STARTING BLOCK STARTS

Latif Thomas

The purpose of this article, ultimately, is to explain proper acceleration mechanics. Proper acceleration is crucial to the success of track sprinters, but can not be achieved without ideal positioning within the starting blocks. Therefore, we will cover the process from the time the official calls the athletes to the line all the way to the point the athlete reaches maximum velocity, or full speed. Thus we will cover blocks, the start, and all the components of acceleration.

Before we get into the technical aspects of the start, something should be mentioned about block starts. Young athletes do not need to learn how to come out of blocks during their first season. Young, physically weak and inexperienced, these athletes do not have the physical strength to get a good start and are only harming themselves by trying to do something they are not ready to do. Getting a good start is a direct result of force application and shin angles with the track. That is, the more horizontal force you can apply out of the blocks, the more capable you are of creating the low shin angles with the track that are required for a competitive start.

When athletes who are not strong enough to create that force are put in blocks, they are harming themselves in two ways. First, they are going to pop straight up as soon as the gun goes off due to their inability to exert proper levels of force. Therefore, they are more likely to fall behind right away and sprint mechanics tend to deteriorate instantly. Second, because they do not have the strength levels to properly apply force to the blocks, they will learn to start with bad form. Once they get stronger, they will have to unlearn their bad habits and relearn proper mechanics.

We suggest starting young athletes with a standing start and then progressing to a three-point stance while developing speed, strength and power levels through general strength exercises, speed and weight training, as well as low level plyometrics. By learning the three-point stance, the coach can teach and the athlete can learn appropriate start mechanics from a position where existing strength levels are better utilized.

Staying loose before your race is an essential, but frequently overlooked issue. Doing a proper warm up is another topic completely, but here are a few things to consider. First, avoid static stretching right before your race. Static stretching should be done early in the warm up, before dynamic exercises, Mach drills and accelerations. Static stretching simply reduces power output, which must be avoided. Also, try to time your warm up to finish soon before your race is scheduled to start. If you have not built up a light sweat just before your race, you have not warmed up properly and are not likely to run your fastest. Many young athletes warm ups are too short (15-20 minutes). Also, they finish well before the race is set to begin. After approximately 15 minutes, core temperature will drop and the effects of the warm up will begin to decrease.

Runners, Take Your Marks

It is critical that you establish a routine for entering the blocks. Every time you work on starts in practice, go through your entire routine. The reason for this is simple. When the official calls you to the line, it is time to focus and go into what Michael Johnson calls the Danger Zone . The shorter the distance of the event you are competing in, the less room there is for error. The better you are at focusing on the task at hand, the more likely you are to have a good performance.

Sprinting is a highly technical activity that demands high levels of concentration. That being said, going into a preset routine helps to clear your mind and puts your body on auto-pilot. When it comes to block starts, many young sprinters suffer from paralysis by analysis . When you try to cover a long mental checklist of block issues immediately before your race, you are dooming yourself to make many of the mistakes you are trying to avoid. Having a routine that you practice consistently allows your body to use muscle memory so that you can focus on one starting cue.

Establishing a routine does not have to be a complicated process. It just has to be a consistent one. There are a number of things that you can do to loosen up before getting in the blocks. For example you can shake out your arms, shoulders, upper body, quads and/or hamstrings. You can walk out past your blocks and give a quick yell (it relieves tension and intimidates your opponents). Try any of these things in any combination when setting up your routine. Finally, there is one drill that every speed/power athlete should add to their pre competitive routine: tuck jumps.

Tuck jumps are important to do as the last drill you utilize before backing into the blocks. Doing a few explosive vertical jumps presets the neuromuscular system. These jumps get your body ready to explode out of the blocks by pre-loading elastic energy in the Achilles and knees that help you to create force and overcome inertia at the start. However, if you choose to just settle right into the blocks as soon as the command is given, you are setting yourself up for a bad start. While your competitors are keeping loose and getting into a rhythm, you will be hunched in the blocks, waiting up to a minute for your opponents to settle in. The whole time your legs will be tightening up and your chances for an explosive start will decrease by the second.

Once you back into the blocks, it is important to get into good position to prepare for the set position and finally the gun. The toes and/or the ball of the foot should be in contact with the track and the heels should be planted against the pedals of the block. Your thumbs should be directly under your shoulders. This maximizes the distance of the shoulders from the ground. The shoulders should be directly over or slightly behind the hands. This will keep the hips from moving forward and upward on the set command. The **quick side, (rear)** knee should be in contact with the ground. Putting both knees down puts the shoulders ahead of the hands which increases the strength demand as well as creates an imbalance. *(**To determine your quick side vs. your power side, fold your arms in front of you. The hand that is tucked under your bicep/armpit is your quick side arm. If your left hand is tucked under, your left leg is your quick leg and should be placed in the back block**).*

Remember, the official is not supposed to call SET until all athletes have stopped moving. If you are not focused as you finish your routine, do not allow yourself to become stationary. Otherwise, the official will call SET , you will lose focus completely, the gun will go off and you will be left in the blocks. If you are not ready for the SET command, rock back and forth from left to right until you are ready and have cleared your mind. Only then should you stop moving and get ready for the next command.

Set

Before going into the set position as it should be in a race situation, we need to back up and discuss the process of setting up that position so that it will be beneficial. As was previously discussed, improper block settings and positioning can serve as a detriment to your race, reducing your ability to get to your top speed.

