The ABC's of Sprint Techniques
Al W. Biancani, Ed.D., C.S.C.S.*D.
Strength and Conditioning Coach Sacramento Kings (Retired)

Sprint speed is said to be an innate ability and can only be developed to a limited degree (LaVoie, 1975). Proper running technique can help sprint speed and is as crucial as good starting form. This article discusses the proper mechanics and forms of sprinting, exercise techniques to optimize mechanics and form, and training regimens for the exercises. When properly implemented these exercises result in an increase in speed and stamina.

Mechanics

Proper sprint mechanics result in the optimal transfer of power and energy from the body into forward motion. As in physics, the force applied results in acceleration. Both force and acceleration have directional components. Proper sprint mechanics ensure that both the force and resulting acceleration are in the forward direction. Good sprint mechanics must be emphasized and maintained at all times. The four mechanical components are arm, hip, body lean and running stride.

Movement Techniques: Arm, Hip and Body Lean

A good starting point for teaching running mechanics is the arm. Arm speed governs leg speed. Arms should move forward and back in a straight line in the direction of motion. They should not move across the body. Any motion across the body causes the shoulders to turn from side to side and results in upper-body forces contrary to straight-line running.

A way to work on **arm movement** is to think of the shoulder as a ball and socket joint. Start by having the athlete circumduct his arm to emphasize the shoulder's movement capabilities. Relaxation techniques should be used to ensure loose shoulders from the very beginning.

The first component of proper arm movement is arm swing. The athlete practices swinging the arms back and forth and in line with forward motion (Figure I). The emphasis should be on keeping the shoulders down and relaxed. The arms must swing freely and straightforward. Have the athlete slide his arms against his shirt, keeping arms close to the body.

The second point of attention is hand position. Every athlete has a personal preference and comfort in the way he holds his hands while running. It is recommended that the hands be held with palms slightly open; thumbs resting against the tip of the index finger. Do not squeeze and tighten fists into a ball. Holding the hands loosely aids in keeping the shoulders relaxed.

Next, teach the appropriate arm angle. Have the athlete bend his elbows to a 105-degree angle and swing from the shoulder (Figure II). The emphasis should again focus on moving the arms forward and back in a straight line. The elbow angle should not change. Releasing arm angle releases leverage power and diminishes corresponding leg drive. The hands should not move past the hips on the back swing and, as the hand goes forward, should never go higher than between the pectoral muscles and the shoulder. If the arms swing too far back it takes longer to bring them forward: slower arm movement results in slower leg movement. Swinging the arms too far back can also cause the shoulders to rock from side to side and change the line of force to a lateral one. If the arm swing is too high the line of force becomes more vertical. The arms govern the legs and the faster an athlete can swing his arms efficiently (in a forward line of motion), the faster he will move down the field.

Proper arm movement includes loose, relaxed shoulders, straight forward and back arm swing, appropriate arm bend and comfortable hand position. It is helpful to have the athlete practice these techniques in front of a mirror to visualize and self-correct proper arm action.

As the athlete becomes competent with the individual movement techniques he should progress to faster arm swings while standing in place. Relaxation of both the hands and shoulders should be maintained at all times. Have the athlete imagine hitting down alternately on bongo drums positioned at hip height. “Beating the drum” encourages quick, powerful arm action: the harder one’s arm comes back, the harder the opposite leg pushes forward to the next step.

The following is a good drill to practice “beating the drums.” Have the athlete sit on the floor with his legs extended. Pump the arms quickly and emphasize hitting down on the drum (Figure III). If proper arm action and force are applied the athlete will slightly bounce off the floor. It is important to remember that the elbow angle should not change.

An exercise to work on **hip action** is the Figure Eight. While walking forward over-emphasize the movement of the hips in a figure eight motion (Figure IV). The pelvis should be rolled forward in order to get the fullest range of motion. Tight hips will not allow the knees to come up as high as they will when they are loose. This will shorten the stride, provide less drive and ultimately hinder sprint speed.

Sprinting is a rhythmical losing and gaining of one’s balance. Proper **body lean** is crucial in maximizing the efficiency of this phenomenon. A method of determining body lean is to

have the athlete stand on his toes and, with arms in the prescribed running position, fall forward into the first step. The body will naturally take the first step with the proper body lean. A straight back, the hips in line with the body and the feeling of "being tall" are all emphasized.

The Running Stride: ABC Drills

The running stride can be broken down for teaching and training purposes into three phases: Knee Lift (**A Drill**), Foreleg Reach with Active Back (**B Drill**) and Back Leg Extension (**C Drill**). The first progression of these drills is done while walking or marching. The next progression is done with an alternating skip. The third progression is performed in a run.

