CYCLINGARSENAL

Bike Fit Guide:

Maximizing comfort, power, efficiency, and performance on the bike

Powered by: BPC Performance Coaching
www.buildpeakcompete.com

Introduction

Disclaimer: Fitting is an art and a science. There is no replacement for an experienced and knowledgeable fitter. The best fitters understand the physiology and biomechanics of pedaling a bike, as well as the effects that different equipment will have on the overall set up. They can pinpoint not only issues with your fit, but also with your strength and flexibility. With that said, all fitters are not created equal, and there are several fit certifications that leave a lot to be desired when actually optimizing a bike fit for each individual. If this guide doesn't help you get comfortable, we suggest asking your local community who the best fitter is in your area. Or, make a trip to another area to get fit. It will be worth every penny.

As you will soon learn, there are a lot of variables that go into properly fitting an individual on a bike. Be patient with the process. Also realize that your fit will change as you increase or decrease strength, fitness, and flexibility, so recheck your fit every 6-9 months. We encourage you to read the full manual before you bust out the allen wrenches. Maybe more than once. There is a lot to consider, even before you jump on the bike. This manual also includes a Trouble Shooting Guide to help find solutions to common injuries and comfort issues.

As you move through your fit process, we have two tips for you:

Tip #1: Only make small changes each time, testing these adjustments out for a few rides before making additional modifications. Large changes in fit can have severe negative effects on your performance and comfort on the bike, even if the previous fit was not optimized.

Tip #2: If you aren't experienced with fitting, we suggest limiting the number of changes you make during your first session. If you change too many variables at one time, you will not be able to identify which changes were positive and which may have been negative. Do not rush the process - make a change, ride it to make sure it is comfortable, and then move on to other areas that need to be addressed. If you are having difficulty, you may want to consider getting professionally fit.

No Perfect Formula

One important thing to be aware of: there is nobody out there with the exact same body type, body proportions, physical training, flexibility, strength, and range of motion that you possess. This means that there is no "exact formula" that can be used to dial in the bike position for every rider. There is also no machine, device, or computer program out there that can fit you to your "perfect" position. This manual is going to give you ranges, starting points, and suggestions on how to best help you dial in your fit. Where your body type fits in those ranges will depend on all the unique attributes we just listed above.

Fitting the Bike to the Body

With such a large variety of body types, bike manufacturers simply cannot accommodate everyone. Instead, they provide a variety of bike sizes (usually in 2 cm increments) and geometries to meet as many individual's needs as possible; while not having to produce 20+ frame sizes. That would kill their profits. Instead, they utilize the accessories listed below to allow riders to dial in their fit. Essentially, the rider must work to optimize the bike within the confines of these limitations, while accommodating their personal athlete profile. This doesn't

mean buy a frame that doesn't fit you and go to town. (Going into all the details on frame sizing and geometries would double the length of this guide) There are companies out there that will make you a custom fit frame based on your body geometry, but most people opt for the closest option from a manufacturer's standard sizing.

Proper frame size is selected relative to your general physical makeup (height, inseam), and then the appropriate mix of the following accessories are used to match your more unique physical attributes:

- stem length
- stem angle
- headset spacers
- seat post length
- seat post setback
- saddle width, length, and rail adjustment
- handlebar width, drop, and ergonomics
- Handlebar tilt and hood position
- crank arm length
- cycling shoes
- cleat position

By riding a frame within the range that suits your body proportions and then utilizing proper accessories, *most* riders can dial themselves into a comfortable, powerful, and efficient riding position.

For those that have a body type out of the “normal” range, you may be forced into going with a custom frame build that suits your genetic makeup in order to truly dial in your fit. Here are a few examples of challenging scenarios that go along with dialing in your bike fit:

1. You have an extra long torso relative to your height
2. You have extra long legs (inseam) relative to your height
3. If you can scratch your shins without bending over, you guessed it, getting dialed into a bike will be more challenging.
4. You are so tall that you do not fit onto a size 64 (about the largest made by most manufacturers)

It is also important to note that there are factors outside of your bike and body geometry that may be affecting your comfort and performance on the bike. In fact, your bike fit may be just fine. We recommend making sure the following three items are addressed either before, or in conjunction with, dialing in your bike fit:

1. Achieving a base level of muscular strength through cycling specific strength training
    a. Poor general physical strength can lead to discomfort in lower back, arms, and shoulders
    b. Lack of core strength can decrease power transfer while also playing a possible role in lower back pain
    c. Poor hip strength can lead to a decrease in power and possible knee pain
    d. Poor lower body strength (and muscle activation acquired from strength training) can impact power development, comfort, and efficiency.
2. Maintaining a functional range of motion and flexibility level
    a. Poor range of motion and flexibility can impact muscle firing capacity, reducing power and potentially being a cause for discomfort and pain.
    b. Your level of flexibility will also determine how aggressive of fit position you can achieve. An overstretched muscle won’t fire with a lot of force, so

making yourself extremely low on your bike (which stretches the glutes and hamstrings) may be pointless if you are grossly inflexible.

