CKTechnical

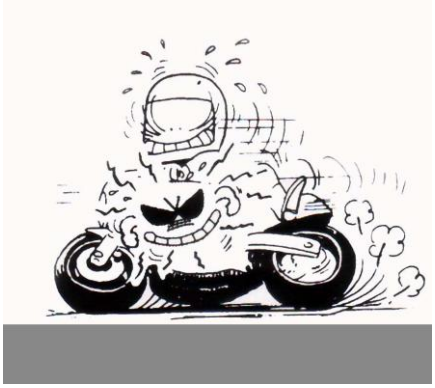
CROWN KIWI TECHNICAL

Road/ Track day / Race Suspension Set Up Tips

Traction * Handling * Comfort
Safety * Improved Tyre Life

ÖHLINS
ADVANCED SUSPENSION TECHNOLOGY

RACE TECH



INTRODUCTION

Unfortunately there is no literature that can give you the perfect machine set-up. Also suspension set-up is individually dependent on rider weight, height & style, preference, track and temperature conditions which all vary from race to race, track to track.
We can therefore only try to give you guide-lines and ground rules for the chassis set-up of your machine.

General guideline

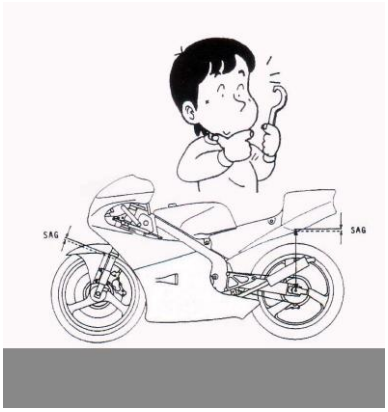
The general guideline in road racing is that the suspension has to support the tyres to create the best possible grip. For this reason suspension plays it's most important role in corners, chicanes, acceleration and braking.
In a straight line the suspension works satisfactorily if it can absorb the bumps without causing instability.

Suspension stroke

A road race bike should normally ***not*** use its full suspension stroke, although on some circuits hollows can cause the suspension to bottom.
Also landing of the front wheel after wheelies can cause excessive use of the front fork stroke.
If suspension bottoms in big bumps or hollows, it should not automatically mean the suspension should be set harder.
However, if suspension bottoms at the place where the maximum grip is essential the tyre cannot create the best traction, this is because it also has to perform as a spring. Adjusting the setting is necessary.
During every riding session the suspension stroke should be carefully checked.
***When tyre grip and lap times improve, the suspension has a harder job. So, the setting must be set harder*.**
Conversely, when it starts raining tyre grip and lap times deteriorate; in that case a softer setting may often be applied.

Note

Different brands of tyre have different carcass construction/characteristics and place different loads on the suspension. A good setting for one brand of tyre may not work well for another brand.



How to set up the suspension

Before starting suspension set-up, read the owners manual!
Tip: You should do your changes in suspension set-up one by one, try to learn what effect each individual adjustment has on your bike, and take notes!

Rebound damping

Rear suspension

Too much rebound damping can cause:

- The rear “jumps” on bumps instead of following the surface.
- The rear “jutters” under brakes.
- It holds the rear down with the result that the bike will understeer!
- Loss of mechanical grip.
- It can cause overheating in the hydraulic system of the shock absorber and make it fade, in other words, it will lose damping when hot.

Too little rebound damping can cause:

- The rear “tops out” too fast under braking. Causing the rear wheel to jump.
- The bike feels unstable.

