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SUSPENSION SET-UP GUIDE

Here is a simple guide to setting up suspension, and applies to forks and shocks. It is written to go with Marzocchi products but a lot of it applies to other brands.
Modern mountain bike suspension has several different variables that can be used to tune forks and shocks to every rider. These can be broken down in to 2 types- External and internal adjustments.
The first thing to get right is the spring rate, since the spring is what pushes the wheel back to the ground so it needs to match the riders weight. Next up is rebound damping and the rest of the damping adjustments after that. Damping is what controls the rate at which the suspension compresses and rebounds so adjusting this can have a huge effect on the handling of the bike.

External adjustments are anything that can be adjusted without disassembling the fork, this includes-

- Air pressure for the air spring, air preload and progression adjustment
- Coil spring preload
- Rebound damping adjuster knob
- Compression damping/lockout knob

Most riders can get their suspension dialled by using what is available externally, but if the full range of the adjusters have been exhausted, there are still several internal tuning possibilities that can be changed to suit the rider. This is often needed for heavier or very light riders and the fork or shock will need to be sent back to the supplier for this to be done. These include-

- Changing damping oil viscosity
- Changing coil spring rate
- Altering the volume of oil in the damper
- Changing the compression and rebound valving.

To start with, here is a guide to the technology used on Marzocchi forks from 08 onwards. Email protune@wideopen.co.nz for help with older forks.

Springs-
COIL SPRING with external preload- Use the external adjuster to fine tune the spring rate, turning clockwise makes the suspension firmer (ie less sag) and anti clockwise makes it softer (more sag)

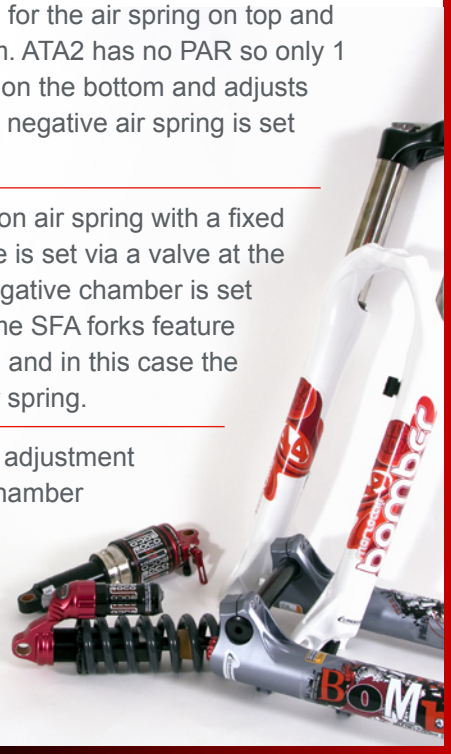
COIL SPRING with air preload- Is a coil sprung fork that can have air pressure added to it if the fork is too soft. If the rider needs more than about 35psi then the fork will need to be tuned internally, either with different springs or changing the oil.

AIR SPRING- Used on ATA, SFA and some TST2 XC forks, pump up the air pressure until the desired amount of sag is reached. In the case of forks with PAR (2 air valves on the one leg) the air spring is the top valve. Air springs usually have a negative chamber which balances the forces on the piston at the start of the travel to make the fork more supple to begin with

ATA-A travel adjustable air spring that allows you to adjust the travel of the fork anywhere in a 40mm range by turning the knob on top. Clockwise shortens the travel and ride height and sometimes the knob needs to be lifted slightly to be able to turn it. ATA has a valve for the air spring on top and PAR on the bottom. ATA2 has no PAR so only 1 air valve, which is on the bottom and adjusts the air spring. The negative air spring is set automatically.

SFA- Single function air spring with a fixed travel. Air pressure is set via a valve at the bottom and the negative chamber is set automatically. Some SFA forks feature PAR at the bottom and in this case the top valve is the air spring.