A Drill - High Knee Lift (Figure V)
Exercise A1 is done by raising the knees high and then down in a march. Emphasize staying up on the balls of the feet and pushing up as the knee goes up. The thigh should come parallel with the ground and the leg under the athlete is straight. The foot should be flexed and directly under the raised knee.

The next progression is exercise A2. Alternating legs, lift the knees high as in high-knee skipping.

Exercise A3 is the final stage for knee lift work. This drill is performed as high-knee running. As the athlete progresses down the field he should take about three steps per meter. Emphasize staying tall with the hips under the runner in order to utilize the fullest range of motion and leverage.

B Drill – Foreleg Reach with Active Back
In exercise B1 the athlete walks and picks up the lead knee (Figure VIa), extends the lower leg (Figure VIb), and claws back on the ground (active back) (Figure VIc). The heel then comes up toward the buttocks (Figure VId).

Figure VIa

Figure VIb

Figure VIc

FigureVId

The athlete should be instructed to lead with the knee before extending the lower leg. The active back is important because the harder the athlete paws against the ground the harder the ground pushes back, and the runner forward. The clawing foot should land near the grounded foot in order to maximize full use of

the pushing force. If the foot is clawed down too far away from the athlete's base, momentum is stomped into the ground and power from the push back is greatly reduced.

Exercise B2 is done as B1 with a skip in changing legs.

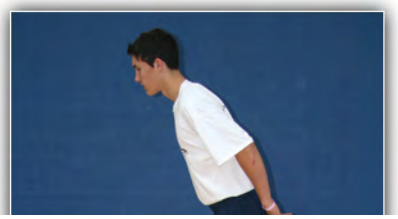
Exercise B3 is running with a high-knee lift, a good foreleg reach and an active back. Focus is on the active back, or clawing, motion during this drill. Progress down the field should be slow with an emphasis on maintaining body lean. The athlete's upper body should be in front of his center of gravity as he comes down onto the balls of the feet, not flat-footed. An active back emphasizes claawing the ground and bringing the heel to the buttocks. The flexed ankle and heel to buttocks is a follow-through and puts the leg and foot in proper position to repeat the drive movement quickly and efficiently. The ability to lift the knee and extend the lower leg will enable runners to lengthen their stride resulting in fewer strides during a race. This drill is also very good for strengthening the hamstring and gluteus muscle needed in sprinting.

C Drill – Back Leg Extension or Bounding
Category C is the third phase of the sprinting stride. Exercise C1 is done by hopping R-R-L-L-R-R with emphasis on back leg extension and height off the ground. The exercise is similar to the drills used for the triple jump. Distance on the hop is important as well as full back leg extension.

In exercise C2, the lead leg is brought up as in the A exercises. The emphasis is skipping high in the air, driving the lead knee up and pushing off with the bottom leg into a full extension. The athlete alternates the movements as the lead knee comes down, R-L-R-L.

Exercise C3 is done by bounding from one leg to the other. Emphasis is again on the back leg extension. With this exercise, the athlete also alternates legs with each step, R-L-R-L. The lead knee is driven up and held as the opposing back leg utilizes a full push or extension. Encourage as much "hang- time" as possible. Distance is important with C3. Focus on full back leg extension and push off with the toes. Proper arm action must be maintained at all times. (Figure VII)

Ankle Flips



Running on the toes or balls of the feet has been mentioned in the exercises. In order to get a good push-off the athlete must have good ankle strength. An exercise to help build this needed strength is the ankle flip (Figure VIII).

Ankle flips are done by getting as high on the toes as possible and then alternately "flopping" the feet as you move forward. The knees are locked and, as the flip is done, the toes drag on the ground. The athlete should stay on his toes and avoid coming down flat-footed.

Butt Kicks

Flexibility and good back kick allows for a greater range of motion and lengthen an athlete's stride. Butt kicks are another exercise to

enhance stride development. Instruct the athlete to run down the court or field alternately bringing the heel up, touching the buttocks. Forward progression should be slow but tap the heel to buttocks as fast as you can while maintaining control. Remember to use proper arm movement, keeping arms bent and swinging loosely from the shoulders. (Figure IX)

Training Regimen

These ABC drills can be utilized in training regimes for the development of both speed stamina and strength. It is important that proper sprint form and mechanics be maintained through all levels of training. This program can be done during the athlete's off-season or during the competition season as well.

