



FREQUENTLY ASKED QUESTIONS

Q: How can I tell if I need suspension work?

A: Well that's a tough one. Here's the problem, "The best you've ridden is the best you know." Until you've ridden something better, the best you've ridden is the best you can compare it to. In fact, it's not the best you've ridden, it's the best you remember. Most people know they could probably use some work when the bike bottoms severely or it spits them off but it's hard to tell when your suspension is limiting the amount of available traction.

To expand on this concept think about the sensation of harshness. What you think is OK, I think is harsh, simply because you are use to getting beat up on the bumps. Our goal at Race Tech is to spoil you. Once you've ridden a well set up bike you won't want to go back to whatever you've been riding. Here's something to keep in mind, our guarantee. We guarantee you'll love it and we guarantee it will be better than anything else, period.

Q: How do I know if my spring is off or my damping is off?

A: If you have a problem with bottoming, for example, it could be caused by either too soft of a spring or too little compression damping. The easiest way to get your spring rate in the ballpark is to do a "Valving Search" on our website. This will give you our recommendation for spring rate. Once you have the proper rate the rest is damping. That is what the Gold Valve® kits are all about, personal setup for you.

If your front end is diving, first of all, it should. If it dives too much or too little or if it bottoms you will need to do something about it. How much it dives can be affected by either spring rate or damping. When you hit the front brake, the front end dives. If you keep the brake on a constant amount the front end will dive and then oscillate around a certain height. Let's call this height the Dynamic Ride Height. This Dynamic Ride Height is totally determined by spring forces. How much it oscillates and how much it initially overshoots this height is affected by damping forces as well. Again the key thing is to do a "Valving Search" on the website.

Q: What is "Race Sag" (Static Sag)?

A: Static Sag or Race Sag is the amount the bike compresses from fully extended, with the rider on board.

Here's how to measure it.

1. First extend the forks or shock completely and measure from the wiper to the bottom of the triple clamp on forks or from the axle to a vertical reference point on the chassis. This is L1.
2. Take the bike off the stand, put the rider on board in riding position. Get an assistant to balance the bike or have the rider hold onto something, compress the suspension about 25mm (1") and let it extend very slowly (slowly is the critical term). Where it stops, measure the distance between the wiper and the bottom of the triple clamp or the axle and the reference point on the chassis again. Do not bounce. This is L2. (If there were no

friction in the seals the bike would come up a little further.)

3. Next lift up on the suspension and let it drop very slowly. Where it stops measure again. Do not bounce. This is L3. The reason L2 and L3 are different is due to stiction or drag in the seals and bushings. (If there were no friction in the seals or the linkage the bike would drop a little further.)
4. Half way between L1 and L2 is where it would come to rest with no friction. Therefore L2 and L3 must be averaged and subtracted from L1 to calculate true Static Sag.

$$\text{Static Sag} = L1 - (L2 + L3)/2$$
5. To adjust Static Sag make longer or shorter preload spacers or use the preload adjusters, if available.

It is important to note that there are no magic Sag numbers. However here are some guidelines to use as starting points. Please refer to the DVS Valving Search for specific guidelines.

Bike Type	Front %	Front (mm)	Rear %	Rear (mm)	Rear Free Sag (mm)
Dirt Bikes (>300mm travel)	22-25%	65-75	30-35%	95-110	25-50
Dirt 80cc Minis	22-25%	55-65	30-35%	75-105	20-40
Street Bikes	28-33%	30-35	28-35%	28-37	2-17
Road Race Bikes	23-27%	25-30	23-30%	23-32	2-17

Q: I am on a limited budget. How can I get the biggest bang for the buck?

A: The answer to this question differs with each bike. In general springs are where I would start. If there are any products available for your model designed to reduce friction like Ultra Slick Fork Bushings or Ultra Slick Suspension Fluid®, this is generally a fairly low cost way to improve performance as well. Gold Valves® and Emulators® are designed to change the damping curves and are essential if you want an outstanding ride. They allow custom setup of the damping for the individual. In some cases checking the anodizing on the outer fork tubes for wear can be a big deal for friction too.

Q: I have heard of progressive springs and this concept makes sense to me. Why does Race Tech recommend Straight Rate Springs for forks?