PAR- Progression adjustment via a second air chamber at the bottom of the fork. This must be set at LEAST 10psi more than the



marzocchi PRO TUNE

SUSPENSION SET-UP GUIDE

top chamber or else it won't function properly and possibly damage the cartridge. The fork can be made more progressive by increasing the difference between the 2 air chambers. More progression is useful to prevent the fork from bottoming out excessively. The top valve is used to adjust the sag but remember to keep the bottom valve 10psi more than whatever is in the top valve.
Eg if someone using a 66 ATA fork gets 30% sag (about right) with 80psi in the top valve, then the bottom valve must be set to 90psi or higher.
Inflate the PAR chamber a little before setting sag to make sure the piston inside extends itself fully. You may here a "pop" while doing this.

DAMPING-
Rebound- Rebound adjusters are found on nearly every Marzocchi fork and shock. It is either on the bottom of a fork, or in the case of RC3 on the top and marked with an "R". On a shock it is the dial or knob close to one end of the shock. Used to control how fast the suspension returns after it is compressed.

TST2- A damper with a rebound knob on the bottom and a Red lockout/low speed compression adjuster that has 2 settings- "Off" (anti clockwise) and "On" (locked out). The fork will slowly compress when it is leaned on while locked out.
*It is not designed to be ridden hard while locked out or the damper will be damaged.

TST Micro- A damper with a rebound knob on the bottom and a Red lockout/low speed compression adjuster on top. The red lever can be turned clockwise to lock the fork out. The gold dial is used to adjust a break-away threshold which means the fork will open up and compress on an impact, depending where the gold dial is set. Fully clockwise is a full lock-out. There are 2 common ways of setting up TST Micro, but the rider can experiment with different set ups.

1-Gold knob wound fully clockwise and the red lever is closed only on climbs to lock the fork out, then opened up for downhill sections.

2-Gold knob set around the middle to ¾ of the way closed and the red lever is left in the closed position. This gives the effect of increased low speed compression damping, making the fork firm enough to prevent brake dive and pedal bob, but will still blow off easily when needed.

*TST Micro can be ridden in the closed position all the time since it does have a dedicated breakaway valve.

RC3- An open bath damper with rebound adjustment on top and compression on the bottom. The compression is used to tune high and low speed compression but has a greater effect on low speed, so is used mostly to reduce diving under brakes or on steep terrain.

The 888 RC3 also has a red progression adjustment dial which is used to make the fork "ramp up" and stop it from bottoming harshly. It is recommended to set this at the minimum to start, then dialing it up (clockwise) once all the other adjusters are set to the riders preference (if needed).
For 2010, the 888 will have an internally adjustable shim stack for the compression damping that allows even more internal tuning.

Roco Shocks-Have a rebound knob near the eyelet and a high speed compression adjuster on the piggyback reservoir. Clockwise increases damping (firmer/slower) and anticlockwise reduces damping (softer/faster). The Air valve on the piggyback controls bottoming resistance and must have at least 170psi for the shock to function properly and prevent damage. The maximum pressure is 210psi.
Rocos use internal shim stacks to provide most of the compression and rebound damping

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SUSPENSION SET-UP GUIDE

then the adjusters are used for fine tuning. The advantage of a shim stack is it is a very simple system but is infinitely tuneable for every rider. Even though it requires rebuilding of the shock by a specialist, it is the only way to truly adjust high and low speed damping independently as external adjusters will always have an effect on both. It gives the rider a far greater range of tuning and is very useful for very light or heavy riders as well as experienced riders who have very particular set-up preferences to match their riding style. Most people will be able to set the shock up how they like with the external adjusters but there is always more room for adjustment internally if the rider feels as though they can't get the shock set up right by just turning the knobs.

Now here is the process we recommend to get suspension dialled in properly-

STEP ONE:

SETTING SAG

"Sag" is how far your suspension compresses when you sit on your bike, having the right amount of sag is vital for a proper bike set up. It means the suspension is able to track the ground properly, giving your tyres more grip, while allow the wheel to use all its travel to absorb big impacts likes rocks, tree roots, and jumps. If your suspension is too soft, it will be unbalanced and compress too much when it's not needed, and bottom out harshly which will damage your bike. If it is too hard, the wheel won't be tracking the ground or absorbing impacts and instead transferring the energy to your body.