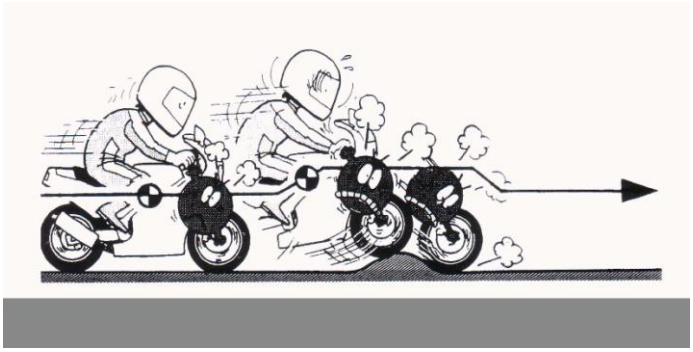
Front suspension

Too much rebound damping can cause:

- Oversteering!
- It will give poor grip of the front tyre.
- It feels like the front wheel will tuck under in corners.

Too little rebound damping can cause:

- Understeer!
- The front can feel unstable.



Compression damping

Rear suspension

Too much compression damping can cause:

- The rear wheel to slide under acceleration.
- It can give a harsh ride over bumps.

Too little compression damping can cause:

- The rear wheel starts to bump sideways under acceleration out of the corner.
- The bike will squat too much (rear is too low), that will cause the front to lose grip.

Front suspension

Too much compression damping can cause:

- Good result during braking.
- Feels harsh over bumps.

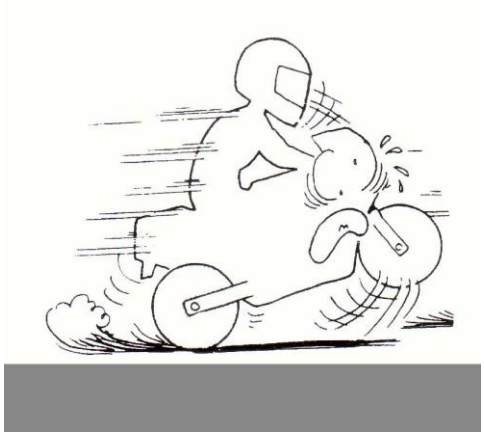
Too little compression damping can cause:

- Strong diving of the front.

Adjustment advice: Compression damping should be adjusted together with front fork oil level.

Note!

External adjusters are not a magic fix all. If you run out of external setting range and/ or cannot set the suspension to work properly then internal setting changes are required.
For further information please don’t hesitate to call us.



Spring ratio

Rear

Too hard spring ratio:

- Gives easy turning into corners.
- Makes the rear feel harsh
- Creates poor rear wheel traction.

Too soft spring ratio:

- Can give good traction in acceleration.
- Creates understeer in entry of corner.
- Makes too much suspension travel which will make it more difficult to “flick” the bike from one side to the other in a chicane.
- Will give a light feeling in the front.

Front

Too hard spring ratio:

- Good under braking.
- Creates understeer.
- It feels harsh in the corners.

Too soft spring ratio:

- Gives easy turning into the corners.
- Creates oversteer.
- Can cause the front to tuck under.
- Bad under braking (diving).

Spring Ratio / Sag Set Up Guidelines

⚠ WARNING!

Incorrect spring rate may result in a front geometry that is either too steep or too flat. This can result in a tendency of under or over steering, that could seriously affect the handling characteristics of the motorcycle.

Setting Spring Pre-load

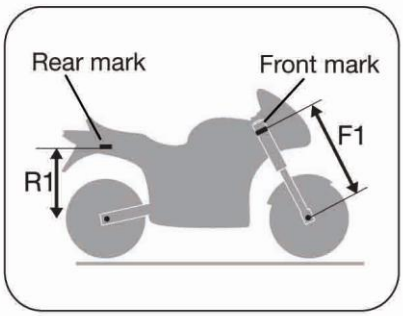
Step 1 - Measure

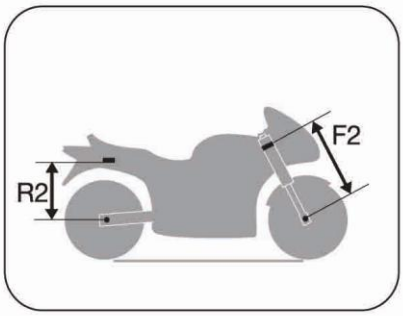
Spring pre-load is a crucial part of setting your motorcycle since it affects the height of the motorcycle and the fork angle.

