What To Look For When Buying A New Bike

Don't Shop For A Certain Size

You may not be aware of this: manufacturers measure frame sizes differently. A 55 cm frame of one brand may be quite different to a 55 cm frame of another brand. So don't let anyone tell you what size bike you need until you have selected the brand and model. Yes, even different models of the same brand will have different dimensions for a given frame size. How important is getting the right size? It is probably the single most important aspect of your new bike. Just imagine if you bought the wrong sized shoes. They would be pretty useless, wouldn't they? It's the same with bikes. You may be surprised to know that in order for you to get maximum satisfaction out of your riding, ten dimensions of your bicycle have to be correct *to the centimetre.* Not just one, but ten. And every model can vary in a number of dimensions to another model.

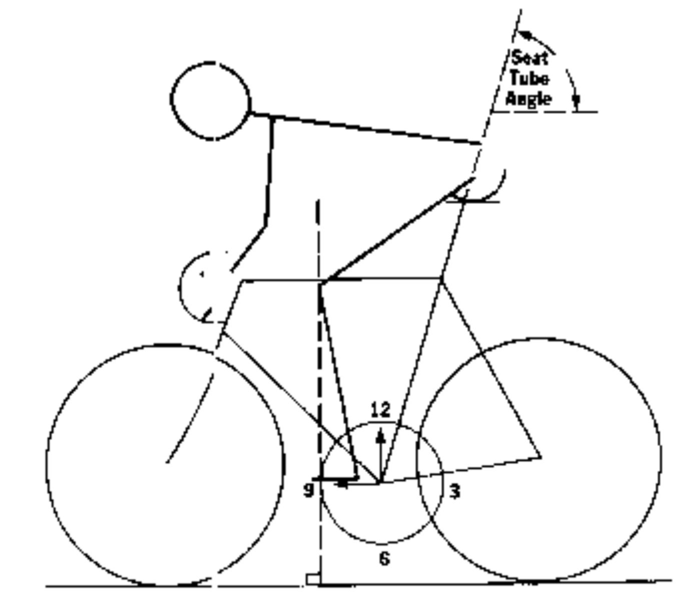
The most certain way to get the right sized bike is to first choose the model you want, then let us work with you to get that perfect size. Unless you have years of experience setting up people on bikes, your chances are pretty slim that the bike you buy will be perfect for you.

Get Fit!

You may be surprised to know that the majority of people who ride bikes don't know how important it is to have your bicycle correctly fitted to you. And we're not talking about just the right frame size here.

There are those ten other measurements pertaining to your bike that have to be right to the *centimetre* for you to get the most out of your new bike. Certain measurement systems exist such as the JS body measurement tool at the Bike Bug shop (612 9954-5599) which used in conjunction with stationary bike trainer assessment results in a bike set up that will provide you with a **balanced** ride in four respects:

efficiency (power),
handling,
aerodynamics, and
comfort.

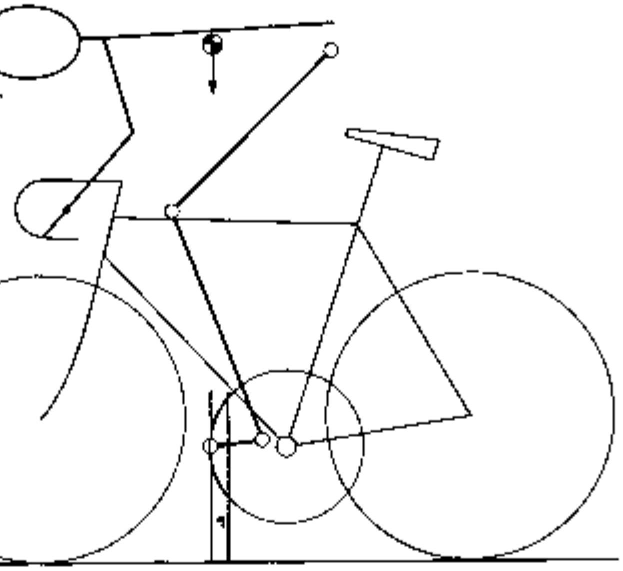


I feel that proper fit should involve more than a good seated position. A good cyclist uses a variety of riding position, including two different out-of-the-saddle positions - one for sprinting and a slightly different one for climbing. The rider's center of gravity (CG) over the pedals changes among all three positions; good overall bike position would assure that the rider is well balanced and does not have to expend excessive muscular energy in the arms and shoulders to support his weight in any of them. Also, there may be other factors that complicate fit, including unique anatomical characteristics and poor upper body strength.

