



Diagonal Stride

Diagonal Stride is the first gear in the classical transmission. It is used when climbing steeper hills where double poling or kick double pole will only bog the engine down.

Introduction

There are several important factors that play a key role in properly executing diagonal stride. To make the discussion easier they have been broken down into body position, timing and power. Each of these components play an integral part in executing the stride successfully. It is important that the athlete perfect each component to be successful.

Body Position

Body position in all sport is important for enabling the athlete to apply power to each motion effectively and efficiently. For this reason body position in diagonal stride is similar to other ski techniques as well as to other sports.

Feet: Center the weight across the ball of the foot. If the weight is too far forward onto the toes it will be hard to apply enough force through the kick. If it is too far back it will be hard to apply force quickly enough to be powerful. The skier's weight will shift toward the whole foot in the glide phase of this technique but will quickly shift back to the ball of the foot for the kick. Body position drills should focus on keeping the weight on the ball of the foot.

Ankles: The bend in the ankles is vital to directing the power in such a way that the skier is propelled forward down the trail and not up in the air. The degree of bend at the ankle is dependent primarily on terrain - the steeper the terrain the more acute the angle at the ankle. Also, the more force the skier is attempting to deliver the deeper the angle will be.

Knees: The angle at the ankle must be closely mimicked by the angle at the knee in order to keep the skier's weight positioned over the feet where that force can be directed through the ski to the snow. Generally skiers struggle to get the proper angle at the ankle rather than at the knee. What results is a knee angle greater than the ankle angle, which places the skier's weight behind the feet. This slows the speed of the kick, loads a great deal of weight on the quadriceps, and diminishes the amount of force applied to the kick.

Hips: The hips must be high and forward. When it comes to body position this is accomplished by having the skier's weight over the balls of the feet, maintaining the proper ankle and knee angle, keeping the upper body in a "C" position and by maintaining a quick kick. Look for the hips to remain high and forward through the entirety of the diagonal stride cycle.



Core/Back: The upper-body, from tailbone to head, should form a soft "C" shape. Think Neanderthal man, big foot, gunslinger. Do not think of the Queen of England or of the postural advice of your parents. This "C" position will help keep the hips over the feet, relax the lower back as well as position the muscles of the core to apply force to the poles. This "C" can be very shallow leaving the skier quite upright or rather pronounced putting the skier in an aggressive forward position. The depth of the "C" is also dependent upon terrain with most skiers adapting a more up-right shallow "C" position as the terrain becomes steeper. An "S" shape in the back is the most common core body position mistake and puts a lot of pressure on the lower back. This can also force the hips back. Another common mistake is to fold at the waist into an "r" position. This too forces the hips back and makes it hard to deliver power to the kicking ski.

Shoulders: Shoulders should be rounded leaving the arms hanging free and loose in front of the body. Even skiers who ski in a very shallow, upright "C" position should have a forward attitude at the shoulder. This position allows for a smooth pendulum swing of the arms as well as a good position from which to apply both body weight and force to the poles.

Arms: In the neutral or starting position the arms should hang loose from the shoulders. The angle of the arm at pole plant should enable the skier to apply maximal force with the core and back as well as the weight of the upper body to the poles. This means that the arm will be much closer to 90 degrees in steeper terrain, and slightly straighter in more gradual terrain. At pole release the hand should be low. The follow through of the arm is dependent upon speed (and terrain). The faster the skier is moving the longer the follow through. The shoulders and hands should reach forward down the track in front of the skier rather than across the skier's body or out to the side.

Timing

In all techniques the whole body works together to transfer the skier's weight from ski to ski and down the track. Timing of the diagonal stride mimics that of a running stride. The skier's opposite arm and leg are forward together. In skiing the upper-body contributes forward momentum by applying power through the pole as the skier glides, plants, compresses and explodes forward off the kicking ski thus propelling the skier down the track. At the same time as the kicking ski and poling arm pass back behind the skier the opposite arm and leg swing forward (just like running) adding forward momentum to the propulsion down the track. This technique uses the same timing as running but has the added power of the upper-body, and the speed and efficiency of the ski gliding on snow.