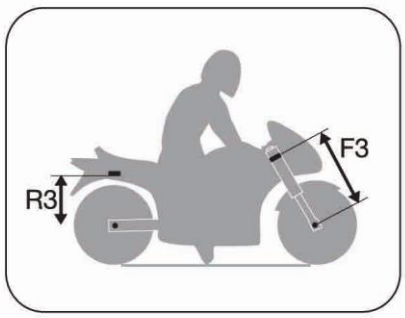
NOTE!

These measures should be taken with the motorcycle on a flat surface.

- Arrange the motorcycle so that the wheels are off the ground and that the front and the rear suspensions are fully extended. For example, tilt the motorcycle on its side stand. You may need to apply force on the wheels to get the suspensions fully extended, so that the top out springs do not compress it.
- Mark with a piece of tape or similar, a point on the seat or rear frame, and another point at the bottom of the front fork outer tube.
- Measure the distance from the marked point in the rear to the wheel axle (R1).
- Measure the distance from the marked point in the front to the front wheel axle (F1).
- Apply load on the front and the rear suspensions and take the same measurements (R2, F2)
- Now, take the same measurements with a rider fully equipped on the motorcycle (R3, F3).







The following measurements serve as a base guideline:

For Supersport / Superbike

Without Rider/Static Sag	**Road >>>>>> Track Day >>>>>>>**	**Dry Road Race**
Rear (R1 – R2)	10 - 20mm	5 - 15mm
Front (F1 – F2)	30 - 35mm	20 - 30mm
With Rider/Rider Sag		
Rear (R1 – R3)	30 - 40mm	20 - 30mm
Front (F1 – F3)	40 - 50mm	30 - 45mm

Note: Normally rider sag that uses 1/3 of the stroke is a good starting point.
Different riders will prefer different numbers. Top teams/riders will also test optional spring rates for varying conditions and tracks.

Special Note for Road Race 125:

Without Rider/Static Sag

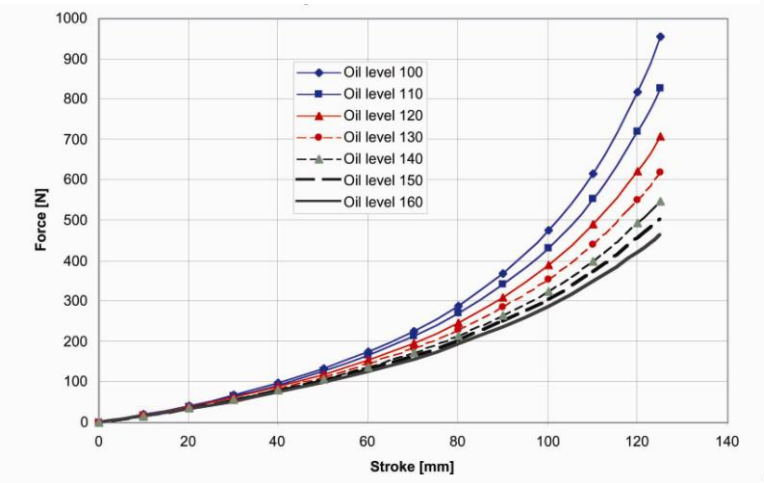
Rear (R1 – R2)	Just top out, 0mm
Front (F1 – F2)	15 - 20mm

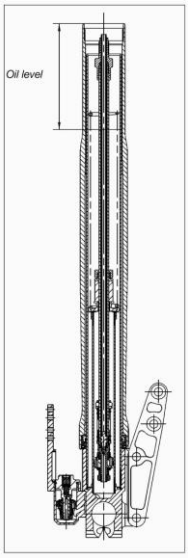
With Rider/Rider Sag

Rear (R1 – R3)	10 - 20mm
Front (F1 – F3)	25 – 30mm

Suspension and chassis geometry set up on a road race 125 is a little subservient to the need for optimum attitude of the fairing into the airstream. Minimising aerodynamic drag and optimising forward speed on a 125 is all important.

