



# ***KAYAK TECHNICAL TEMPLATE***

## ***Glossary of Terms***

***Bottom hand*** - This is the “pulling” hand; hand of the blade in the water; hand of the blade about to go into the water during the drive phase; the front hand in the set up.

***Top hand*** - This is the hand in the air during the pull phase; back hand in the set up.

***Set up*** - This is the break between strokes, although it might be subtle at high rates. The paddling motion is a continuous smooth rhythmical powerful stroke, yet there is a slight break/pause in the set up phase.

***Head up:*** Eyes are looking ahead – approximately six feet in front of the boat.

***Individual differences*** - The coach allows some variance in the athlete’s technique for individual body differences, although the principles of biomechanics will still apply. The coach has identified an acceptable bandwidth of deviance from the ideal and communicates this with the athlete.

***Equipment*** - Full foot board and straps are part of the connection to the boat. The pressure is applied by the heel versus the toe of the foot while utilizing a full foot board. The use of swivel seat is a choice for athletes in the late Stage 4 USA Canoe Kayak LTAD who demonstrate a good grasp of the technical elements of the kayak stroke specifically in hip rotation through a strong core and its associated muscle groups.

***MF - Mental Focus*** - Athlete is mentally focusing on a particular technical element within a given phase of the stroke.



This is an explanation or definition appearing at the start of a new phase in the stroke. It is also inserted to highlight a drill or drills to be used by the coach to assist the athlete with a specific skill acquisition.

## Set Up



The set up phase is the break/pause between strokes – the end of a stroke occurs when both hands are at approximately the same level. The end of one stroke is the prep for the next – beginning of the next.

### Key Elements

- ⇒ Bottom hand position – eye level — site the horizon.
- ⇒ Top hand position – approximately eye level — individual differences.
- ⇒ Top hand and top elbow form an angle that is 90 degrees or slightly less.
- ⇒ Top forearm and hand is in a 45 degree angle to the water.
- ⇒ Top arm from elbow to armpit is parallel to the water - avoid a low elbow position.
- ⇒ Top hand has knuckles facing forward versus palm – MF – “throwing a punch” position.
- ⇒ Athlete is relaxed as much as possible in shoulders and arms – relax / drop shoulders.
- ⇒ All rotations at a maximum – hips, lower back, torso and shoulders – near knee in strong flex position / “near hip” is fully rotated.
- ⇒ Once the set up is in place, avoid over reaching with the bottom shoulder or hyper extending the elbow – “relaxed straight” in the arm.
- ⇒ Boat is level.



1. Use an erg or balance board with mirrors to assist the athlete in identifying the “feel” for correct positions.
2. “Tap drill” – to assist athlete with correct top hand elbow position – athlete holds the set up position and moves hand in and touches side of head by ear and moves hand back out to correct position. This teaches the athlete to be flexing the top elbow to acquire the “90 degree or slightly less” at the upper arm and elbow.

## Drive Phase:



The drive phase is from the set up to the tip of the blade touching the water when the “catch” phase *begins*. The aim is to generate as much “free power” as possible in this phase by being aggressive and dynamic. Biomechanics are at play in this phase - the “stretch – shortening cycle”. Athlete is preloading with an isometric contraction – firming the core, applying pressure on foot rest, tensing in the near leg, and anticipating the “all in” principle of neuromuscular activation.

MF – analogy to hitting a nail with a hammer – you lift the hammer and hit the nail versus placing the hammer on the nail and tap / tap / tap it!

Speed of the blade hitting the water is needed to overcome the resistance of the water and combined weight of paddler and boat.

### Key Elements

- ⇒ Both hands are directing paddle into the water. Top shoulder and top hand pressure down the line of the shaft. There is a lead and follow/guide relationship that develops between the bottom hand (lead) and the top hand (guide) during each stroke.
- ⇒ Athlete maintains all the rotations while driving/directing the paddle into the water close to the boat.
- ⇒ MF – bottom hand stays forward as it drops towards the water with the top hand directing/driving the motion.
- ⇒ Press the bottom hand downward and feel your weight going onto the blade – the paddle actually is stopping you from tipping – if the blade snapped, you would fall in.
- ⇒ Boat is level.



1. To assist the athlete in maintaining all rotations while in the “drive phase” attach a plastic zip lock tie to deck of the boat (duct tape) so that it projects out from the side of the boats. This is a visual cue as well as a kinesthetic one for the athlete to target. It is used to help the athlete from prematurely initiating any early movements that result in catching the water short (CWS) or losing rotation before the “catch”.

## **Catch Phase:**



The catch phase starts when the blade tip touches the water and is completed when the blade is fully immersed or buried.

### **Key Elements**

- ⇒ MOST IMPORTANT - Blade is buried in the water, before any rotation is initiated – MF – before leg drive (extension) and hip rotation is to occur, blade must be completely buried in the water – “top of blade gone”.
- ⇒ If rotation occurs before placement of blade in the water, catch ends up being short (CWS) and maximum force application is past ideal critical angle resulting in loss of maximum propulsion.
- ⇒ Paddle is placed into the water as close to the boat as possible – top hand is directing the blade into the water.
- ⇒ Bottom hand is pressing down; near side of torso is strong and long - MF - engage the oblique muscle group.
- ⇒ Big angle under near armpit.
- ⇒ Strong, dynamic forceful catch with minimal splash.
- ⇒ This is the beginning of a sequence of rhythmical movements.
- ⇒ Boat is level.



