

Testing an athlete

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Doing an athlete fitness test

Every competitive cyclist makes comparisons. They make them with their peers, rivals and maybe even Lance Armstrong. They want to know how they stand in relation to other cyclists. Too often they rely on vague similarities on terrain or their speed over a set distance. The only trouble with making comparisons is that that seldom reflect the athlete's real condition or ability. Variables and lack of control make comparisons almost pointless. It is more important for an athlete to know themselves than guess on how they match up to someone else. In order for an athlete to clearly understand their condition they need to be tested in a controlled, repeatable environment. Here is a simple outline for a standardized test taken from the book Basic Athlete Fitness Testing that is used by coaches around the world.

The purpose of this test is to use a CompuTrainer or other controllable resistance trainer to determine the basic fitness level of the athlete. There are a variety of high quality stationary trainers on the market such as TACX, Cycle-Ops and CatEye, that allow you to obtain accurate information such as heart rate, watt load, cadence, speed, time, distance and a variety of averages. Many of these trainers also come with computer software that allows the coach or athlete to analyze the information. However, only the CompuTrainer has the ability to analyze the athlete's pedaling technique. Therefore, whether the athlete is new to the sport or a seasoned veteran, the CompuTrainer is the stationary trainer of choice for testing.

The nice thing about this test format is that it is simple yet allows a level of flexibility in its use. Three major areas of concern are taken into consideration; explosive power, sprinting ability and basic endurance level. Not every athlete is going to be contesting the sprint at the end of criteriums or competing on the velodrome. Some athletes may be interested simply in improving the fitness for a club ride or recreational tour. Therefore determining explosive power or sprinting ability will be of little importance to them.

By having a standardized format for testing, the coach is able to perform repeatable experiments that can track pertinent information over an extended period of time. The format also allows the use of different stationary trainers, while still collecting the same information. The key in any test program is repeatability and simple tests are more easily repeated. Remember, no matter how sophisticated the equipment and no matter how elaborate the procedure, if the data collected does not help the athlete then the test is meaningless.

Smart Cycling Team

Initial Fitness Test - CompuTrainer Protocol

Home Lauri Green Date 9/29/2002 Time 11:30 AM
 Rider Weight 190 Bike Weight 19 Total Weight 169

Vertical Jump Test

#1 7" #2 6" #3 6.5" Average 6.5"
 Rider Height _____ Rider Reach _____

Sprint Test

CompuTrainer Resistance Setting 2.3 Room Temperature 78 degrees
 Gearing 53 15 Starting Speed 21 mph Max. Heartrate 178
 Max. Watts 612 634 Average Watts 556 End Watts 583 547
 Max. Speed 34 Average Speed _____ Elapsed Time 21.2
 Rider Rate of Fatigue _____ Recovery Heartrate after 5 minutes 101

Endurance Test

Distance	Time	Heartrate	Watts	Speed	RPE	Breathing	Gearing	Remarks
.5 mi.	<u>1: 34</u>	<u>142 bpm</u>	<u>200</u>	<u>19.0 mph</u>	<u>1</u>	<u>Easy</u>	<u>39 / 16</u>	
1 mi.	<u>3: 09</u>	<u>151 bpm</u>	<u>218</u>	<u>19.1 mph</u>	<u>2</u>	<u>Easy</u>	<u>39 / 16</u>	<u>light</u>
1.5 mi.	<u>5: 04</u>	<u>162 bpm</u>	<u>248</u>	<u>19.0 mph</u>	<u>4</u>	<u>Pushing</u>	<u>39 / 16</u>	<u>light riding</u>
2 mi.	<u>6: 20</u>	<u>169 bpm</u>	<u>296</u>	<u>19.2 mph</u>	<u>7</u>	<u>Pushing</u>	<u>39 / 16</u>	<u>striders rest</u>
2.5 mi.	<u>7: 42</u>	<u>176 bpm</u>	<u>328</u>	<u>17.6 mph</u>	<u>10</u>	<u>Gasping</u>	<u>39 / 16</u>	<u>leaving at peddle</u>
3 mi.	:	bpm		mph			/	
3.5 mi.	:	bpm		mph			/	
4 mi.	:	bpm		mph			/	
4.5 mi.	:	bpm		mph			/	
5 mi.	:	bpm		mph			/	
5.5 mi.	:	bpm		mph			/	
6 mi.	:	bpm		mph			/	
6.5 mi.	:	bpm		mph			/	
7 mi.	:	bpm		mph			/	
7.5 mi.	:	bpm		mph			/	
8 mi.	:	bpm		mph			/	

Remarks _____ Recovery Heartrate after 5 minutes 95 bpm

The CompuTrainer Test Protocol is a combination of test procedures from three different sources. The basic riding part of the test is described in the materials included with a CompuTrainer. There are also aspects created by USA Cycling dating back to their first Junior Identification camps. The rest come from suggestions or observations made over the years by various coaches or physiologists.