Front fork oil level (Trapped air volume)





First see manual. The modern front fork of cartridge type is very sensitive to oil level changes, because of the small air volume.
Air inside the front fork works as a secondary spring.
The different level of oil affects the spring ratio from the middle of the stroke and has a very strong effect at the end of the stroke.

When the oil level is raised:
The air spring in the later half stage of travel is stronger, and thus the forks are harder.

When the oil level is lowered:
The air spring in the later half stage of travel is lessened, and thus the front forks are softer.
The oil level works most effectively at the end of the fork travel.
Note: Adjust the oil level according to your manual.

Suspension Balance

Perform a static test by pushing down on the tank of the bike. Everything must harmonise! If the suspension is well set up and balanced both the front and rear of the bike should more or less compress and also return evenly. Different riders will demand different set ups but essentially one end of the bike shouldn't be fighting the other.

Suspension Service Intervals

Forks / Shocks

Manufacturer	Off-Road	Road / Road Race
Ohlins	Every 25 – 30 hours	Once yearly
OEM Shocks with gas Separating bladder	Every 15 – 20 hours	Twice yearly

Although in reality very few people will service at such intervals, suspension performance slowly and imperceptibly deteriorates.
Bear in mind that on a typical motocross track the suspension units undergo approximately 17000 compression cycles every lap.
OEM shocks with gas separating bladders require more frequent service as the nitrogen gas migrates through the bladder and homogenises with the oil, deteriorating its performance.
A higher preponderance for fade and overheating also destroys the oil and wears components at a faster rate.

Top road race teams may have the suspension apart several times at race meetings to optimise the internal settings so the act of oil changing alone is frequent.

- **DON'T HAVE JUST ANY JOE BLOGGS "SERVICE" YOUR SHOCK!**

Appropriate, certified training, attention to detail and the correct equipment is essential to do the job to a proper standard. It's also your safety at stake!

- **Please call for the nearest certified technician to you.**

CROWN KIWI TECHNICAL is a company focused solely on optimising motorcycle and race car suspension.

- Exclusive NZ Distributor for **OHLINS** Suspension.
- Master **RACE TECH** centre for NZ.
- Suspension solutions for road race, track day, road riders and touring riders seeking handling precision and ride comfort. MX, ATV, Race car and **CUSTOM BUILD**.
- Suspension solutions are also a **TYRE LIFE SOLUTION (!)**
- We rebuild/service/up spec many suspension brands. (Please call)
- Cost effective but high performance upgrades of stock suspension units using **RACE TECH** components or (where possible) reworking stock components.
- Sophisticated **SUSPENSION DYNAMOMETER** enables us to verify damping curves and match dampers. It also enables us to closely mimic **OHLINS** damping curves into stock units from our knowledge base.
- **VACUUM BLEEDING** of shocks, gas cartridges and steering dampers for a superior job.
- Personalised road or track set ups for your application.
- **QUALITY** work borne of long experience, knowledge and good old fashioned fussiness! Ongoing **FACTORY TRAINING** in Sweden and U.S.A.
- You can have the same quality of suspension used by Bugden, Stroud, Shirriffs, Smith, Charlett, Williams, Fitzgerald, Toyota Racing Series, Subway Yamaha, Honda Racing (MX & Road Race) and many more.
- Quick turnaround by **QUALIFIED, EXPERIENCED STAFF**.

WE GUARANTEE BIG IMPROVEMENTS FOR ALL BUDGETS AND PROVIDE FULL HELPFUL BACKUP.

All enquiries welcome

Ph: 06 751 2100 A/Hrs 06 769 6969 Mobile 021 825 514
Email robert@crownkiwi.co.nz