A: When setting up the spring forces in a bike you want a setup that is progressive enough yet not too progressive. A setup that is not progressive enough will have a tendency to feel too harsh yet when a big hit is encountered bottoming occurs. A setup that is too progressive will either drop through the travel feeling mushy and then feel as though it hits a wall or can feel good until it hits that wall. On front forks there are two forces we consider to be "spring" forces. First is the coil (mechanical) spring and second is the force due to air pressure and oil level. Even if you run zero air pressure the oil level causes the pressure to increase as the forks are compressed. By its very nature this increase in pressure is very progressive. We have found that in combination with a straight wound spring we have a good level of progressiveness. If we

want more progressiveness we simply raise the oil level.

Another subtle benefit of straight wound springs is that they are easy to understand. In order to make sense of progressively wound springs you really have to map out the force as you compress the spring. For example a spring marked 20/40 lb/in (excuse me for the Imperial units but this will work with metric units as well) may start out at 20 lbs/in in the first inch but where does the 40 refer to? It might be referring to the rate in the 4th inch or it could be referring to the rate in the 6th inch. This would cause a huge difference in ride.

Q: What is the difference between raising the oil level and changing the viscosity?

A: Raising the oil level increases the compression ratio in the front fork and therefore changes the progressiveness of the spring forces. This has nothing to do with the damping (key point). Changing the oil viscosity changes the damping. Both the compression and the rebound. The spring forces are sensitive to position in other words where it is in the travel while damping forces only care how fast the damper is moving.

Q: I am going to go race my sport bike. What do I need to do to get the suspension ready to race?

A: Send it to Race Tech. (ha ha) But seriously folks most people think they need to make their bike stiffer and slower so they crank in the adjusters and perhaps put in thicker oil. In many cases nothing could be further to the truth. In general we use stiffer springs both front and rear for racing than for street use. Compression damping is higher than street use as well but rebound is nearly identical. Remember the faster you go the quicker the wheel needs to rebound in order to stay in contact with the ground. Check out the "Valving Search" for your Personal Valving Setup.

Q: I have a KTM with the PDS system. I have seen a lot of aftermarket suspension companies put on straight rate springs and the magazines seem to like them. Why does Race Tech want me to use progressively wound springs?

A: One of the problems with the PDS (no linkage) system is that it doesn't have much rise in rate in other words it is not progressive enough. To give you some numbers for comparison the 2002 RM 125 has a 24% rise in rate and the YZ 125 has a 30% rise in rate while the KTM has about a 10% rise. This means it will tend to be both too harsh on the small bumps as well as too soW on the big bumps. Every setup is a major compromise, if it is stiff enough it's too harsh, if it's plush enough it's too soW. Using a progressively wound spring makes the rear wheel spring forces much more progressive, more in line with the Japanese stuff. Unfortunately the number of progressively wound springs that have been available have been rare so most aftermarket performance shops have used straight wound springs instead (maybe some of them actually think it works better that way but our tests refute this).

Q: I don't race (or "I'm only a novice."). Why do I need Race Tech suspension?

A: Just BECAUSE! (just kidding) Even if you don't race or if you are a novice you can greatly benefit from well tuned suspension. Most beginner riders can feel a major change in ride when we setup their bikes. Even if you think you are too slow to know the difference wouldn't you want your suspension to keep you on the rubber side as much as possible? Comfort and safety are additional benefits on top of control and speed.

Q: What is a Gold Valve?

A: A Gold Valve® is Race Tech's valving kit. It is designed to break through the limitations of the stock piston design. Research has shown that when the piston ports are as large as possible the harshness is dramatically reduced. This allows a valving stack to be personally tailored to the

individual rider. It allows bottoming resistance to actually be increased as the harshness is decreased. The Gold Valve® itself is only the first step. The key to a successful custom setup is the Digital Valving System or DVS available on our website. In development for over 8 years, this computerized valving system calculates the proper setup for the individual rider and application from over 300,000 possible valving combinations.

Q: The Gold Valve has such huge ports, won't it just blow through the travel?

A: See "What is a Gold Valve®?" The truth is that the velocity of the damper is controlled by the input (the size and shape of the bump as well as the speed at which it is hit) as well as the damping setup. The Gold Valve® is designed to eliminate restriction by improving flow to allow for a setup that is both plush initially and improves bottoming resistance. The huge ports of the Gold Valve® allow incredible valving flexibility. If we wanted to, the valving could actually be setup so stiff with a Gold Valve® that it is as bad as stock. Of course we don't want that. What it allows though, is the ability to make a damping setup both firm and plush at the same time.