It should be easy now to see that a rotation of the leg/crank lever system about the bottom bracket is the same as a change in seat tube angle. A shallow seat angle has the same effect as rotating the rider in our diagram clockwise about the bottom bracket; a steep one does the opposite. In both cases, the plumb bob will swing away from the pedal spindle, but the lever system remains the same. Obviously, too much rotation away from seat tube angles found on diamond frames will change the effects of gravity enough to be noticeable. The horizontal component of the peak pedal forces may become large enough to overcome the frictional forces that help keep you in the saddle.

The peak pedaling force applied by the seated rider produces an upward and slightly rearward force at the saddle (Figure 3). If pedaling forces are small, the cyclist is able to remain seated because the upward component of force is smaller than the rider's weight on the saddle, and the rearward force is smaller than the static friction between the rider and the saddle. During the angular phase of the pedal cycle when the pedaling force is small, the rider tends to fall forward due to the moment between his CG and the saddle, and this must be resisted with upper body and torso effort.

As peak pedaling forces increase, the gravitational constraining forces on the rider at the saddle are no longer sufficient and larger arm and torso efforts are required to maintain a



ting position.

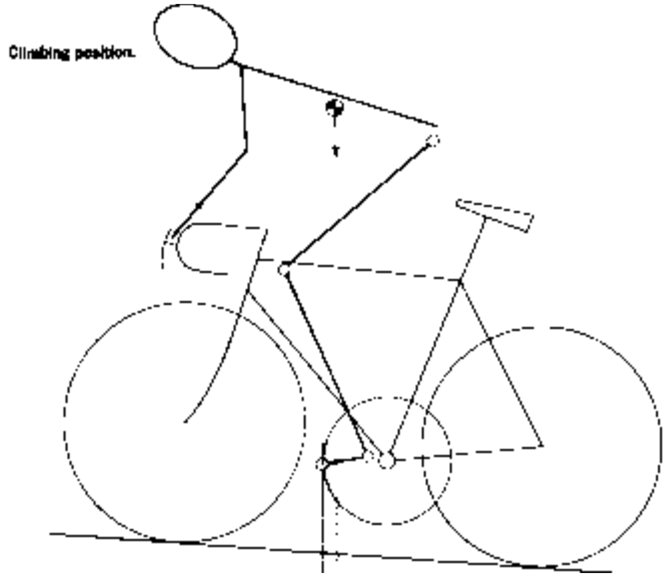
seated position. At extremely high pedaling forces, the rider comes out of the saddle to straighten the load path for his arms which allows them to effectively resist the loads created by the much stronger leg muscles. The diagram of the lever system in Figure 1 is no longer accurate at this point; the rest of the rider becomes a complicated system of levers as well.

The two basic out-of-the-saddle riding positions are useful in many circumstances. The one mentioned above is used to accelerate as rapidly as possible during a start, jump, or sprint. A slightly different position is used to climb hills. These two circumstances are worth considering in more detail in order to understand how the horizontal saddle position determines the rider's overall position on the bicycle.

The sprinting position is the simpler of the two. The rider is making such large pedaling forces that his torso and upper body can do little more than resist the peak forces of the power stroke. The arm effects between the peaks keep the bicycle leaning in the direction that puts the pedal being pushed under the rider, as well as locating the rider and contributing a small amount to the pedal forces. Peak pedaling forces are large compared to gravitational forces, and the rider's position adjusts accordingly, shifting his upper body forward to achieve the best load path for the arms (Figure 4). The rider's CG is typically forward of the pedal at this point. During the phases of the pedal cycle when pedaling forces diminish (around the six and twelve o'clock positions), there is a small torque on the rider about the pedal. As before, this will tend to cause the rider to fall forward and will need to be resisted with upper body and torso effect.

