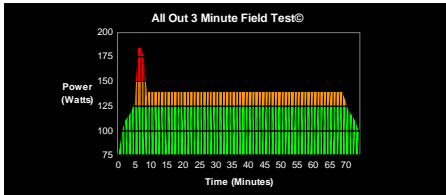


## Landmarks and Land Mines



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One of the landmarks of riding with power is that you fall in love with it. Yes, it can become a co-dependent form of riding—you learn to love the power of power. If it has happened to you, you have passed over the threshold between the discovery phase of riding with power and onto your second phase of riding: benchmarking. You now know how hard you have to push (torque) and how fast you have to spin (cadence) to see small (10 watts) or dramatic (50 watts) amounts of change in your power output.

In those first few days of riding with power and your new riding tool, the power meter, you might have exploded a few land mines in your riding. For example, if you are light in weight, you may have discovered that your power output is lower than that of a bigger rider. Discovering first hand the weight-to-power ratio is an ah-ha! discovery moment for many folks. What it means is that lightly built riders are better hill climbers, because they have a lot of power per pound of body weight. This is while more heavily built riders eke out higher watt numbers on the flat, because they don't have to drive the weight of their body up an incline.

Another land mine might be the differences between your heart rate and your power readings. That explosion might have happened on a day when it was hot, and your heart rate was excessively high while your watts were very low. Heart rate reflects a lot of complicated internal and external variables, while power is clean and easy. Both seem to measure how hard you are riding, and the two—heart rate and power—often respond to changes in your effort in a direct relationship with each other. However, if it's a long ride and you experience hyperthermia and dehydration, you can visibly watch the decoupling of the two as heart rate soars and power stays steady.

One final land mine is how the experience of riding naked—with no tools on board to measure anything—is suddenly a little shocking. Without tools, you become acutely aware of how you can only rely on your subjective feelings of exertion to assess your intensity. How then do you know if you are riding at intensities that are moderate, heavy, or severe? How do you know if you are effectively training?

The land mine really hits when you start to connect the power number on your power meter with your estimated feeling of how hard you are riding—moderate, heavy, or severe. For example, you don't know it, but if you are having an “off” riding day, and you notice that you feel fine but your watts, your power output, is a lot lower than usual and you wonder why. And then it hits you: when we are having an off-day you can't always sense it. It's only the data from the power meter that can tell you the real story.

Back to disarming the land mines so they don't explode during your ride ... Researchers, coaches, and pros measure physiological landmarks all the time so they have real data that they can use for analysis and comparison. Heart rate is a physiological landmark, as is power, volume of oxygen consumed (VO<sub>2</sub>), lactate, sweat rates, caloric expenditure, and so many more landmarks. Physiological landmarks are a way for you to benchmark your cycling conditioning. Gathering “landmark” data lets you make ongoing adjustments to your riding program, based on the results of several standard assessments.

The “effort” landmarks are often described using intensity ranges. There are three different intensity ranges or domains that set three different, non-uniform, zones in cycling:

1. **Moderate intensity:** An aerobic effort level that you can maintain at a steady state rate with minimal fatigue.
2. **Heavy intensity:** The effort level that is sustainable, but at which you feel compromised.
3. **Severe intensity:** The effort level that is unsustainable for an extended time. It is at, about, or around your pulmonary oxygen uptake (VO<sub>2</sub>) peak<sup>1</sup>, and after which fatigue ensues.

Between each of these intensity ranges, there are borderlines, key physiological landmarks that you pass through to get to the next one. The boundary between moderate and heavy intensity is called “the threshold.” The boundary between heavy and severe intensity is your *maximal steady state power output*<sup>2</sup> or your critical power watts. And, the intensity above severe is the highest power that you can elicit as fatigue is hitting you, hard.

The physiological landmark between heavy and severe intensity is key because it divides your cycling effort between a steady state that you can hold and that which cannot be sustained. It is your **maximum steady state**. It is critical power. Just 15 watts below this number and you’ll be able to maintain that power for most of your ride. While, 15 watts above this number puts you into severe intensity—it simply isn’t sustainable.

And, wouldn’t it be wonderful if there was just one assessment that could provide multiple landmarks, rather than having to take individual tests to measure each individual parameter? That’s just what the All Out 3-Minute Power<sup>3</sup> ride provides—one short test, several key landmarks. And, imagine this; you can assess these landmarks in just 3 minutes. Bingo.