Q: Gold Valves have been out for a number of years. Why are Gold Valves still needed on current models?

A: The factories have a pretty big challenge when setting up their suspension. They have to set it up for some mythical "average" rider. They also realize that it makes more sense for them to error on the stiff side rather than on the soft side if they are going to release it to the general public with all shapes and sizes and types of riding and skill levels. They also have budget considerations and time limitations to release new models. The truth is the stock pistons have been very similar since 1987. I believe they realize their stock settings must be a compromise and they leave the custom setup to the aftermarket.

The Gold Valve® has been out for a number of years and the theory behind them still stands up. The real key is the Valving that goes on the Gold Valve®. Race Tech's development goes on year round. This process has produced more refined DVS settings with every successive year.

Q: What is so great about Race Tech Springs? Why do you call them "High Performance"?

A: To understand what is so great about Race Tech High Performance Springs the first thing to know is the industry standard for spring rates. Everything that is made has production tolerances. With springs the industry standard is +/- 5%. This means a spring marked 5.0 kg/mm could actually be a 4.75 to a 5.25. This means the rates overlap radically, a spring marked 5.0 and one marked 5.5 could actually be the exact same rate. To handle this situation we 100% test our springs. This is a very time consuming process but eliminates this problem.

The term "High Performance" is thrown around fairly lightly these days by many people. In the process of design the spring manufacturers have a number of options in making a spring. They can use a lot of coils of thick wire or less number of coils of a thinner wire and end up with the exact same rate. The thinner wire and less coils combination makes for a spring that weighs less than the other combination. Of course a higher quality material and process is required to yield a reliable spring. Race Tech springs use the finest materials, they are heat treated, shot peened and preset (eliminates sacking). This is what makes Race Tech High Performance Springs light weight yet tough with very accurate rates.

Q: My forks pump up with air. Why, and what do I do?

A: The job of the fork seal is two fold. First it must hold the oil in and second it must keep the air out. As the seal wears or as the fork tube gets pitted it can lose the ability to keep the air out. The solution is to rebuild the forks and replace the seals. When we do a rebuild we will typically

polish the tubes as well. Unfortunately at some point the tubes will be pitted too much and will need to be replaced.

The other reason forks "pump up" is due to temperature, altitude and barometric pressure changes. If the temperature increases or you go up in altitude or the barometric pressure decreases the forks will have a higher pressure in them. This is normal and this pressure buildup should be bled off when you get to your riding location and perhaps after your forks are brought up to temperature.

Q: I have a bike with damping rod type forks. I have heard that Gold Valve Cartridge Emulators® are the greatest thing since sliced bread. Why?

A: Old fashioned damping rods while inexpensive to manufacture have major limitations. To create compression damping, oil is shoved through a hole or holes. Shoving oil through holes creates very little resistance to flow at low vertical wheel velocities as when hitting a dip or gully or applying the front brakes. This allows the forks to shoot through the travel fairly easily, diving or bottoming in these situations. On the other hand when the wheel hits something square edge, especially at speed, it needs a lot of oil to pass through the damping holes very quickly. Unfortunately the nature of shoving oil through holes is that as the wheel velocity increases the damping force increases with the square of the velocity. In other words if you double the velocity you get four times the force. This means the hole basically "hydraulic locks" resulting in a harsh spike. Damping rods give the worst of both worlds, they are both too mushy and too harsh at the same time.

An Emulator® is a valve that sits on top of the damping rod and is held in place with the main spring. To install them we simply remove the damping rods and drill out the existing compression damping holes so they are so large they do not create any appreciable damping. Then during reassembly we simply drop the Emulator® on top of the damping rod. The Emulator® creates the compression damping of a state-of-the-art cartridge fork. The ride is both firmer and plusher than the damping rod and is completely tuneable. Sliced bread is good, Emulators® are better.

Q: I have external adjusters. Why do I need a Gold Valve?

A: The range of adjustment for external adjusters is very limited. In some cases their affect is less than 3%. They are good for fine tuning, however, many damping changes need to be in excess of 200%.

Q: Where can I get an access code for valving specs?

A: The access code should be on the first page in the top right hand corner of the instructions that come packaged with your Race Tech product. If there is no access code call or e-mail Race Tech.