NAWGJ
Education Committee

September 2017

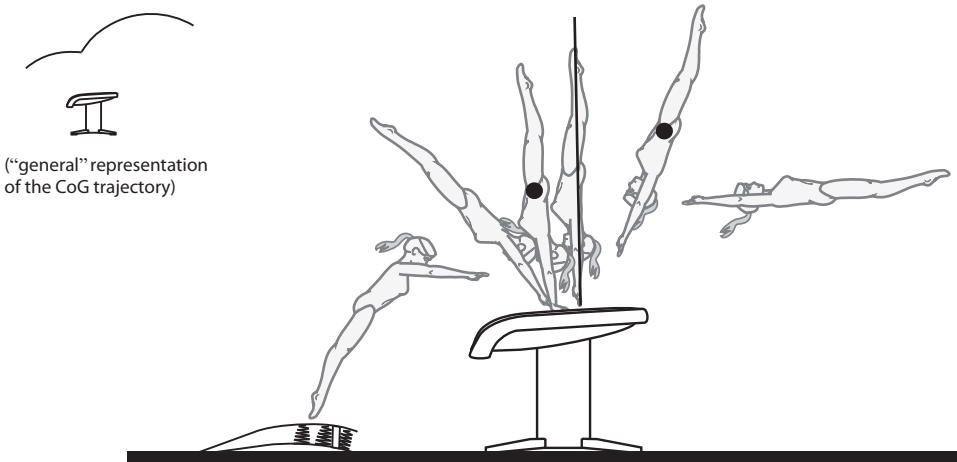
The following are line art illustrations of 10 different performance varieties of compulsory handspring vaults. These are by no means the only variations of this vault but may be among the most common handsprings that we might see.

Each vault will show a dot for the location of the center of gravity, CoG. The small vault table in the upper left corner of each illustration is a rough representation of the trajectory of the CoG given the body position and the angle of entry to the table as illustrated. A straight line shows the angle achieved at the moment of lift off or block from the table.

Each vault line art will have a POSSIBLE evaluation and scoring scenario given the illustrated body positions, angle of repulsion and height achieved. It is NOT intended as a legitimate means of vault evaluation as this can only be achieved with physical performance. Pre flight, quickness of repulsion and resultant post flight power, i.e. vertical lift and distance is most affected by take off lift power and inversion (angular velocity). These factors can only be exactly evaluated with actual performance. These representations are intended to illustrate the IF/THEN of certain pre flight and off flight trajectories and to also study the results of different body position errors on the final potential outcome of the vault. The distance deduction is a logical "guess" based on the angle off, the time in support, the body position off and the overall dynamics. One can extrapolate from these the approximate distance but it is not exact.

The vault below is our MODEL. This illustration depicts a low angle of entry, a vertical lift off, a strong rise of the CoG and resulting distance achieved. Note that the height is measured by the CoG at the moment of arrival on the table to the maximum height achieved in the post flight. Examples 2-9 show varying techniques. Most of the samples are with relatively fair to good form so adjustments would be made for leg separations, more pronounced knee bends and extreme arching.

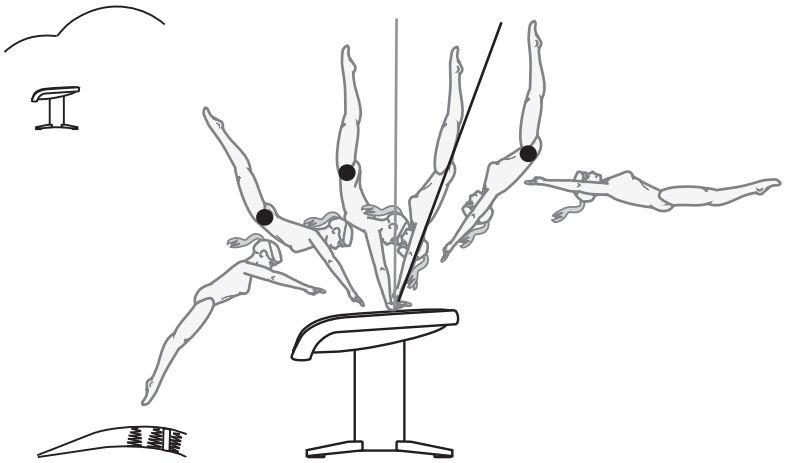
The **angle off the table** affects the potential **height**. Given a pre vertical arrival on the table, the angle off also can help to predict the **time in support**. Taking the time in support and the height achieved combines to predict the overall **dynamics** of the vault. The body and head positions are in a straight and efficient line. For these reasons the angle, height, time in support and dynamics are often closely related and so you will see these categories in BOLD type to highlight that point.