This test covers all the basic areas of concern; explosive power, sprinting ability and endurance. Plus because of the level of difficulty involved, it is also a test of mental toughness and determination. Once you have obtained the athlete's personal information, the CompuTrainer Test Protocol helps address the main areas of fitness and performance tracking.

The Vertical Jump Test

The first is the simple Vertical Jump Test to try to determine the athlete's explosive power or leg speed. A basic method for determining the amount the athlete's fast twitch muscle fiber. So the question here is - How high can the athlete jump?

Vertical Jump Test

#1 18.5 #2 20.0 #3 19.5 Average 19.3
 Athlete Height 65.5 Athlete Reach 82.4

This portion of the test is very simple to perform and requires no bicycle equipment at all. It is often easiest to do this test outdoors, against a building or high wall. The only materials needed are a tape measure, a marking device (chalk, pen, tape, marker or anything that will make a readable mark), a chair and paper to write the results on.

You start by measuring the athlete's height in stocking feet. This is the distance from the ground to the highest point on their head when their head is level. This dimension is especially important when working with junior riders, as they can often grow beyond all understanding in just one season.

Next, the athlete stands up straight with one shoulder to the wall and extends their arm straight up as far as possible with their palm touching the wall. The point where the tips of their fingers touch the wall is then marked. This is the athlete's reach. Once these two measurements have been recorded, the athlete will make

three explosive jumps touching the wall at the apex of each jump. The point where the athlete touches the wall with their fingertips is marked. The height of each jump is recorded and the average determined and recorded.

Remember that this is only a simple test to try to understand the athlete's basic abilities. Age, weight, experience and anatomy are just some of the factors that can affect the athlete's ability to jump. It is very possible that this distance may not increase over time no matter how much the athlete trains. The test is designed to help identify if the athlete has an abundance of fast twitch muscle fibers. If this is the case, the athlete will not only be able to achieve a very high vertical jump, but will probably be able to handle a hard, fast sprint at the end of a race.

The Sprint Test

The next portion of the test also involves measuring the athlete's explosive leg speed, but also taxes their determination and stamina. In order to get a realistic result, it is suggested that you have the athlete do their normal warm-up. This will help you as a coach in two ways. It will allow you to see what the athlete considers an adequate warm-up and it will allow you to observe their riding technique. These observations will allow you to develop a set of standardized warm-up routines and stretching exercises for the athlete to follow before training or racing.

Sprint Test

CompuTrainer Resistance Setting 2.8 Room Temperature 72
Gearing 42/16 Starting Speed 20 mph Maximum Heart Rate 197 bpm
Maximum Watts 1108 Average Watts 743 End Watts 853
Maximum Speed 42 mph Average Speed 27.3 mph Elapsed Time 20.1 sec
Athlete Rate of Fatigue _____ Recovery Heart Rate after 5 minutes 136 bpm

The sprint portion of this test protocol begins by following the instructions for the device being used. In the case of a CompuTrainer, the equipment must be warmed up and then calibrated in order to provide accurate results. A .2 mile flat course should be programmed into the computer and saved for future tests. This can be done by following the instructions provided with the equipment. The results of these tests should also be able to help develop a standard warm-up for the athlete to follow before future testing or racing. It is important when testing an athlete to try and repeat the previous conditions as much as possible. Temperature, humidity, tire pressure, the number of fans and their settings and the test equipment settings should be as consistent as possible. Always use a fan to cool the athlete, even if the room seems well ventilated.

Once the equipment has been prepared and calibrated, the athlete rides with a focus on gradually building up their speed until they reach the point where they will attempt to sprint to complete exhaustion. If the athlete has never sprinted before, you may have to provide an example or have the athlete practice the techniques involved. There are actually some real advantages in having an athlete who lacks experience in sprinting. It allows you to help the athlete develop the best technique for their particular physical gifts. A coach can spend a lot of time trying to break an athlete of previous bad habits or techniques.

Gearing – refers to the combination of chain ring and cog used at the time of the sprint. If the athlete likes to shift through the gears until they reach maximum speed, then record the last gearing combination used. If, on the other hand, they prefer choosing one gear and wind it out to their maximum cadence then record that gear combination.

Starting Speed – refers to the speed at which the athlete began to sprint. As time goes by, this speed will probably increase since the athlete should be able to reach higher speeds before beginning their sprint. It is not uncommon for younger or newer athletes to start their sprint at 18 mph or less, since they have little power development.

Maximum Heart Rate – refers to the highest heart rate seen during the sprint test. This often comes just after the finish of the sprinting effort.

Maximum Watts – refers to the highest watt output the athlete generates during the test. If for example the display briefly shows 1,005 watts, that should be considered the maximum watt output. Never try to estimate or guess any readings from a test. It not only undermines accuracy, but puts a shadow of doubt into the value of the test.

Average Watts – refers to the average watt output during the actual sprinting effort. On many testing devices like the CompuTrainer, you can program in a set course of .2 mile and when the test is over most of this information will remain displayed. On most computerized devices it is also possible to replay the entire test.