The term "kick" is used to describe the forward propulsion of the skier from one ski to the next (as in a runner striding from one foot to the next). This term is misleading, as the skier does not actually kick backwards any more than a runner kicks backwards. This "kick" could better be described as a jump or the propulsive component of the stride, but the term "kick" is utterly entrenched and will do fine.



The “kick” of the diagonal stride can better be likened to the explosive jump of a long jumper than the foot strike of a runner. In either case imagine the jumper or runner attempting to kick the foot back at take off. In actuality the foot and leg is left behind the athlete in the follow through after the jump or foot strike. The same is true for the skier. In fact the skier’s “kick” is similar to the jumper’s jump in that the foot is planted on the ball of the foot. The athlete then compresses down on the planted foot, and explodes forward off the foot down the trail or, in the case of the jumper, through the air. The time the jumper spends in the air is the time the skier is gliding. The more powerful the jump the further the jumper sails through the air. The more powerful the “jump” for the skier the further the skier can glide. The major difference is the direction of this jump – the jumper must orient some power into the air while the skier is oriented entirely down the trail.

This jumping sequence is so linked as to be a single motion containing all the elements of glide, plant, compress, explode, glide. See more on timing under “Power”.

Power

Power results from force applied quickly. Power relies on being in a position that allows both the application of the skier’s strength and the application of that strength over a short period of time. The above description of body position aims to put the skier in that position. Timing allows power development while maintaining the forward momentum of the skier.

The effective, efficient and repetitive application of power to the skis and poles is the goal of learning proper technique – including body position and timing. Once the skier can grasp the idea of proper body position it must be ingrained through repetition. This repetition will also develop the strength it takes to maintain this position and develop power from it. The practice of proper timing will help develop the speed of force application.

The job of the kick in diagonal stride is two-part. The first part is compressing the ski to the snow, which is vital to gaining the platform from which forward propulsion is performed. The second part is making that forward propulsion powerful enough to propel the skier further and faster than the competition.

A large part of this power comes from weight transfer. This could easily be put in the “body position” section. The entirety of the skier’s weight must be over the gliding / kicking ski for the skier to both glide with relaxed balance and apply maximal power to the kick. In fact the ski will carry 100% of the skier’s body weight in the glide and all the skier’s weight plus the force added by the kick itself during the kick phase.

In diagonal stride the speed of the kick is of primary importance to power development. This is because the skier must execute the kick fast enough in order to stop the ski in the snow without interrupting their forward momentum. In the short period of time that the ski can be stationary while the skier is still moving forward, that ski must be planted, flattened against the snow, and loaded with the force of the skier’s weight plus muscular strength (compressed) until the skier can finally



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explode forward off that foot onto the other ski. This entire sequence must be split-second fast – and that speed is the primary contribution to power in diagonal stride.

Power from the upper body is generated in a similarly quick application of force down onto the pole. The force is developed with a crunching motion of the core as well as the use of the lats and application of the upper body's weight onto the poles.

This motion actually takes place over a longer period of time than the kick as the poling motion begins before the initiation of the kick. Never-the-less power is still developed by applying this force quickly. To enable this, the poling motion should not be overly drawn out. The forward swing of the other arm is simultaneous to the poling arm. It should be swung low, relaxed and directly down the track so its momentum can be best utilized.

Training/Racing

Technique is the tool you use to apply your fitness to the sport. Technique is the screwdriver, fitness is what you use to turn the screwdriver, ski racing is the job you are trying to accomplish. With technique training you are simply trying to develop a good tool to help you get the job done. But fitness comes first. If you are fit enough you can drive the screw into the board with no screwdriver at all. There are many examples of skiers with inefficient technique winning even World Cup ski races – in other words skiers who can drive the screw with no screwdriver – and they do this with fitness. All technique work must be done in conjunction with and as an addition to preparation aimed at aerobic, anaerobic or strength oriented training. Do not mistake having a nice tool chest with being a good carpenter.

Drills

- Hotfeet
- Minson's Last Dance
- No Pole
- Skipping

Conclusion

Proper body position enables proper timing—both of which enable effective, efficient application of power.