The pedaling forces are smaller when climbing. When a rider gets out of the saddle to climb (Figure 5), his CG moves over the region directly above the range of pedal positions where the pedaling forces are high (from eight to ten o'clock). This allows the rider to "balance" on the pedals when the forces are high, minimizing the arm effort required and lets the full weight of the rider contribute to pedaling forces. The torque on the rider is still there when the pedal forces decrease and must be resisted, but it is smaller because the rider's CG is closer to the bottom bracket spindle. The geometry of the link between the torso and bars made by the rider's arms when climbing out of the saddle is something I pay particular attention to when I fit a rider, but is somewhat flexible due to the larger number of bones and muscles that make it up.

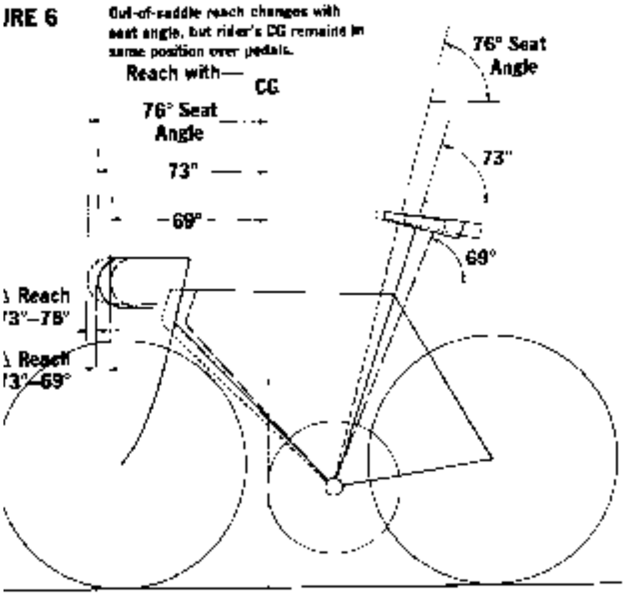
The CG of a seated rider in a fairly aerodynamic position will often be about 1 to 1.5 inches (2.5 to 3 cm) in front of the bottom bracket. I have determined this in two ways: by direct measurement of the rider's anatomy (measuring this balance point), and by weight distribution calculations (weighing the axles). Of the two, the latter is the more



accurate. The result is generally consistent with a 45/55 fore and aft weight distribution that many classic cycling texts regard as optimal.

With this insight into pedal forces and weight distribution for both in- and out-of-the-saddle riding, we can look at what happens to rider position as the seat angle is varied, and how these variations affect performance. We can start with something in the middle of the range of seat tube angles and see what changes occur to the rider's position as this angle is varied.

IRE 6 Out-of-saddle reach changes with seat angle, but rider's CG remains in same position over pedals.



At about 73 degrees, the rider's CG is a little in front of the bottom bracket spindle when seated, and it moves a little forward when he rides out of the saddle. As the seat tube angle is rotated back (made shallower), the seated rider's CG will shift back. The bars will have to come back to keep the reach the same. However, when a rider gets out of the saddle, only the bars and pedal locations determine position. Since the bars are back, the standing rider's reach is shortened. There is less room available between the rider and the bars (Figure 6). At 69 degrees, the out-of-the-saddle reach is reduced by seven to eight percent. For a typical medium-sized bicycle, this change correlates to about a five cm reduction, a large change compared to typical stem length adjustments.

The opposite result occurs when the seat tube angle is steepened. The seated rider's CG moves forward and the distance between the bars and saddle is maintained by installing either a longer stem or a longer top tube. But as the rider stands out of the saddle, his CG will again move to the spot a little behind the nine o'clock pedal position. The result is that the rider has to reach farther forward to the bars. At 76 degrees, the out-of-the-saddle reach is increased by five to six percent and the rider will have to reach forward roughly four cm more than at 73 degrees. Again, you can appreciate that this is a fairly large change when compared to a typical stem length adjustment.

In both these extreme cases, there could be problems. If the seat tube angle is too shallow, rider CG will be well behind the position where it is comfortable and efficient for out-of-the-saddle riding. If he jumps out of the saddle for a sprint, he may hit his knees on the bars. In the climbing position, the rider may have to lean back uncomfortably far, putting extra stress on the arms and shoulders. In most cases, the rider can put just as much power in the pedals, but only at the expense of upper body comfort.

As an example, early off-road designs suffered from these problems, although current frame design trends solve it.