3. Incorporating a proper, efficient, pedal stroke
    a. Make sure you are maintaining proper lower body leg angles (ankle and foot position greatly affects bike fit)
    b. Make sure you are firing all the major muscle groups and with the correct timing
    c. Make sure both sides of the body are working together and not against each other

By making sure you have dialed in all three of these areas, along with the following bike fit guide, you should be well on your way to improving comfort and performance out on the road.

Now let's get down to the nitty gritty.

Step One - Off Bike Assessment

1. Check your basic flexibility. If you are inflexible, or have obvious muscle imbalances, an aggressively aerodynamic position is not the best option for you. Over-stretching to attain an aero position will lead to a decrease in muscle firing of the over-stretched

muscle groups. Therefore, lack of hamstring and glute flexibility will limit the amount of handlebar drop the rider can attain. You need to accommodate for this at first, but then work to improve those limiters and later you can make changes to your bar drop or seat height later once you have improved your flexibility.

Step Two - Riding Style Analysis

2. Analyze the type of riding that is planned to determine how much importance should be placed on aerodynamics over comfort
    a. Recreational Rider - speed and aerodynamics less important, so utilize a more upright position to emphasize comfort
    b. Road Racer - optimize power and aerodynamics. More aero is better until it impacts power production
    c. Time Trialist - more forward position and blend of power and aerodynamics. Length of goal races play big factor on comfort vs power vs aerodynamics. For 40k and under events, and rolling speeds of 25 mph or more, aero reigns supreme. IF your flexibility can handle it.
    d. Triathlete - Short course or Long course - must consider muscle activation and strain due to run leg taking place right after bike. Short course athletes can handle more aggressive positions, whereas long course racers should err on the side of comfort and force production with glutes and hamstrings.

Step Three - Past Issues

3. Analyze any past or present injuries, discomfort, or other limiters that may impact specific body positions. Poor range of motion in joints/muscles will impact bike fit.

a. For example: Lack of knee/quad flexibility will require a bike fit with greater leg angles (higher seat height)
b. THE BIG ONE, if your saddle is not comfortable enough to get low and roll your pelvis forward, this needs to be addressed FIRST AND FOREMOST. There is no point in trying to dial in a fit with a saddle that is not comfortable. Which leads into...

Step Four - Saddle Analysis

4. Check the “wear point” and “sweet spot” of current saddle. Is the saddle itself impeding optimal pelvic roll? On a well used saddle, you should notice if you sit off center or if there are imbalanced wear patterns. (more on this later)

Step Five - Current Set Up

5. Assess your current bike relative to your structural makeup. Is it even the right size based on the manufacturer’s recommendations? (We are going to assume that it is)

Based off everything above, it is time to start thinking about the points of contact between yourself and your machine:

- left hand
- right hand
- left foot
- right foot
- saddle

Humans are not perfect mirror images of themselves. Some people have limb length

discrepancies that require each side of the bike to be adjusted separately from the other. For most, you should be able to keep the right and left side adjusted equally, which you will learn more about below.

STOP! Before you start tinkering with your bike do 3 things:

1. Again, try not to make big adjustments unless you know things are WAY out of whack. In the art of fitting, millimeters can make a huge difference.
2. Take these quick measurements on your bike so you know where you started. Take them again when you finish your fit. Write them down!
    a. Center of the bottom bracket, up the seat tube, over the top to the center of the saddle.
    b. From the nose of the saddle to the center of the stem bolt
    c. From the nose of the saddle to the hoods, bullhorns, and/or center of the aerobar pads
    d. From the center of the front wheel (skewer) to the top of the handlebars or aero bar pads.
3. Make sure your bike is set up on a level surface. Do this by matching the height of the rear wheel or skewer by putting a riser block of equal height under the front wheel.

Saddle Adjustment

We always recommend starting with the “back end” of the bike, making sure your lower body position is dialed in before moving towards the upper body and hands. Our first step in this discussion will be to start with the saddle. This is a very important step since the placement of the saddle is going to greatly impact force production and overall strain on the muscular system.

The saddle can also be your main source of discomfort in your present riding position.

Similar to the handlebars, the saddle can do the following:

1. Move forward and backward
2. Move up and down
3. Tilt up and down

The saddle (via the seatpost) on most bike frames can also be twisted left and right. Your frame may have a seat post that does not allow for any left to right twisting of the nose and tail of your saddle, but should still allow for adjustments to be made fore/aft and up/down. This is where it is very important to have the off-the-bike analysis done on both yourself and your current setup. We have seen a number of people come in for fits complaining of saddle discomfort, and we immediately noticed their saddle was rotated or tilted too much.

