

TTIPS VOL. 11/22 – Technique Gear Selection

After a long ride with Donna this past weekend, we settled in on the lanai with ample portions of wine while relaxing in front of another South Carolina sunset. After a few minutes of silence, Donna drew in a deep breath, stared into the distance, took a sip, and softly said, "I love you." Turning slightly towards her, I raised an eyebrow and said, "Is that you talking or the wine talking?" Without hesitation she replied, "It's me talking to the wine."

INTRODUCTION

Fellow riders, welcome to another volume of TTIPS. Have you ever started riding up an incline only to discover that you are in the wrong gear combination? Then you start changing the gearing combination with your left and right hands, perhaps a bit frantically, as you watch your ride mates get further away because you are spinning your pedals too fast or even worse, mashing them because you can't find the sweet spot? Or, have you coasted up to a traffic signal looking cool as you come to a complete stop and then find yourself in the wrong gear as you start moving again, leaving you feeling like a beginner?

A fellow KABC rider recently purchased a new bike equipped with more gears than their previous bike. They suggested that I put together a TTIPS article to explain bike gearing and proper gear selection during a typical ride.

Modern bikes can have a bewildering number of gears. Many bikes have "compact gearing" that allow the rider to adjust their pedaling workload across a greater spread of options than earlier bike models. With a typical configuration, a rider has two gears on the front and eleven gears on the back, allowing as many as 22 ($2 \times 11 = 22$) unique gearing options. Many will refer to such a bike as a 22-speed bike. Though that is mathematically accurate, and the bike physically will allow the rider to shift into 22 unique gearing combinations, the bike was not intended to be ridden that way. Really? Yes, really, keep reading.

DEFINITIONS

Chain Rings vs. Gears

Chain rings are the two big gears connected to the right-side pedal crank arm. Gears (also known as cogs or sprockets) are the gears also on the right-side connected to the back wheel. When referring to the gears stacked together as a single unit, they are called a cassette or sprocket cassette.

Front vs. Rear Derailleurs

Front and rear derailleurs are the devices near the chain rings and the cassette respectively that move left and right (as determined by the rider through their handlebar shifters) to adjust chain position.

Mechanical vs. Electronic Shifters

Shifters are the levers on mechanical shifters, or the buttons on electronic shifters, operated by the rider's hands that send commands to the derailleurs to move the chain left or right. Most of our bikes have mechanical shifting. Some of us have electronic shifting. Irrespective of which you have, the principles behind shifting as you ride are the same for each. For the purposes of this article, I will assume that you have a typical road bike with two gears on the front and ten or eleven gears on the back, where the left-hand shifter controls chain position on the chain rings, and the right-hand shifter controls chain position on the cassette.

Shifter Indexing

When multi-gear bikes were first developed, riders used analog shifters where they moved shifting levers just enough to position the chain exactly where they needed it on the chain rings or the cassette. Modern shifters are "indexed" meaning that they are precisely tuned to move the chain the exact amount to position the chain in exactly the right position. Indexed shifters allow the rider to focus on riding and not worry about maneuvering the chain to the right spot.

Loading and Unloading the Pedals - The Amount of Power You Are Exerting on Your Pedals

You are said to be loading the pedals when you are putting heavy downward pressure during the power stroke, for example when climbing or sprinting. You are said to be unloading the pedals when you ease up on foot pressure during the power stroke.

Cadence

How many times your pedals make a complete revolution in one minute. Cadence is measured in revolutions per minute, or RPM. For example, if your right leg completes a full revolution 80 times per minute, your cadence is 80 RPM. Most cycling computers measure and allow you to display cadence. Optimum cadence is a matter of personal choice. Most riders are comfortable with a cadence between 70-100 RPM.

GEAR AND CHAIN RING SELECTION - WHERE SHOULD MY CHAIN BE?