Too steep a seat tube could cause a rider to have to reach too far for the bars when out of the saddle (a poor load path), cause the saddle to interfere with the rider's legs as the bike leans from side to side, or put his CG too far forward, increasing the load on the arms and torso to catch himself during the low force portions of the pedaling cycle. Some production frames in the smaller sizes have these problems built in. They have steep seat angles and uncomfortably long reaches due to the geometrical constraints, such as wheelbase and tow clip overlap, forced upon them by 27-inch front wheels.

Now we can derive some insight into what proper seat tube angle should be. The correct seat tube angle allows correct weight distribution for both in- and out-of-the-saddle riding. The cyclist will find the handlebars in just the right position for a comfortable riding stance in all riding positions. I am neglecting the fact that the overall weight distribution of the bicycle affects the dynamics of the vehicle and may need to be considered, though that is not generally a problem with road frames.

I begin my fitting procedure by taking the standard anatomical measurements that have mechanical significance, including two leg lengths (inseam and hip socket to floor), foot length, torso length, and a measure of arm from the shoulder to the center of the hand as it clasps the handlebars. Then I determine the rider's CG. For convenience, I use his seated CG which I measure by placing the rider in a full crouch against the wall and have him back up on his feet a bit at a time until he is on the verge of toppling over. Since a human being always balances on his feet. I know his CG will be right over the balls of his feet at the moment he topples over. I measure this distance away from the wall. This becomes the horizontal coordinate for the rider's center of gravity.

With the anatomical measurements and the CG finger in hand, I am ready to design the frame. My first concern is setting the rider's out-of-the-saddle position. Invariably, a climbing rider will place his CG at a spot two to three cm behind the pedal spindle at the nine o'clock pedal position. This is the case for all riders. The reach the rider needs to the bars from this position depends on several factors, including torso and arm length, as well as how his body mass is distributed. The seated CG figure helps me here. For instance, a rider with a lot of upper body mass will not want to reach as far to the handlebars as another rider of equal stature but with more lower body mass. I have worked out a mathematical equation that establishes a good arm-to-torso relationship for a comfortable climbing position using the rider's seated CG, plus his arm and torso measurements (this relationship includes a significant amount of anatomical information that involves the relationship of numerous bones and joints in the standing rider; any interested framebuilder can contact me for details about this equation). The math gives me the horizontal distance from the pedal at the nine o'clock position to the handlebars.

Now we know where the handlebars and pedals are so, using the rider's torso and arm measurements, it's a simple matter to extend the top tube back, locating the seat. At this point, I look at the overall design and consider a rider's particular requirements. For instance, if the rider demands a short wheelbase, I'll try to change the design to accommodate him.

In my experiences so far, I've found that most riders are suitably positioned with a seat angle that falls between 72 and 74 1/2 degrees. What is important is that I have not noticed any specific correlation between seat angle and my customers' femur bone length. I am reasonably certain that none exists. Still, it is easy to see how the KOPS method can get by. It usually puts the rider in the range of correct fit, although in my experience, the more anatomical proportions vary from the norm, the more off the mark the KOPS method is.

You achieve that balance when you get the bike that's perfect for you *and* you get each of those ten measurements exactly right in setting up your bike.
And those ten measurements? Here they are….

1. Crank length

Too short and you'll be losing leverage for hills and acceleration. Too long and your pedal stroke will be compromised. Your knees won't like you either.

2. The ball of your foot to the pedal axle

The all of the foot should sit over the pedal axle or up to 5mm infront only. Too far forward and you'll be favouring your hamstrings at the expense of your quads. The result: possibly a loss of efficiency, especially if you are male. Too far back and your Achilles tendon may never be the same. The cleat should transfer power under the ball of the foot to the pedal.

3. Knee to the pedal axle

This is a key position to achieving balance on your bike. At horizontal cranks the back of your patella should be plumb in line over the pedal axle. If your knees are too far forward (due mainly to saddle forward position), you'll have too much of your weight forward on the bike and more knee bend (flexion). This will compromise your handling.and subject the knee to higher loads. If you are too far back, the same issues may arise, but for different reasons. Experienced, competitive riders can achieve a balanced rearward position. But under pressure even they will move forward slightly to maximize their efforts.