Notes to account for:

1. In general, moving the saddle forward and backward is going to change the balance of work between the major muscle groups (quads, glutes, hamstrings, hip flexors). Forward puts more strain on the quads whereas backward allows the hamstrings and hip flexors to work some more. Both too far forward and backward can limit glute activation.
2. The majority of bike frames have angled seat tubes which means (generally speaking) moving a saddle forward or backward will change the effective distance to the pedals. If you move the saddle forward (or even slide forward on

the saddle), you have effectively lowered your seat height. Move it back and now your distance to the pedal has been increased. If you have played around with your bike fit in the past, you may have noticed that moving your seat back may have resulted in you having to reach a lot more for your pedals. Now you know why.

Saddle Fore/Aft Positioning:

Moving the saddle forward also results in bringing the sit bones closer to the hands and as a net result may lead to increased curvature of the spine. For some, increased pressure on the hands may result as your center of mass moves more forward relative to the bottom bracket. Naturally, moving the seat back will have the opposite effect.

Not only can spinal position, hand pressure, and weight distribution be affected by fore/aft position, but also muscle activation and shoulder/neck comfort. Moving your saddle too far forward may limit your ability to roll the pelvis forward while in a lower hand positions which can cause a decrease in glute activity. Moving the saddle further back draws more hamstring activation, but may increase your reach so much that it puts excess pressure on the neck and shoulders. This may also “close off the hips” and result in a loss of muscle activation from the hip flexors (over the top of your pedal stroke) as well as decreased quadricep activation on your downstroke. Neither of which are good for performance.

A “neutral” position is determined by checking the vertical alignment of the knee in relation to the pedal spindle when the crank arm is in a horizontal position, or the 3 and 9 o'clock positions. We recommend using a “plumb bob” and placing the string on the small knob on the top of the shin (tibial tuberosity), right below the knee cap. Check where the the plumb bob is

relative to the pedal spindle. In general, the line of the string should not be more than couple centimeters in front of or behind the pedal spindle. When in doubt, or in the case of a new rider, shoot for neutral or slightly behind the pedal spindle to decrease knee strain. Those on a time trial set up generally have knee positions slightly in front of the pedal spindle. The same goes for those who do a lot of sprinting or out of the saddle climbing. However, most road setups fair well with a neutral knee position.

Seat height

Having too low of a seat height will increase the pressure on the “undercarriage”, increase strain on the knees, increase activation of the quads, and close off the top of the pedal stroke creating a “dead spot”. Being too high can also increase pressure in the undercarriage. It may also lead to rocking of the hips while at the bottom of the pedal stroke, and decrease force capacity (especially in the hamstrings) through the lower portion of the downstroke and into the bottom of the pedal stroke. This also creates a "dead spot" in the bottom of the pedal stroke.

Seat Tilt

The tilt of the saddle can impact the balance point of your body relative to the seat. Tilting the seat forward may assist in rolling the pelvis forward and decreasing “nether-region” pressure, *but*, it may also increase pressure in hands. Tilting the saddle up may bring the center of mass further back relative to the bottom bracket and

decrease effective hand pressure, *but*, it could also increase perineal pressure when in lower riding positions. In most scenarios, we recommend starting and not deviating very far from horizontal. If you are experiencing lots of pressure issues, continue tweaking the saddle type, saddle height, and fore/aft position before going to extremes with tilt. If you are setting yourself up in a very aggressive position, some downward tilt may be necessary, but it will depend completely on the saddle, your core strength, and balance on the bike.

Note on Saddles: A lot of times it takes numerous saddles to finally get one that is comfortable. We have worked with athletes that have gone through 10+ different saddles and are yet to find one they are happy with. Saddle preference is so individual that we cannot recommend a specific saddle for any specific person. There are some businesses out there that offer saddle demo's, so try those out if you have had problems finding a saddle you are comfortable with. If you have a saddle that you like and are comfortable on, we recommend buying several of them as brands tend to discontinue models.

The main thing you want to be sure of is that you are comfortable rolling your pelvis forward when in the lower hand (drops) or aerobar positions. If you are experiencing too much pressure in these positions, there is little chance you will do it while training or racing. Without proper pelvic roll, you will decrease muscle firing and increase lower back tension while in your most aerodynamic and powerful positions.

Analyzing the wear pattern of your saddle may give indication of whether you should adjust the direction your saddle nose points relative to the top tube. It may also indicate musculoskeletal, biomechanical, and/or fit based changes that need to be made. This is really too in-depth and too case specific to dive into in this guide, but just know that if there isn't even wear on both sides of the saddle, greater evaluation may need to be made. This is more important if you are experiencing any sort of pain or injury.

You can also (unintentionally) change the seat height by **swapping saddles.** The height and length of saddles vary, so even if you change nothing else but your saddle, you may have significantly impacted your seat height and leg angles. Make sure you measure before and after a saddle swap, and adjust seat post height and fore/aft position accordingly.

Cleat Adjustment: Left and Right Foot

Cleats should be adjusted to allow for a natural foot position. Just like the saddle has a lot of different adjustment possibilities, so too do most cleats.