For **strength or power-speed**, the maximum distance used should be 30 meters. All of the A, B and C Drills mentioned earlier can be used for speed work. The exercises are to be done quickly with progression slowly down the field with 3 steps per meter. As the athlete's form and mechanics become sound the A1 and B1 exercises should be eliminated. A good workout for strength or power-speed: four 6X 30meter repetitions.

Weight vests can be used during certain phases of the athlete's training season to enhance routine effectiveness. A maximum of 25 pounds should be used. These exercises can be done on a hill for an extra challenge, but all B drills should only be done going downhill.

For **stamina and strength endurance**, these drills should be implemented progressively. The athlete should only move to the next level (I, II, III or IV) when he is able to handle the current level while maintaining proper mechanics and form. The following table details the exercise regimen for each level and category:

ABC Strength Endurance Progression

Level	Reps	Category	Reps	Category	Reps	Category
I.	2x40m 2x80m 2x40m	A3 A3 A3	2x40m 2x60m 2x40m	B2 B2 B2	2x50m	C3
II.	2x40m 4x80m	A3 A3	2x40m 2x60m	B2 B2	2x60m	C3
III.	1x40m 2x80m 1x100m	A3 A3 A3	2x60m 2x80m	B2 B2	2x100m	C3
IV.	2x80m 2x100m	A3 A3	2x60m 2x80m	B2 B2	3x100m	C3

Acceleration: 4 Step Drill

The following exercise, the 4 Step Drill, will help develop the ability to accelerate. The first 4-5 steps in an athlete's start are crucial and should be executed with explosive power. This exercise teaches the athlete to gradually lengthen his stride as he transitions from still to full sprint.

Mark the recommended four-step acceleration distances (listed below) on the court, floor or track:

- 30 inches between starting position and step 1
- 40 inches between step 1 and step 2
- 50 inches between step 2 and step 3
- 60 inches between step 3 and step 4.

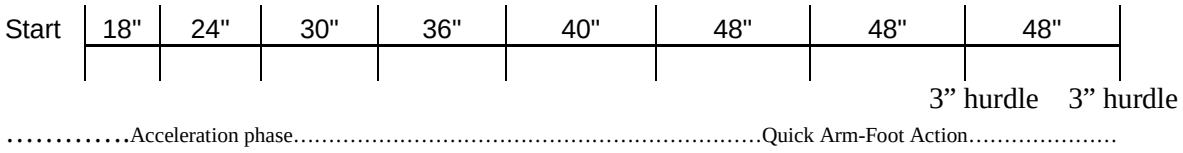
Stand at the first line in the starting position for the athlete's sport, (ie: three-quarter stance: football, slight crouch: baseball, basketball and set position: track). Start running through the four steps at quarter speed, avoiding any hesitation between the first and second step. One foot should land inside each measured distance. Explain the importance of a smooth transition (like a drag car with a 4-speed transmission). Instruct the athlete to gradually come up to the proper body position (like an airplane taking off). Emphasize arm movement: the harder the arms are pumped, the harder the opposite leg will drive. After you become proficient with the technique at one-quarter speed, you can graduate to half effort, three-quarter effort, and then 100% effort.

Quick Arm and Foot Drills

The purpose of these drills is to improve both arm and foot speed and promote a smooth acceleration. Proper running mechanics are emphasized at all times. Along with arm-foot speed development, proper acceleration techniques are also practiced.

The athlete begins the drill by accelerating his stride between flat pieces of wood or plastic spaced progressively farther apart. The pieces or rungs are spaced as follows: From the start line rungs are 18", 24", 30", 36", 40", and 48" apart.

Example.



Please note: These drills are designed to develop quick foot movement. Distances between rungs and hurdles are deliberately shortened vs. a normal acceleration and running stride. The acceleration phase of this drill helps the athlete smoothly transition from standing still to running.

After accelerating, (Phase 1 of drill) the athlete continues his sprint through 12 low hurdles. The hurdles are 3", 5" and 7" high and set at a specific distance apart. The 3-inch hurdles are set 48" apart, the 5-inch hurdles are 54" apart and the 7-inch hurdles are 60" apart. Begin with the 3-inch hurdles and change to higher hurdles as comfort and mastery is achieved.

Before incorporating the acceleration phase of the drill, have the athlete practice by simply running through the spaced hurdles. Begin by running through the line with one foot landing between each hurdle and progress to putting both feet down between each hurdle. Running between the hurdles with two feet down requires very quick arm movement. Make sure the athlete leads with different legs.