End Watts – refers to the watt output at the moment the athlete finishes their sprint. This information is important for two reasons. First, it shows how the choice of gearing and sprinting technique affects the workload. Second, it allows you to calculate the Rider Rate of Fatigue.

Maximum Speed – refers to just that - the maximum speed the athlete reached during the course of the sprint.

Average Speed – refers to the average speed the athlete produced during the course of the actual sprinting effort.

Elapsed Time – refers to the actual time of the athlete's sprinting effort only. It is suggested that the distance of the sprint be kept to a reasonable length, such as .2 mile.

Rider Rate of Fatigue – refers to the drop in watt output over the sprinting distance. If the athlete developed 1,000 watts at the beginning of their sprint and ended it 20 seconds later at 500 watts, it can be determined that they lose power at a rate of 25 watts per second. Based on a result like that, part of your job in the future would be to help the athlete control the rate at which they expend their energy, whether by changing their technique or their selection and use of gearing.

Recovery Heart rate after 5 Minutes – refers to the athlete's recorded heart rate at the end of five minutes from the completion of the sprint. The faster the heart rate drops, the better the athlete's recovery abilities are.

The last portion of the test measures the athlete's ability to produce a steady effort over a set grade and distance, at a specified speed. In the sample shown below, the athlete has been asked to maintain 20 miles per hour for as long as possible. Again, if you are using a CompuTrainer, the course should be programmed into the computer and saved for future testing. In this case the program consists of increasing the gradient .5% every one-half mile. So at the beginning the athlete is riding up a .5% gradient and by the 5 mile point is now on a 5% gradient. The gradient is simulated by the amount of resistance created by the CompuTrainer software and load unit. This can be accomplished on other trainers either by programming the resistance or slope, or by manually increasing the watt load.

The idea is to have the athlete maintain a constant speed for as long as possible. Every time the gradient increases, you will record the elapsed time, heart rate, watt load, current speed, and ask then athlete how they feel. They should respond only with a number, using an RPE chart. It is also important to track the way the athlete is breathing and how their body is moving on the bike. Often times these other indicators can reveal more than the athlete's words. As soon as the athlete can no longer maintain the required speed for thirty seconds, the test is over and the athlete uses the next five minutes to recover.

Endurance Test

<u>Distance</u>	<u>Time</u>	<u>Heart Rate</u>	<u>Watts</u>	<u>Speed</u>	<u>RPE</u>	<u>Breathing</u>	<u>Gearing</u>	<u>Remarks</u>
0.5 mi.	1:31	114 bpm	172	19 mph	2	easy	42/16	hips rocking
1.0 mi.	3:01	122 bpm	212	20 mph	3	easy-	42/16	choppy pedal
1.5 mi.	4:35	131 bpm	246	20 mph	5	easy	42/16	very choppy

In the sample Endurance Test shown here, the athlete has started off with a heart rate of 114 beats per minute and although they have had their bike properly adjusted, their hips are rocking as they pedal. By the one-mile mark their breathing is showing signs of stress and their pedal stroke has begun to deteriorate. Note also that the gear combination is the same.

It is suggested that the athlete not be allowed to change gears during this test. How well they do on their first test may cause them to select a different gearing combination the next time.

The second to last area on the form is for your remarks. It goes without saying that the more information you record the better. Keeping lots of information on how an athlete tests, races, trains, and learns will certainly help you in the job of coaching them. Plus if your athlete moves on to the national or professional ranks, their new coach will be aided greatly by what you can tell them about the athlete.

Finally is the Recovery Heart rate after 5 minutes. How this number changes over time will be a good indicator of the athlete's ability to recover and a mark of their improved fitness. This is also a good range for the athlete to use when recovering on training rides or after a competition.

A few helpful tips for you to remember when doing tests on a stationary device such as a CompuTrainer, TACX Trainer, or Cyclosimulator:

- Keep a designated rear wheel that is used only for testing. Make sure that is compatible with the normal gearing on all of your athlete's bicycles. Preferably something with enough spokes to be durable and a long lasting tire.
- Keep the air pressure the same for each test.
- Keep the tire and the roller on the stationary trainer clean.
- Keep the settings on the stationary trainer as close as possible from one test to another.
- Use the same heart rate monitor for all tests.
- Use at least one powerful fan to keep the athlete cool during the test.
- Have a towel, water, and other items the athlete needs on hand.
- If the athlete has preferences, such as music, teammates, fan placement, and lighting, make sure to keep a record of that for all future tests.

One last piece of advice; no matter how good or bad a performance the athlete produced you must find something in it that will give them encouragement. There will be times when the athlete seems to have improved their power beyond their expectations. These times will give them great satisfaction in having gotten high marks.

There will also be times when they may struggle terribly just to finish. At those moments they will look to you, the coach, for answers. It is important that you learn how to give them answers. You may have to send them home and then go over their results by yourself in order to find an answer. Take all the time needed and then get back to the athlete with your findings. Your time and efforts to help the athlete improve will gain you the respect and trust every coach strives for. Good Luck!