Cleat Rotation Adjustment:

The easiest way to check your natural foot position is to do a squat with your feet 6-8" apart and see if you feel more stable with your heels in or out. If you are naturally more duck footed, where the toes point out from the body, then cleat position should allow for this natural outward toe position (heels inward). In some instances, this foot position is impacted by muscular imbalances (such as weak hips) rather that skeletal issues, so just be aware that this foot position may change after undergoing a strength program. Cleat rotation should be slight, as most pedal manufacturers build in varying amounts of float into their cleat and pedal systems. The greater the float in the system, the less you need to rotate the cleats.

Cleat Adjustment Fore and Aft:

We generally recommend keeping cleat position under the ball of the foot. We have seen that sprinters tend to go further towards the toes and those focused more on time trials and triathlons bring the cleat closer to the heel.

Unless you are experiencing some lower leg issues, then we recommend not making any extreme changes. However, if you are experiencing a lot of calf fatigue, we recommend moving the cleats closer towards the heel. ***Note:*** There are a variety of things that may cause extra calf strain (see our perfect pedal stroke video for further details), but this may be one of the factors. It must also be noted that you are limited in the amount of forward and backward movement of your cleats. Just like bikes are built around “averages,” so too are shoes. Your ideal position may not work with the current range of adjustment of your shoes. Some cleat brands offer cleat fore/aft extenders, but keep in mind, these can add effective length to your leg which will impact your seat height.

Cleat Movement Left and Right (Out/In):

Cleats can generally be slid left and right relative to the outside and inside of the sole. If you have wider hips and/or are experiencing some knee float left and right during your pedal stroke cycle, this aspect of the cleat may need to be adjusted. We have also seen seat height affect knee float, as well as flexibility issues, poor hip strength, or just improper pedal stroke mechanics, so it may not be cleat position that is to blame. On average most people are more comfortable with the cleats set to allow for a slightly wider foot position, which actually requires the cleats to be placed closer to the inside of the shoe. This keeps a better hip-knee-ankle alignment and reduces lateral forces in the joints that can cause common overuse injuries.

Shims/Insoles:

Shims and insoles can also be used to even out musculoskeletal and biomechanical issues. Again, this is very case specific so we will not go into too much detail here. Our philosophy is to work on correcting these issues with strength and mechanics work, relying only on shims and other support as a last resort. Issues like leg length discrepancies would be one situation where utilizing a shim may be necessary, but few people actually have true leg length issues. An insole is sometimes the better option. Adding some lateral (arch) support can help keep the knee in better alignment while pedaling.

The Front of the Bike: Handlebars, Stems, and the Left/Right Hand

We will begin our discussion on dialing in the front of the bike by starting with the left and right hand. If there is very little size discrepancy between the left and right shoulder, arm, and hands, that is a good news. Look to keep the handlebar centered on the bike.

If you do have larger discrepancies between your right and left side, we recommend you get fit by a professional to make the proper adjustments. There are a lot of small modifications that would need to be made, more than we feel we can correctly discuss in this guide.

For the majority of you, changes in hand position relative to the rest of the body can be made by doing the following:

1. Extending the handlebars forward or backward by changing the stem LENGTH
2. Lifting or dropping the height of the handlebars by adjusting the spacer height, or changing the angle of the stem.
3. Adjusting the width of the handlebars to bring hands closer or further apart resulting in a

closing or opening of the shoulders and chest

4. Rolling the handlebars to adjust the hand/wrist angles at various positions based on the curve of the handlebars

Stem Length

Increasing stem length can be used to ‘stretch’ the rider out. Being too bunched up on the bike can lead to a curvature of the spine. By-products of this can be lower back pain and decreased glute activation. Stretching out the rider with a longer stem helps remove the curve out of the spine and helps the rider maintain more neutral, powerful, and aerodynamic position. It also allows for better body angles when sprinting or climbing out of the saddle.

Lengthening the stem will result in an overall drop in chest height on the bike. It is possible to lengthen the stem and keep the rider at the same chest height by using a stem with a steeper rise angle, or in some instances, by adding spacers to the steerer tube.

Shortening the stem may be necessary for riders that are too stretched out. This position can sometimes lead to an increase in hand pressure, core activation (which can be a problem if you have a weak core), and shoulder/neck discomfort. A shorter stem may be necessary to elevate the chest and help to open up a closed down hip angle, or correct over stretched flutes and hamstrings. As noted, a closed down hip angle can lead to a dead spot over the top of the pedal stroke which will result in decreased efficiency and power production.

Handlebar Height

Handlebar height, as well as stem choice, will impact the amount of stretch that the glutes and hamstrings are undergoing when in different hand positions. Glute and hamstring flexibility, pelvic roll, and hip angle all play a huge role in determining how low and aerodynamic a person can go with the handlebars. For some cyclists, dropping of the handlebars may lower the overall chest height on the bike (more aero), but it may result in an increased roll of the lower back so pay attention to what happens to upper body positioning when making changes in handlebar height and reach. Excessive spinal curvature increases the load on the lower back and decreases glute and hamstring activation. At the amatuer level, a more comfortable and powerful position trumps an extremely aerodynamic position.