The amount of sag needed depends on your riding style, basically the more travel your bike has, the more sag you can run. As a starting point we suggest-

- Cross country (4")- 15%
- Trail riding/All mountain (4-6")- 20-25%
- Downhill/Freeride(7-10")- 30-40%

Here is an easy guide to setting the sag on your bike, it can apply to hardtails and full suspension. You will want to do this leaning against a wall or with a friend to help you.

(FRONT)

Step one: wrap a zip-tie around one stanchion of your fork

Step two: Sit on the bike, and lean forward like you are climbing or stand up in the case of a downhill bike. Bounce a few times so the fork settles in to its travel, then slide the zip tie down to the dust wiper

Step three: Carefully step off the bike without bouncing then measure the distance between the zip tie and the dust wiper. Take this number, divide it by the amount of travel your fork has then multiply by 100, this is your sag. Add or remove air pressure until you reach the desired amount of sag.

(REAR)

Step one: Measure the eye-to-eye length of your shock

Step two: Sit on your bike in your usual riding position, bounce a few times so the shock settles in to its travel. Measure the eye-to-eye distance again. Subtract this new measurement from the first one.

Step Three: Divide that number by the stroke length of your shock (which is the amount of shaft that you can see sticking out when the bike is at rest), then multiply it by 100 to get you rear suspension sag. Again add or remove air pressure until the desired amount of sag is reached. In the case of a coil shock, you can add preload by turning the collar on the spring but do NOT exceed 5 turns from fully wound off. If the shock is still too soft you need to replace the spring with a harder one, and vice versa.

STEP TWO:

Rebound damping- Do this after setting the sag

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SUSPENSION SET-UP GUIDE

because the spring is what extends the suspension again and will determine how much rebound damping you need.

Rebound is how fast the suspension returns after it is compressed. It needs to be slow enough so the rider isn't bucked off their bike but then fast enough so that in a series or impacts (eg. braking bumps) the wheel returns in time to absorb the next impact. In general, we recommend setting the front a little bit faster than the rear.

To find a good starting point for the fork, push down hard on the handle bars then pull back up quickly. The wheel should leave the ground for just a moment and the touch down gently. If it lifts right off then the rebound is too slow. If it stays stuck to the ground then it is too fast.

The rear shock should be a touch slower, as this helps to stop the riders weight from being thrown forwards. Push down on the seat and the shock should rebound gently without feeling like a pogo stick or like it is "sluggish" to return.

If you have the sag right and you find that you reach the end of the rebound adjusters range, but the fork or shock is still too fast or too slow, you can still have the rebound tuned even further in most cases. Wide Open offers custom tuning like this as part of the PROTUNE service.

Now at this point, we recommend to set any other adjustments to their minimum settings and go for a few rides to make sure the rebound and sag feel ok. After that you can experiment with compression adjustments, if any. Remember it is ok to bottom out once or twice during a typical ride. If bottoming out happens frequently, you need to increase the compression damping/progression (either externally or internally) or reduce the sag.

STEP THREE: Compression Damping

Most compression adjusters and lockouts control what is often referred to as "low speed" compression damping. Low speed means the rate at which the suspension is compressing, not how fast the bike is moving.

Examples of "low speed" impacts-

- Bob from pedalling
- Fork diving under braking
- "G-outs" Like railing a berm

Increasing compression damping can be used to reduce the negative effects of these situations, eg the bike wallowing or "bobbing" and compressing when it isn't needed and wasting energy.

STEP FOUR: High speed compression and progression adjustment

These adjustments are usually found on suspension designed for downhill bikes, but some cross country forks feature PAR (progression adjustment) which is adjusted via an air valve on the bottom of the fork. High speed impacts are things like big rocks, tree roots, braking bumps and landing drops or jumps. Someone who rides mostly high speed trails that may have drops and jumps will need lots of high speed compression or progression to stop the fork blowing through the travel and bottoming out. Another rider who rides rougher and slower trails with rock gardens, roots and braking bumps will need less high speed compression to allow the suspension to use all of its travel.
You can reduce bottoming out by increasing PAR pressure (reservoir pressure on a Roco), adding oil to reduce the internal air volume of the fork or by turning the top red dial clockwise on a 888 fork.