arrêt du joint spy en faisant levier avec un tournevis plat, tout en faisant attention de ne pas rayer le tube

(JPG, 140.7 ko)

Etape n° 4

Dévissez complètement le bouchon supérieur et retournez le tube de manière a faire s'écouler l'huile.
Faites coulisser l'ensemble tube/fourreau pour faciliter l'opération.
Videz aussi le haut de la cartouche, l'excès d'huile s'écoule par un orifice de 6mm situé sous le bouchon supérieur

(JPG, 124.3 ko)

Devissez complètement le bouchon inférieur

(JPG, 111.9 ko)

Mettez la fourche a la verticale et appuyez sur le tube de manière a faire ressortir le plongeur, vous avez ainsi accès a l'écrou situé sous le bouchon.
Bloquez l'écrou avec une clé plate de 17 mm et devissez complètement le bouchon inférieur.

(JPG, 111.6 ko)

Retirez-le

(JPG, 119.6 ko)

Puis retirez la tige interne de réglage de détente

(JPG, 109 ko)

Sortez la cartouche

(JPG,

Vue de l'ensemble cartouche / tube / fourreau démonté
Sortez le ressort resté a l'intérieur du tube

128.4 ko)

(JPG, 128 ko)

Etape n° 5

Chauffez à l'aide d'un décapeur thermique le logement de bague inférieure situé sous le joint pour faciliter le démontage

(JPG, 180.1 ko)

Tirez quelques fois de manière vive et rapide sur le jeu tube/fourreau pour les mettre en extension jusqu'en butée.
Le choc produit permet de désassembler l'ensemble

(JPG, 125.4 ko)

Vue du tube séparé du fourreau, les pièces sont encore présentes dessus : de gauche a droite cache poussières / jonc d'arrêt / joint spy / rondelle d'appui / et les 2 bagues

(JPG, 154.2 ko)

Etape n° 6

Nettoyez l'ensemble des pièces a l'aide d'un solvant gras (white spirit / kerdane / petrole desaromatisé ...) puis séchez le tout
Contrôlez l'état de surface du tube qui ne doit présenter aucunes rayures ou impact, ainsi que l'état des bagues de guidage (le téflon doit présenter une usure uniforme sans laisser apparaître le métal du support en bronze)

(JPG, 98.1 ko)

Etape n° 7

Protégez le haut du tube avec de l'adhésif d'emballage pour ne pas déchirer la lèvre du joint au montage

(JPG, 78.3 ko)

Graissez ou huilez la lèvre du cache poussières

(JPG, 99.9 ko)

Puis insérez le sur le tube suivi du jonc d'arrêt

Faites de même pour le joint spy

(JPG, 86.1 ko)

Et insérez-le

(JPG, 133.1 ko)

Suivi de la rondelle d’appui

(JPG, 140.2 ko)

Puis de la bague de guidage téflonnée a l’intérieur

(JPG, 108 ko)

Et terminez par la bague téflonnée a l’extérieur

(JPG, 113.1 ko)

Vue de l’ensemble en place

(JPG, 132.2 ko)

Etape n° 8
Rentrez la bague de guidage en prenant appui sur la rondelle a l’aide d’un outil approprié

(JPG, 108 ko)

Puis faites de même pour le joint spy

(JPG, 118.7 ko)

Etape n° 9
Vérifiez visuellement que la lèvre du joint ne s’est pas retournée au montage et que la gorge du jonc d’arrêt est bien dégagée

(JPG, 110 ko)


(JPG, 102 ko)

Positionnez le jonc d’arrêt au fond de sa gorge


(JPG, 150.8 ko)

Etape n° 10
Remettez le ressort en place dans le tube


(JPG, 161.7 ko)

Et insérez la cartouche dans le fourreau


(JPG, 99.8 ko)

Vissez à fond l’écrou du plongeur sans forcer


(JPG, 130 ko)

Insérez dans le plongeur la tige de réglage de détente


(JPG, 125.7 ko)

mettez le bras de suspension a la verticale et appuyez sur le tube pour faire ressortir le plongeur, et vissez dessus le bouchon inférieur


(JPG, 116.2 ko)

Bloquez le bouchon contre l’écrou


(JPG, 122.7 ko)

Serrez a fond le bouchon inférieur

(JPG, 117.8 ko)

Etape n° 11
Remplissez le tube avec une huile conforme aux préconisations constructeur (consultez le manuel d'origine pour la quantité et la viscosité)

(JPG, 91.7 ko)

Etape n° 12
Pour terminer, remettez les réglages que vous aviez noté au début de l'opération

(JPG, 103.7 ko)

Imprimer l'article

Suspension and Springs

*W*hat's all this ruckus about suspension these days? It seems everyone is clued in that suspension setup can be a key to riding fast and safely, but how do you do it? No matter what shock or fork you have, they all require proper adjustment to work to their maximum potential. Suspension tuning isn't rocket science, and if you follow step-by-step procedures you can make remarkable improvements in your bike's handling characteristics.

The first step to setting up any bike is to set the spring sag and determine if you have the correct-rate springs. Spring sag is the amount the springs compress between fully topped out and fully loaded with the rider on board in riding position. It is also referred to as static ride height or static sag. My company, Race Tech, (909/594-7755) has an advanced method of checking spring sag that I'll describe.

If you've ever measured sag before, you may have noticed that if you check it three or four times, you can get three or four times, you can get three or four different numbers without changed anything. We'll tell you why this occurs and how to handle it.