Block Positioning

When learning to use starting blocks, it is important that you remember one fundamental thing: blocks are used to put you in position to accelerate, not to get you to full speed in the first few steps. Young athletes have a tendency to try to get to full speed as quickly as possible once the gun goes off. You can tell this is happening when an athlete pops straight up, becoming vertical with the ground, within their first few steps.

The first thing that you need to do is determine your quick side vs. your power side. This process was explained in the previous article. Once you have determined that, you must then establish block spacing. Technically, the distance between the front block and the starting line should be approximately 55-60% of your leg length. The distance between blocks should be shin length, which is about 42-45% of total leg length. A simpler and equally effective spacing is to start by placing front block two foot-lengths from the starting line and the rear block another foot length between the front and rear blocks. Spacing can be adjusted from there based on comfort, existing strength levels, etc.

Body Position While Set

The front knee angle should be between 90 and 110 degrees, while the rear leg angle should be between 120 and 135 degrees. Existing strength levels will be the primary factor determining whether your knee angles are closer to 90 and 120 degrees, versus 110 and 135 degrees. This means that weaker athletes will have the hips higher in the air (closer to 120 and 135). Evidence suggests that angles in this range allow for the greatest stretch reflex in the hamstrings, as well as the greatest amount of velocity when exiting the blocks. It is important that you know your limitations.

Even advanced male athletes, at the high school level, usually do not have the strength and power capabilities to successfully use lower knee angles when in the set position. A tell tale sign of poor block settings and/or body angles is seen when an athlete becomes completely upright within the first few steps of a race. Rapidly decreasing shin angles are the most obvious evidence of limited strength and power output.

When in the set position, make sure that the front pedal is all the way down creating the smallest possible angle with the track. Ideally, block pedals should be at 30 degrees. A 30 degree angle best utilizes the stretch shortening cycle, which means you will get the most power from stretch reflex, but without increasing the amount of time you are pushing on the pedals. The problem is that most blocks can only be lowered to about 45 degrees. Therefore it is important that both heels be pressed firmly against the back of the pedals. If they are not pressed against the pedals, you will waste precious time stuck in the blocks as your heel fires back against the pedal, creates force, goes through the stretch shortening cycle, then helps propel your body out of the blocks. Losing a tenth of a second in the blocks can be the difference between being a Champion and being an Also Ran .

Force application at the start comes mostly from the glutes. Pre-tension of these muscles while in the blocks minimizes movement time and gets rid of any conscious effort to push with the back leg at the gun. The set position is not an entirely relaxed position. That is why you should not stop moving until you are focused and ready to move into the set position. Being set in the blocks is your final opportunity to focus and get ready to maximize all the strength and power your body has developed from your time in the weight room, plyometrics and speed training. Hips should be above the shoulders.

The degree of height above the shoulder will affect knee and hip angles, thus affecting force application and acceleration. Hands should be placed about shoulder width apart. The hands should also be arched, so that only the fingertips are actually touching the track. Doing this ensures that you will not place too much weight on your arms which forces your legs to move the majority of your body s mass.

The position of the shoulders while in the blocks is a subject for debate. Some coaches instruct their athletes to bring their shoulders out slightly past their hands, thus bringing the center of mass closer to the starting line. We disagree with this strategy. Research shows that, once the gun has gone off, an athlete s hands will leave the track in about .15 to .20 seconds. After that time, the arms and hands are no longer part of the base of support for the body and only the feet and legs are able to propel the center of mass forward.

Most young athletes are not strong enough and have not learned proper acceleration mechanics to compensate for the position of the center of mass once the hands leave the track. In essence, leaning forward at the line often makes young sprinters fall forward out of the blocks. Instead of creating horizontal velocity during the drive phase, they are instead trying to keep their feet underneath them to avoid falling forward. I ve tripped coming out of the blocks enough times to know that this is true. Instead, we have our athletes line their shoulders up directly above the hands or slightly behind the hands.

The goal is to have the arms carry as little weight as possible while in the set position. This accomplishes a couple of things. It takes pressure off of the arms which allows for more pre-tension and force to be applied to the block pedals as well as eliminates the feeling that you are going to fall when the gun goes off. Of

primary importance it creates the potential to apply more force to the blocks, which in turn allows for the storing and release of more elastic energy, which allows for greater velocity out of the blocks. It also makes it easier for you to get into proper sprint position upon clearing the blocks, increasing the likelihood that you will accelerate smoothly and obtain top speed.

The final issue to cover before the gun goes off is what to focus on once you are set and locked in the blocks. There are two things you can do here. One is to focus on a motor set, which means to focus on your first movement, not the gun. Second, would be a sensory set. This means that you would focus your attention on the starter s gun.

We suggest focusing on a motor set. Focusing on the gun isn t necessary because you are going to hear it and react to it whether you are focusing on it or not. By focusing on a sensory set as opposed to a motor set, you are likely to get a slower reaction time to the gun. By waiting to react to the gun, you have to wait to hear the gun, then your brain has to acknowledge the sound of the gun, then send a signal to your muscles to react to the gun. This might only take .10, but it is time you cannot afford to waste. Instead, you should focus on driving the power side arm (if your right leg is forward, then drive your right arm) up as soon as the gun goes off. This will help bring your quick side leg through as well as help you drive through your power side leg. It will also decrease reaction time because your brain will not have to send as many signals throughout your body before motor units begin to fire.

To review, once the starter calls set you must rise quickly to the set position and stay there without moving. At this point you should be focused on one thing; driving your power side arm up as soon as you hear the gun. That will help you get a better start and set up pure acceleration and the drive phase that will help you get to top speed.