There are other longer and shorter assessments, the All Out 3-Minute Power ride isn’t your only choice. For example, the 90-second power test is an excellent measurement of maximum dynamic power output, but it doesn’t predict maximum oxygen uptake, maximum steady state power, or the dividing lines between the different intensities, because it doesn’t last long enough to allow your body to yield the response needed to measure maximum steady state power.

Try the All Out 3-Minute test. It’s the ride of the month and you can read all about it by clicking on it in the Library of Rides. If you do this ride, I guarantee, you will never trip and detonate a land mine on another ride, again.

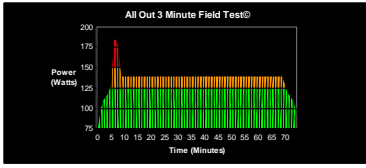
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<sup>1</sup> Peak oxygen uptake (Peak VO<sub>2</sub>): regardless of how fast you ride, this is the most oxygen that you can consume. You can still ride faster; you just can’t extract any more oxygen to use for energy.

<sup>2</sup> Maximum steady state power output: This is the power number that you can maintain for a long period of time, also known as critical power.

<sup>3</sup> Burnley, M., Doust, J.H., and Vanhatalo, A. “A 3-minute All-Out Test to Determine Peak Oxygen Uptake and the Maximal Steady State” *Medicine and Science in Sports and Exercise*, Volume 38, Number 11, November., pp 1995-2003, 2006.



# ALL OUT 3 MINUTE FIELD TEST<sup>1</sup> ©

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**DESCRIPTION:** Rarely, is there a ride assessment that you can take that gives you more than one piece of data. The All-Out 3 Minute Test does just that. In less time than it takes to ride around the block, you can have exactly the power numbers you need to ride your fastest and your furthest without hitting that fatigue point that brings you to a grinding, well, and embarrassing slow-down.

This is a field test. It is an estimate of the different training intensities that you can use in for your riding by your power numbers.

There are three different ranges of intensity commonly measured by exercise scientists in the lab. These ranges or domains are valuable for you to know so that you can train to improve them as well as “ride your numbers”. This field assessment, the All-Out 3 Minute Test, is one of the best ways to estimate your power output between the three different ranges of three different physiological land marks.

A physiological land mark is a marker of your current physiological profile. There are three big ones for cyclists to appreciate, respect and sometimes embrace while other times avoid at all costs:

1. **Moderate intensity:** that effort level that you can maintain at a steady state rate without fatigue
2. **Heavy intensity:** that effort that is sustainable but that you feel compromised.
3. **Severe intensity:** Unsustainable for a long time effort at about or around your pulmonary oxygen uptake (VO<sub>2</sub>) peak and fatigue ensues.

**Ride Format:** The field test measures your maximum steady state ride power. Begin with a comfortable warm-up and then when ready, start your chronograph and ride at the highest effort, highest watt output, that you can hold for 3 continuous minutes. Measure your average watts the last 30 seconds of the 3 minute field test. This is the best estimate of your maximum steady state ride power output.

## ALL OUT 3-Minute Field Test

Event	Description	Duration (min)	Elapsed Time (min)
Warm-Up	Easy pedaling at 60-80 RPM+	5	5
Field Test	<b>For 3-minutes, ride as fast and as hard as you can. Only measure the average watts during the last 30-seconds starting at 2.5 minutes into the three minute test. Record the last 30-second watts.</b>	3	8
Steady State	Continue your ride for 30-60 minutes at	30-60	38-68

<sup>1</sup> Burnley, M., Doust, J.H., and Vanhatalo, A. “A 3-minute All-Out Test to Determine Peak Oxygen Uptake and the Maximal Steady State” Medicine and Science in Sports and Exercise, Volume 38, Number 11, November., pp 1995-2003, 2006.

	an easy speed and cadence		
<b>Cool Down</b>	Easy pedaling at 60-70 rpm	3-5	43-73
		<b>Total Elapsed Time:</b>	<b>43-73 minutes</b>

**Challenge:** So, what do these numbers mean? You probably will discover that your ride power degrades the last 30 seconds, which happens to most riders taking this assessment and is normal. The information that you want to capture is the power output the last 30-seconds. That is the best estimate of your maximum sustainable steady state power output. Riding 15 watts below that number means that you can ride at an even pace for most of your ride time, riding 15 watts above this watt number and it simply isn't sustainable. In the intensity continuum of moderate to heavy to severe the 3 minute test is at the border of heavy and severe, it is critical power, it is maximum sustainable power output.

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