Sample Workouts

I.	10 X over 12	3” hurdles.	No acceleration.
II.	10 X over 12	3” hurdles.	No acceleration.
	10 X over 12	5” hurdles.	No acceleration.
III.	10 X over 12	3” hurdles.	No acceleration.
	10 X over 12	5” hurdles.	“
	5 X over 12	7” hurdles.	“
IV.	10 X over 12	3” hurdles.	With acceleration.
	5 X over 12	5” hurdles.	With acceleration.
	5 X over 12	7” hurdles.	With acceleration.
V.	10 X over 12	3” hurdles.	With acceleration.
	10 X over 12	5” hurdles.	“
	10 X over 12	7” hurdles.	“
VI.	15 X over 12	3” hurdles.	With acceleration.
	15 X over 12	5” hurdles.	“
	10 X over 12	7” hurdles.	“
VII.	15 X over 12	3” hurdles.	With acceleration.
	15 X over 12	5” hurdles.	“
	15 X over 12	7” hurdles.	“
VIII.	20 X over 12	3” hurdles.	With acceleration.
	20 X over 12	5” hurdles.	“
	20 X over 12	7” hurdles.	“

Drills can be done both single leg and double leg between hurdles. Speed through the 12 hurdles is very important.

Hurdle Construction

1. Acceleration wood: 1” X 24” (6 flat pieces).
2. Hurdles (12 of each height)
    a. Use ½ inch PVC pipe.
    b. Cut 2-foot lengths. Attach L connector at each end.
    c. Cut desired heights: 3”, 5” and 7” pieces. Attach to bottom of each L connector.

Teaching Hints

The following is a teaching checklist to fully maximize your athlete’s sprint potential and can be used as pre-workout exercises:

1. Body alignment is critical. Your ear, shoulder, hip, knee, and ankle should be in a straight line. This position should be maintained at all times when you are sprinting and through the duration of the drills.
2. Let your arms swing from your shoulders.

3. Keep your elbows at a 105-degree angle. Do not let your angle change.
4. Keep your hands slightly open. They should go no further than your shoulders on the forward swing and no further back than your hips on the back swing.
5. Fully extend your push leg but do not overextend, as that will cause you to fall out of balance and rhythm. (Running is a rhythmical losing and gaining of your balance).
6. In the recovery phase of the stride, your heel will rise near your buttocks.
7. The drive leg should reach a position where the thigh is approximately parallel to the ground. Once in this posture your ankle, which is located directly below the knee, is slightly flexed.
8. Talk about arm action first:
    a. Physics (for every action there is an equal and opposite reaction).
    b. Drum on hip and why.
    c. Explain arm sliding on shirt.
    d. Explain why arms are kept bent (Figure II).
    e. Shoulder movement.
    f. Must emphasize why arms are important (arms speed governs leg speed).
9. Talk about the A Drill:
    a. Foot behind the knee (Figure V).
    b. Bottom leg should be straight (Figure V).
    c. Where center of gravity is and why it is important in running.
    d. Body lean, staying tall.
    e. Sprinting is a rhythmical loosing and gaining of your balance.
10. Talk about the B Drill:
    a. Lead knee lift, foreleg extension (Figure VIa, VIb).
    b. Why you claw back on the ground (Newton's Law).
    c. Explain where the foot should land and why (Figure VIc).
    d. Explain foot flexion and heel position and why (Figure VId).
11. Talk about the C Drill:
    a. Explain back leg extension and push (Figure VII).
    b. Emphasize knee drive.
12. Acceleration Drill:
    a. Explain the need to think of their steps as if they are a 4-speed transmission.
    b. Explosive initial arm drive is vital to an explosive first step.
    c. Arm action (arm speed governs leg speed).
13. Quick Arm-Foot Drill:
    a. Practice a smooth, quickstep acceleration.
    b. Emphasize that quick arm action governs quick leg action; quick arms are crucial.
    c. Progress through higher hurdles and both feet down in between.

Summary

Proper sprint mechanics result in optimal transfer of power and energy from the body into forward motion. These exercises and techniques will help train the body to perform the running movement in a more efficient manner and directly relate to an increase in speed.

Practice these exercises by progressing down the field slowly; moving the arms and legs quickly and staying relaxed. The emphasis of the ABC drills is keeping the knees high, moving the arms properly, extending the lower leg well, having a good active back, and maintaining good running techniques at all times.

Mechanics and running form are vital to optimizing force, acceleration and stamina. These techniques and drills can be used in training many athletes together or with individuals. This regimen has been successfully implemented and, when combined with an emphasis on proper running mechanics and form, will result in an increase in speed.