For our purposes here, and to keep it simple, let's refer to positions on the chain rings and gears as inside and outside, which is to say, inside means closer to the bike frame and outside means further away from the bike frame. Interestingly, the smallest chain ring (in front) is located on the inside, but the smallest gear (in back) is located on the outside. Why? Simply said, this configuration provides rider options to select the greatest possible mechanical advantage for any given terrain. Here's what I mean:

Flat Terrain. On flat, open ground, that is, terrain conducive to faster riding, your bike is fastest with the chain all the way outside (biggest ring, smallest gear). Most riders, however, could never climb a hill in that gear configurations.

Hilly Terrain. On hills or any terrain that requires more work than on flat terrain, the bike climbs better with the chain to the inside (smallest ring, biggest gear). When climbing, you will do your best when your chain is inside in the front, and on the innermost gears on the back.

Thankfully, with the riding terrain easily available to KABC, most of us enjoy riding somewhere between those two extremes, most of the time. Naturally, then, you will be using some combination of gearing between those extremes depending on the speed that you choose, road conditions, fitness, etc. Consequently, your chain will rarely be all the way inside or all the way outside. You will be using other combinations of rings and gears. A configuration that you don't want is to be "cross-chained."

Cross-Chaining - Your Chain Wants to Be Straight

When you ride with your chain all the way outside on the front ring, and all the way inside on the back gears, or, likewise, all the way inside on your chain rings, and all the way outside on your gears, you are "cross-chained." When you do this, your chain is severely angled between the rings and the gears. Your chain hates this. Why? First, prolonged riding in this mode will wear out the chain prematurely; second, these configurations wear down the cassette prematurely; third, your chain is more likely to come off your gears; and fourth though rare, your chain can break under load. This is why your 2 x 11, or 2 x 10 bike is not really a 22-speed or 20-speed respectively.

Frequently, when you are cross-chained, your chain will rub on the front derailleur cage, resulting in a perceptible metal-on-metal rubbing sound. This is your chain complaining that you are doing it wrong.

Properly done, you should be riding with some other ring/gear combination other than cross chaining. As a rule of thumb, if you have selected the smallest chain ring (inside), you should avoid selecting the outermost three gears (outside). Likewise, if you select the largest chain ring (outside), you should avoid the three innermost gears on the back.

GEARS AND RING SELECTIONS - WHEN AND HOW SHOULD I SHIFT?

Now that we know where the gears should be, and importantly, why they should be there, let's talk about proper shifting technique.

Generally, most of us ride at a steady cadence, even unconsciously. We find a comfortable cadence and keep it, often because it is the sweet spot where we feel that we are delivering power to the pedals at our most comfortable and efficient rate at any given speed. Unless you are racing, it's a good practice to keep pedaling at a steady cadence. When you encounter upward sloping terrain, naturally pedaling will be slightly more difficult. Your choice is to either push a little harder on the gear you currently are in or shift to an easier gear. Laboratory results show that most experienced riders will seek to change gears when there is a terrain-imposed change of at least five RPM. If the terrain change is not severe, they usually will choose to shift

one gear larger (inside) to sustain the same cadence. When encountering a severe terrain change, they may shift several gears or even change to the smaller (inside) chain ring and try to recover their cadence or will seek a new one. Naturally, it's best to anticipate gearing changes to avoid clumsy changes at the bottom of the grade where you are caught in the wrong gearing combination.

Likewise, if on flat terrain, and you wish to go faster, you can remain in the same gear configuration which will result in higher RPM, or you can shift to a smaller gear (outside) and keep the same cadence.

When you shift, especially your chain rings, you should slightly decrease load until the shift is complete. This technique is especially important when shifting during a hill climb. If your bike is well tuned, normally shifting will take only a fraction of a second, allowing you to quickly re-apply full load. Most often, when you see someone's chain come off the gears, it's because they are sustaining pedal load while shifting.

Finally, when climbing very steep inclines, it is nearly impossible to maintain the same cadence as you might on flat roads. Now worries, just bring your gearing combination to the inside front and back, and get over the hill at best speed, and best cadence that you can achieve, knowing that you can rest on the downhill side.

Until Next Time.....

Make Every Ride Epic,

Darryl