4. Seat height

The seat height is 0.88 the inseam length to the foot for a 170mm crank arm length and the heel should rest on the pedal at full extension on the bike. . Set it too high and your hips will be rocking and your pedal stroke will be inefficient. Too low and you'll do damage to your knees

5. Seat angle

Comfort is the key here. If you are male, you'll probably like it level. If you are female, you may prefer a very slight dip in the front. If you like your saddle positioned differently, it's often an indicator that something else is wrong with your set-up.

6. Top tube length

The top tube length is an important measurement
on your bike and one that can't be varied. The correct length top tube is the foundation to achieving the balance that you seek.

7. Stem length and…

8. Stem height

Comfort, handling and aerodynamics are in balance when the right stem is used with the right top tube length. Your neck, shoulders and arms should be relaxed and you should feel like your "cockpit" (saddle to handlebars) is roomy enough to comfortably handle the bike.

9. Handlebar width

Achieve a balance between handling, aerodynamics and comfort by selecting handlebars that are suitable to your body and the type of riding that you will be doing.

10. Handlebar rise (MTB or cross bike) or drop (road bike)

Even with 9 positions exactly right, you still want to get No. 10 right to achieve that perfect fit. Too low on this one and you'll lose efficiency, comfort, handling and even aerodynamics. Too high and your handling and aerodynamics will be compromised. Remember, the best bike set-up achieves a balance between efficiency, handling, aerodynamics and comfort that is best suited to your needs. You may want more comfort and handling in a recreational bike or alternatively, more efficiency and aerodynamics if you are racing. An enthusiast mountain biker faced with hills and varying terrain would seek handling and efficiency above comfort and aerodynamics, for instance.

Whatever your style of riding, when you buy your new bike from us we'll work with you to achieve *your* perfect balance in the four areas. And that will make all the difference in the world to the pleasure you derive from riding your new bike.

Every Bike Has A Heart And Soul

The heart and soul of any bicycle is its frame. A superior frame means you will have a bicycle that is a joy to ride. Whether you want a frame that's light for great hill climbing, stiff for blinding acceleration or resilient for a comfortable ride, there is a frame that is just right for you. Three elements are central to a great frame: design, materials and workmanship.

Cheap bikes have cheap frames. At first glance the untrained eye can't see much of a difference, but wait until you start test riding. What an eye-opener! In fact, in a recent survey 92% of the people who test rode bikes said it made a difference in their choice. You can feel the difference between a quality frame and a cheap one even if you have no experience riding bikes. You may not be able to explain it, but you'll feel it.

A good frame doesn't just happen, it evolves. First a concept is explored and then prototypes are made. These are tested in the lab and then more importantly, in the great outdoors by experienced cyclists. Further changes are made to improve the ride you'll ultimately get.

Materials used in bikes vary. Aluminium frames for example, come in different commercial grades. The better grades are stiffer and have a longer life. And even amongst the commercial grades, the world's best manufacturers will opt for raw materials that are certified to aerospace quality to deliver you a frame that is a sheer joy to ride.

The final key to a great frame is the workmanship. The external and internal wall thicknesses can be shaped to get maximum performance from your bike and even the hand welding found in better bikes will give you a better ride. Remember, you can always change the components on your bike, but changing your frame is a costly exercise. Get the best frame you can afford. You will appreciate the difference every day you ride.

Components And Accessories

Many people base their bicycle purchase on the quality of componentry that they are getting for their money. It is a good idea to compare components, but remember that comparing frames is more important...and harder.

Most manufacturers provide a suitable level of componentry for the quality of frame they are selling. There are many types of componentry which you can choose based solely on your personal preference. In other words, the parts will all work, just choose what feels best to you. Also consider upgrading certain parts of the bike if you are rough on equipment. There are up to 40 different accessories you may want when you buy a new bike. Some will make you more comfortable, others will improve your performance, some will make your riding safer. Others are just fun.

The Women’s Way

You would think that all bike manufacturers – and bike shops! – would recognize the difference between men and women, but they don’t. Sure, many offer a step-through frame but that’s where it ends. The women’s range of mountain, cross and road bikes should feature comfortable women’s saddles, a shorter reach to the handlebars so you won’t get aching shoulders, rises in the handlebars designed specifically for your riding comfort, and shorter cranks to optimize your efforts.

(Article thanks to RENEGADE CYCLES
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