Handlebar Width

An easy way to get a ballpark feel for how wide the handlebars should be is to stand in front of a wall, place your arms directly out in front of you with palms facing in towards each other and measuring the distance between the inside of your palms. Having handlebars

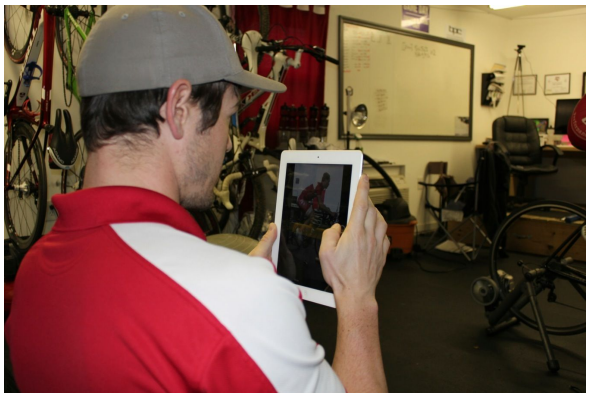
significantly more narrow than that distance may close down the chest and expand the upper back. It may also lead to increased pressure and activation of the triceps. Narrow handlebars can also affect the amount of torque you can apply to the handlebars when riding out of the saddle.

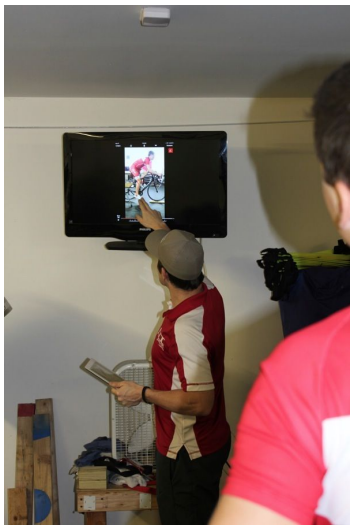
There are some professional riders who prefer a more narrow bar because it forces them to decrease the frontal surface area of their body by drawing their arms closer together. There is also a group of pro riders who prefer a wider handlebar to allow their chest to open up and allow for better torque on the bars during out of the saddle efforts. As you can see, this ultimately turns into a case of personal preference and riding style.

For those that are being fit on a road bike, you know that there are multiple possibilities for hand and grip positions while holding onto the brakes/shifters, or “hoods.” Changing these angles can result in more or less pressure being placed upon the wrist or hands, and may also impact the comfort and relative position of the shoulders. When out of the saddle, handlebar position becomes especially important in maximizing balance and comfort. In general, rolling this system back will result in a shift backward when out of the saddle, and vice versa. Start with the tops of the handlebars being level, and adjust as needed to get the maximum amount of comfort. Make sure you test all of your possible hand positions to find the best balance. Most of the people we fit either use a level bar position, or they roll the system slightly forward relative to the stem. Regardless, look to minimize the wrist angle in the hand position you use the most.

Putting It All Together

Now that we have covered each contact point, it's time to make the adjustments. This is where it is particularly important to have a dynamic fit done. It does no good to put yourself into a perfect pedaling position if that is not the way you actually ride. Likewise, it does not make any sense to fit yourself sitting in a static position that does not replicate your riding position at varied exercise intensities. Our bodies do a lot of interesting things when we are trying to drop the hammer. This seems obvious, but we are amazed at the number of people who still work off of a static fit process.





It is also worth noting that pedal stroke mechanics can play a HUGE role in your overall bike fit, especially at higher intensity efforts. Again, it does no good to be fit in an upright position with your sit bones back on the saddle if you spend your time riding in the drops with your sit bones more forward on the saddle. Remember, sliding just 3 centimeters forward or backward is roughly the same as adjusting that saddle height by 1 centimeter. In the world of bike fitting, that's a pretty big deal.

The Apps

To measure body angles, and break things down into slow motion video, you will want one of the following apps:

- Fast Bike Fit (our favorite)
- Dartfish Express
- Coach's Eye
- Ubersense
- Any other that will calculate angles and allow frame by frame analysis