1. “Drive drill” - 10 strokes – drive blade into the water to buried position with no other movements – “drive and direct”.
2. “Catch drill” - Drive the blade into the water and exit immediately afterwards – feel weight onto the blade.
3. “Alternating catch drill” - 10 strokes on one side with an aggressive catch with accompanying 10 easy strokes on the opposite side.
4. “Hand drill” – coach is standing in shallow water and has hand in water under the catch area to feel downward pressure of blade on hand.

## **Pull Phase:**



The pull phase starts when the blade is fully immersed and finishes when the blade leaves the water.

### **Key Elements**

- ⇒ MF - sequence of rotation begins with the brain, followed by foot pressure, leg drive, and rotation through the hips, lower back, torso and shoulders.
- ⇒ Bottom hand and top hand lock the paddle in the water at the catch; the athlete is loading the paddle by applying forces in both a horizontal (reach ahead, grab the water and move the boat past the blade) and a vertical direction (force down the length of the shaft, critical to power generation and engage the core).
- ⇒ The athlete is trying to create as much power as possible through a summation of these forces – both vertical and horizontal.

⇒ The critical component in this phase is to maintain the vertical paddle angle as close to 90 degrees for as long as possible by:

- ✓ Push/pressure is directed down the shaft - avoid top hand / shoulder forward push.
- ✓ Create a torque motion/rotation about/around the paddle.
- ✓ Top hand height maintains its position.
- ✓ Top hand guides the paddle in following the bottom hand lead.
- ✓ Top hand moves laterally in fixed angle in support of hip, lower back, torso rotations.
- ✓ Pressure with the top hand throughout the pull phase — top is hand is stabilizing the paddle in the water and attempting to maintain a vertical angle as long as possible – **NO FORWARD PUSH.**
- ✓ Between the top and bottom hand there is a maximum load on the shaft – “bend the shaft”.
- ✓ Paddle in water follows its own path – along the bow wave.
- ✓ Paddler is trying to pull him/herself forward.



1. “Top Hand drill” – 1 stroke @ 100% power – begin in the water; press down very hard with maximum tension between two points of contact with paddle (top/bottom hand) is constant; lose either one and the result will be that the connection to the water is lost. Feel how much force the top hand exerts. MF – it is a pressing versus pushing down with the top hand; it is a supportive strong role versus a dominant role.

- ⇒ The speed of these movements (why they are done as well as how they are done) is the most critical of all components in the biomechanical application towards power generation – summation of power = mass x acceleration x velocity.
- ⇒ STRONG CONNECTION - from hip to the boat is through the leg to the foot board. Rotation occurs on the seat with hips; as hips rotate – moves the boat past your catch. Torso rotation follows hip rotation - hip movements through a “strong connection” to the overall body movements are powering the boat.
- ⇒ MF - all movements must be a forward motion about a vertical axis – rotating around the paddle.
- ⇒ All movements must direct the boat forward - “the athlete is one with the boat”.



Arm movements are to allow for hip to move efficiently – the path of movement of the top hand is eye level versus for it to loop. It is important for the top hand to follow the bottom hand - MF – in stabilizing the paddle, guiding the paddle. There is a definite connection between the roles of the hands – there is a pull and following in a supportive manner.

- ⇒ Bottom hand stays in same height relative to distance from water throughout the stroke from catch – same level.
- ⇒ Bottom hand is following the blade movements in the water yet the elbow comes in “slightly” towards the hip at end of this phase.
- ⇒ Boat is level.



GRIP - “bottom hand” - fingers hooked solid; palm slightly open; avoid clenched fist or death grip; no pressure in crux area between thumb and first finger; “top hand” - fingers are around paddle shaft in a strong grip but avoid squeezing “white knuckles”; very strong in thumb, index and middle finger, less so with ring and baby finger.



1. “Hand drill” – easy to feel – open your hand.

## ***Exit Phase:***



The exit is a moment in the stroke between the pull phase and the set up phase when the paddle clears the water. MF - once past the critical acceleration point, the athlete is not moving boat forward. Get the paddle out of the water!

### ***Key Elements***

- ⇒ Allow elbow to bend in latter part of the pull phase.
- ⇒ This movement of the elbow slightly “in” sets the paddle and arm movements up perfectly for the set up position described earlier – it is a more dynamic and fluid motion.
- ⇒ Elbow stays in front of the hip – MF – finish off the pull phase aggressively; sharp on the exit.
- ⇒ The force is accelerating throughout the pull phase; avoid slowing down. Opposite hip is driving forward – ends in fully rotated set up position for next stroke with knee completely flexed.
- ⇒ On exit fist goes above the elbow; versus straight arm exit; MF – athlete thinks of flicking baby finger to the side and up.



1. “Bump drill” – hit elbow to the body versus allowing it to drag past the hip or out to the side

## ***Credits***

Scott Oldershaw, National Team Kayak Coach; Canoe Kayak Canada.

Nathan Luce, Head Coach USA Canoe / Kayak, 2005 – 2009.

Dean Oldershaw, Head Kayak Coach, Mississauga Canoe Club.

Jeff Howser, Nova Scotia Provincial Team Coach.

Shaun Caven, Head Coach, Oklahoma City; Team USA U23 Coach; former Head Coach, BCU Men's Kayak Team.

Dr. Jurgen Sperlich, Germany, Sport Scientist and Bio-mechanic – OTC Chula Vista, Feb. 2010.

David Gubser, Athlete, Swiss Senior National Team 2001- 2010.

Dan Henderson, Head Coach Cascade CK Club; author, ICF Level 1; Kayaking and Power seminar, Feb. 2010.