REAR END
Step 1: Extend the suspension completely by getting the wheel off the ground. It helps to have a few friends around. On bikes with sidestands the bike can usually be *carefully* rocked up on the stand to unload the suspension. Most race stands will not work because the suspension will still be loaded by resting on the swingarm rather than the wheel. Measure the distance from the axle *vertically* to some point on the chassis (metric figures are easiest and more precise; *Figure*

1). Mark this reference point because you'll need to refer to it again. This measurement is L1. If the measurement is not exactly vertical the sag numbers will be inaccurate (too low).

Step 2: Take the bike off the stand and put the rider on board in riding position. Have a third person balance the bike from the front. If accuracy is important to you, you *must* take friction of the linkage into account. This is where our procedure is different: We take *two* additional measurements. First, push down on the rear end about 25mm (1") and let it extend *very slowly*.

Where it stops, measure the distance between the axle and the mark on chassis again. If there were no drag in the linkage the bike would come up a little further. It's important that you do not bounce! This measurement is L2.

Step 3: Have your assistant lift up on the rear of the bike about 25mm and let it down very slowly. Where it stops, measure it. If there were no drag it would drop a little further. Remember, don't bounce! This measurement it L3.

Step 4: The spring sag is in the middle of these two measurements. In fact, if there were no drag in the linkage, L2 and L3 would be the same. To get the actual sag figure you find the midpoint by averaging the two numbers and subtracting them from the fully extended measurement L1: static spring sag = L1 -[(L2 + L3) / 2].

Step 5: Adjust the preload with whatever method applies to your bike. Spring collars are common, and some benefit from the use of special tools. In a pinch you can use a blunt chisel to unlock the collars and turn the main adjusting collar. If you have too much sag you need more preload; if you have too little sag you need less preload. For road race bikes, rear sag is typically 25 to 30mm. Street riders usually use 30 to 35mm. Bikes set up for the track are compromise when ridden on the street. The firmer settings commonly used on the tract are generally not recommended (or desirable) for road work.

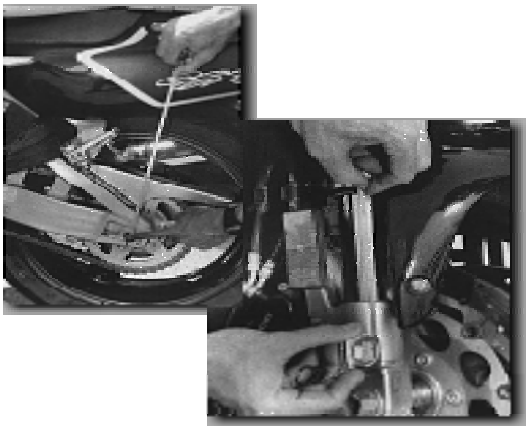
You might notice the Sag Master measuring tool (available from Race Tech) in the pictures. It's a special tool made to assist you in measuring sag by allowing you to read sag directly without subtracting. It can also be used as a standard tape measure.

Measuring front-end sag is very similar to the rear. However, it' much more critical to take seal drag into account on the front end because it is more pronounced.

FRONT END

Step 1: Extend the fork completely and measure from the wiper (the dust seal atop the slider) to the bottom of the triple clamp (or lower fork casting on inverted forks; *Figure 2*). This measurement is L1.

Step 2: Take the bike off the sidestand, and put the rider on board in riding position. Get and assistant to balance the bike from the rear, then push down on the front end and let it extend *very slowly*.



Where it stops, measure the distance between the wiper and the bottom of the triple clamp again. Do not bounce. This measurement is L2.

Step 3: Lift up on the front end and let it drop *very slowly*. Where it stops, measure again. Don't bounce. This measurement is L3. Once again, L2 and L3 are different due to stiction or drag in the seals and bushings, which is particularly high for telescopic front ends.

Step 4: Just as with the front, halfway between L2 and L3 is where the sag would be with no drag or stiction. Therefore L2 and L3 must be averaged and subtracted from L1 to calculate true spring sag: static spring sag = L1 - [l2 + l3) / 2].

Step 5: To adjust sag use the preload adjusters, if available, or vary the length of the preload spaces inside the fork.

Street bikes run between 25 and 33 percent of their total travel, which equates to 30 to 35mm. Roadrace bikes usually run between 25 and 30mm.

This method of checking sag and taking stiction into account also allows you to check the drag of the linkage and seals. It follows that the greater the difference between the measurements (pushing down and pulling up), the worse the stiction. A good linkage (rear sag) has less than 3mm (0.12") difference, and a bad one has more than 10mm (0.39"). Good forks have less than 15mm difference, and we've seen forks with more than 50mm. (Gee, I wonder why they're harsh?)

It's important to stress that there is no magic number. If you like the feel of the bike with less or more sag than these guidelines, great. Your personal sag and front-to-rear sag bias will depend on chassis geometry, track or road conditions, tire selection and rider weight and riding preference.

Using different sag front and rear will have huge effect on steering characteristics. More sag on the front or less sag on the rear will make the bike turn more slowly. Increasing sag will also decrease bottoming resistance, though spring rate has a bigger effect than sag. Racers often use less sag to keep the bike clearance, and since roadraces work greater than we see on the street, they require a stiffer setup. Of course, setting spring sag is only first step of dialing in your suspension, so stay tuned for future articles on spring rates and damping.

-Paul Thede

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