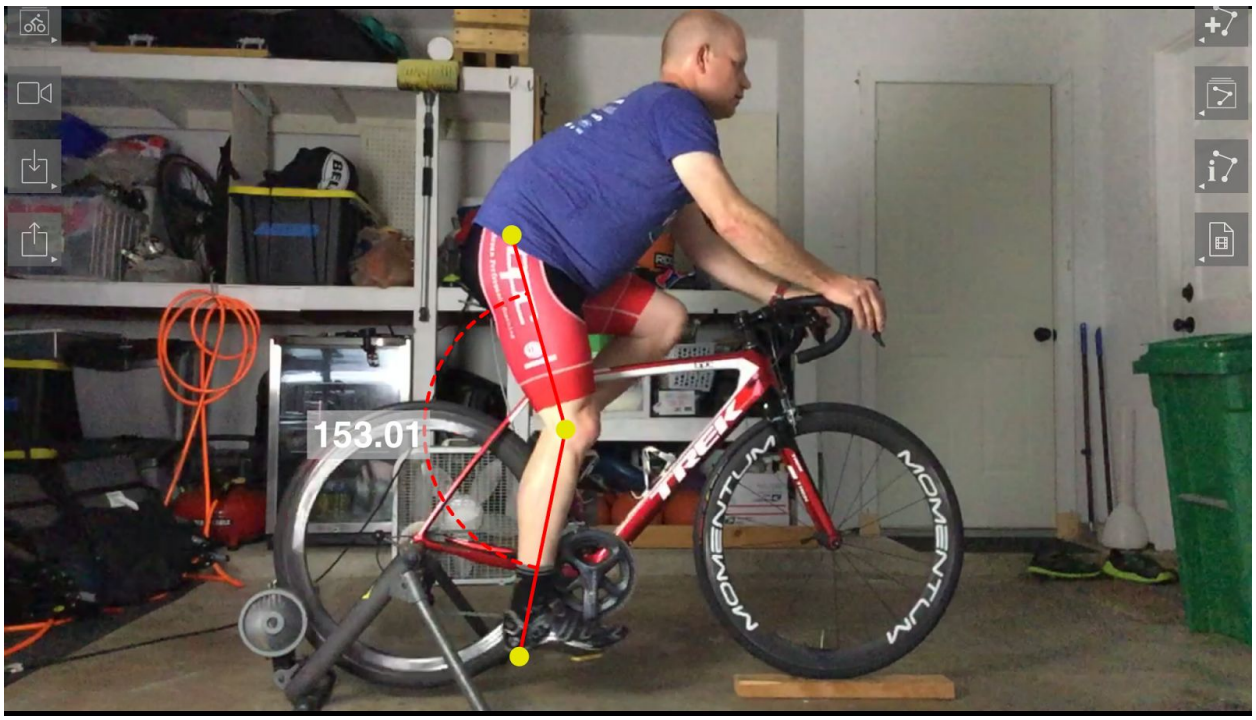
Capturing Video

We recommend simulating a hard but controlled effort during the recording process. We usually take people through a 30s build effort with the last 10 seconds being very hard but with a smooth pedal stroke. This ensures their leg goes through full extension. The rider needs to remain in their normal riding position for the entire effort.

Let’s Talk Angles...

Ideally, you would like to see the angle from your hip socket, to the mid-point on the outside of your knee, down to the mid-point of your ankle to be around the 145-153 degree range at the bottom of the pedal stroke. Note: The bottom of the pedal stroke is considered the moment when the knee stops dropping, right before the hamstrings engage. Notice this is a range that depends on a lot of outside variables that are unique to you. Recreational riders fall on the lower end of this range, while time trialist and triathletes tend to be on the higher end due to their more forward positioning. **PRO TIP:** If you are concentrating on dropping your heel while doing a hard

effort, and the heel still appears really high in the video, the saddle could be **way too high**. We've dropped saddles over an inch before because the athlete couldn't drop their heel and had to finish the bottom of the pedal stroke with their calf. This means a HUGE loss in power and efficiency is taking place, so larger changes are warranted.



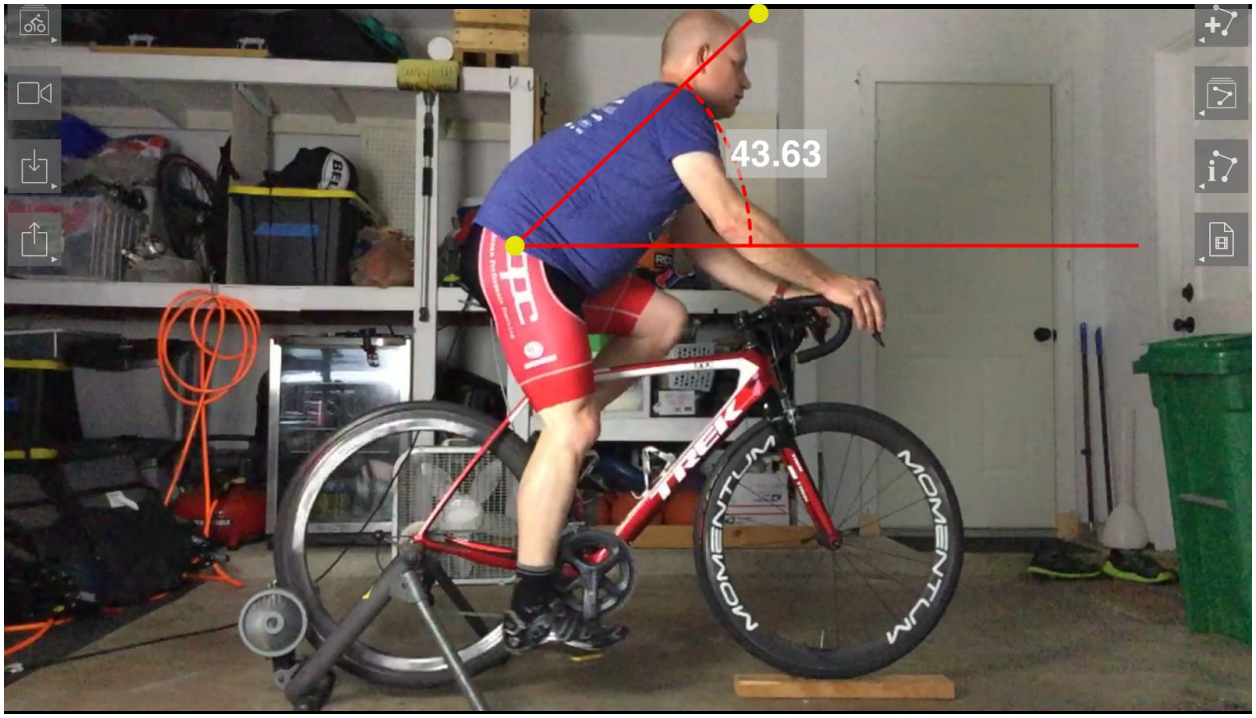
When the crank arm is at 12 o'clock, you don't want the hip-knee-ankle angle to be less than 70 degrees. In our experience, angles less than 70 degrees tend to prevent the quads from firing on time at the top of the pedal stroke, which creates a dead spot. It also puts extra unnecessary strain on the knee joint during the power phase; when maximal power is being produced.

For a basic fit, we also recommend that there be relative vertical alignment from the pedal spindle to the frontside of the knee (tibial tuberosity) when your front crank arm is parallel to the ground (3 or 6 o'clock). This is known as Knee Over Pedal Spindle (KOPS). While there is no research that this is the best place to start, it is the general “starting point” that you will want to work from based on what your goals are, what type of riding you are doing, and your current physical status. We find that this allows riders the most room to move around on the saddle and engage different muscle groups when needed. **PRO TIP:** When gaging fore/aft positioning, look to see where the crank arm is at the point where the hamstrings visibly kick in. If they kick in too far in front of 6 o’clock, the saddle likely needs to come forward. If they kick in way behind 6 o’clock, the seat likely needs to move backward slightly. This only works if the heel is low and the person is actively engaging their glutes on the downstroke.

Once seat height and fore/aft are adjusted, take a look at spine curvature and angles relative to upper arm and torso (outside elbow, shoulder, hip). 90 degree angles are where you want to start. If these angles are less than 90, you may be under extending your reach and

adjustments generally need to be made. If they are over 110 degrees (some exceptions in time trial set ups), you are likely reaching too far and putting extra stress on the shoulders and neck.

The marker we use for chest height is the angle of the hip, through the shoulder, relative to the ground. Again, consider the previously mentioned factors before slamming your bars to the headset. The absolute highest angle we like to see on a recreational road set up is 45 degrees to the ground when on the hoods. Most competitive cyclists are in the 30-36 degree range while on the hoods and under 30 degrees in the drops. For time trialists, in the aerobars, 11-14 degrees is a pretty aggressive setup, and you can adjust higher based on flexibility and style of riding.


43.63
MOMENTUM
MOMENTUM


28.10
S-WORKS
Performance Coaching

Moving to the arms. On a road set up, you should have a slight bend in the elbows as the forearms taper towards the hoods. If arms are completely straight then adjustments need to be made. On a time trial set up, the bend in the elbow should be very close or just above the 90 degree mark. You should feel as if you can just rest your hands on the shifters and do not need to put the kung fu grip on the bars while staying relaxed in the shoulders.

As far as the wrists go, you want to maintain a very ergonomic wrist position. Always try to keep the wrist angle while your hands are on the hoods as close to 180 degrees as possible. You may need to adjust the position of the shifter itself, as well as the bar angle to get optimal wrist position. Again, make sure you test the other grip positions as well. If you have perfect wrist position on the hoods, but you are uncomfortable in the drops, put more emphasis on whatever hand position you ride or race in more often. On a time trial set up, you always want the wrist to be flat so that using the bar end shifters is not affected.

Troubleshooting Common Pain and Discomfort

Hand numbness:

- Your center of mass may be too far forward increasing stress and weight on hands. Move saddle back to test. This may require a lowering of saddle height to maintain consistent leg angles.
- Too aggressive of position: You may have too significant of a drop from your saddle height to your handlebars increasing weight on hands
- Too much downward tilt of the saddle nose: This can cause the body to slide forward and the hands to take increased weight and pressure.
- Gripping bars too tight: Not fit related, but you may be going with the death grip and restricting blood flow. Relax your hands more and don't be afraid to move hands around on bars.
- Improper handlebar positioning: You may have your handlebars rolled too far forward or too far back causing poor hand positioning.
- Stem length: Being too stretched out may cause for increased strain on hands or unnatural joint angles
- Lack of core strength: Core strength is needed to help comfortably carry the weight of your upper body. If your core is weak, there will be an increase in weight placed on the saddle and/or feet and/or hands.

Foot numbness:

- Shoes that do not fit correctly. Also note that feet can swell during exercise, so you may

need to adjust to accommodate this.

- Keeping toes and feet tense can restrict blood flow and lead to numbness
- Saddle height: Being too low or too high can cause extra strain on the feet and butt.
- Saddle shape and features: Very individualized here, but if a saddle does not fit with your natural body structure and riding style, this can lead to restriction of blood flow and/or pinching of nerves.
- Center of mass may be too far back: This would cause increased weight to be placed on the saddle which could lead to butt/foot numbness.

Perineal (butt, undercarriage, use whatever term you'd like) numbness:

- Saddle height: Being too low or too high can cause extra strain on the feet and butt.
- Saddle shape and features: Very individualized here, but if a saddle does not fit with your natural body structure and riding style, this can lead to restriction of blood flow and/or pinching of nerves. We have seen this cured with cut out saddles, and also cured my moving away from cut out saddles - again, very individualized.
- Too much upward tilt of saddle: Try tilting nose down slightly.
- Center of mass may be too far back: This would cause increased weight to be placed on the saddle which could lead to butt/foot numbness.
- Not moving forward on the saddle and rotating pelvis when dropping into lower, more aggressive, hand positioning. As you roll the pelvis for more aero/aggressive positioning, the amount of sit bone contact narrows which may mean if you have gone to a more aggressive position you *may* need to switch to narrower saddle.

Lower back discomfort:

- Position may be too aggressive: potential fixes could be to add spacers to your steerer tube to lift the stem. Changing the amount of angle on the stem. This can be done by

flipping the stem (assuming it's in the "low position") or choosing a stem with greater angle of lift.

- Not enough length in the cockpit: Being cramped on the bike can result in rolling of the lower back, increasing strain. Fixes can be made by increasing stem length, moving saddle back (less desired if lower body is already dialed in), or possibly lowering the handlebar height. If there is noticeable roll of the back and spine, make adjustments to work this out. Sometimes just mental awareness of flattening the back can help.
- Spending too much time in one position: The fix may be as simple as standing up and stretching things out during times where you are coasting.
- Lack of core strength: A weak core may result in lack of activation (which has a host of other problems associated with it) that can lead to lower back discomfort and loss of power.
- Lack of glute engagement: This can be fixed with a proper strength program and usage of a smooth, efficient pedal stroke where glutes are engaged and fire at the proper time.
- Poor flexibility: Tight hamstrings and glutes can lead to a lack of pelvic roll. The system can accommodate for this by rolling the lower back.
- Not rolling pelvis forward under more aggressive riding positions: This ties into the point above. For some it is a flexibility issue, for others is a lack of attention, comfort, or knowledge that leads to not rolling pelvis forward and flattening out the lower back when riding in a more aggressive position (hands in drops vs on the hoods for example)

Neck discomfort:

- Too much bar drop: dropping too low can be associated with a pinch in the lower portion of the neck. Thinking of the spine and neck junction as an angle, ideal comfort would come from not deviating much from a 180 degree angle at that junction

- Significant lower back roll: Rolling the lower back can cause an increase in the neck/spine angle.
- Lack of core strength forcing the shoulders, arms, and neck to carry extra load
- Not staying relaxed: Many people carry their tension in the shoulders and neck. Focus on staying relaxed.

Knee issues:

- Seat height too low
- Seat too far forward: leads to increased quad activation and knee strain
- Over-utilization of the quads: the quadricep is tied into the knee. Over use of the quad can lead to increased strain on the knee. Fixes include: perfecting your pedal stroke, making sure all appropriate muscle groups are firing and firing at the correct time (glutes, hamstrings, hip flexors, quads), and making sure a proper heel/footbed position are utilized throughout the full pedal stroke.
- Cadence: low cadence, especially combined with any of the above issues, requires increased muscular strength (and strain) and in turn places a greater load on the knees.
- Cleat positioning: Needs to allow for natural foot position. Float (either too much or too little) can be an issue for some. Cleats positioning that doesn't allow for proper knee tracking and alignment.
- Strength: Weak hip and core strength can result in improper knee tracking which can lead to strain and knee issues
- Tight hamstrings, glutes, IT Band: This system is interconnected and all of these can lead to increased knee strain. Proper stretching and rolling programs can help alleviate these issues.

We hope that this has helped you get dialed into your most comfortable and powerful bike position yet! Remember, your body is constantly changing - sometimes for the better and sometimes for the worse depending on what you are putting yourself through. Check your fit a couple times a year, make strength training a part of your routine, and be sure you maintain a sufficient amount of flexibility to keep you healthy, powerful, and injury free!