#1 MODEL of the Compulsory Handspring

NAWGJ Education Committee

#2

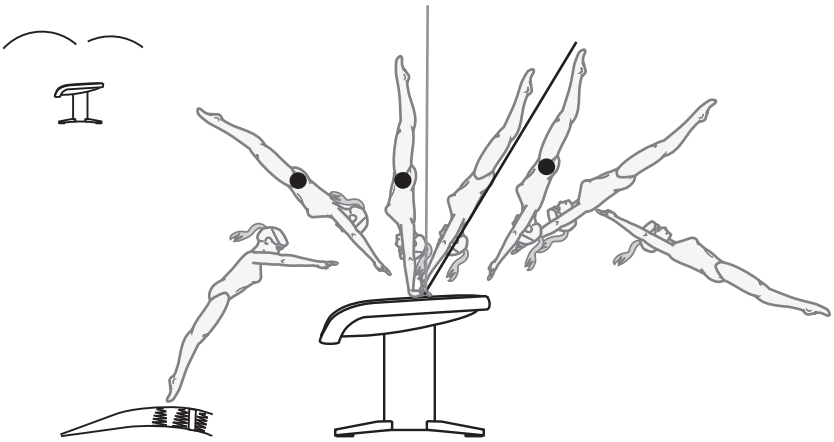


The Slingshot Vault

Angle Off	**.2**
Time In Support	**.15 - .2**
Height	**.25 - .3**
Dynamics	**.1**
PF Arch/Head	.5
On T. Arch/Head/Sh.	.25 - .3
Post Flight Pike	.2
Distance Estimate	0

Score Range: 8.2 - 8.35

#3

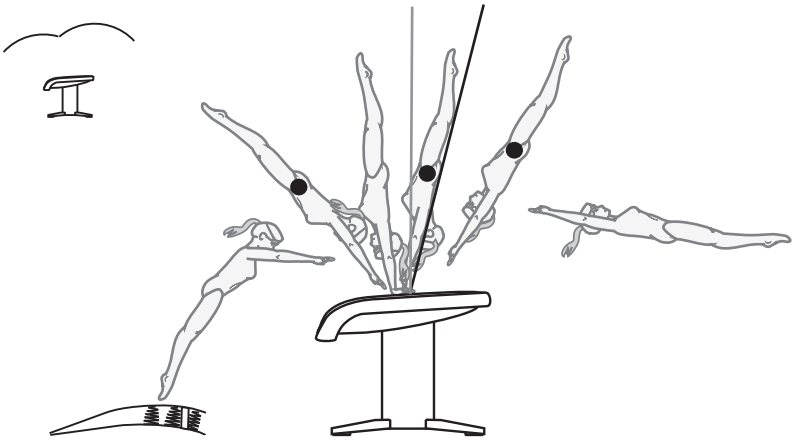


The High On Flat Off Vault

Angle Off	**.35**
Time In Support	**.25**
Height	**.4 - .45**
Dynamics	**.15 - .2**
Pre Flight	0
On Table	0
Post Flight	0
Distance Estimate	.05 - .1

Score Range: 8.65 - 8.8

#4



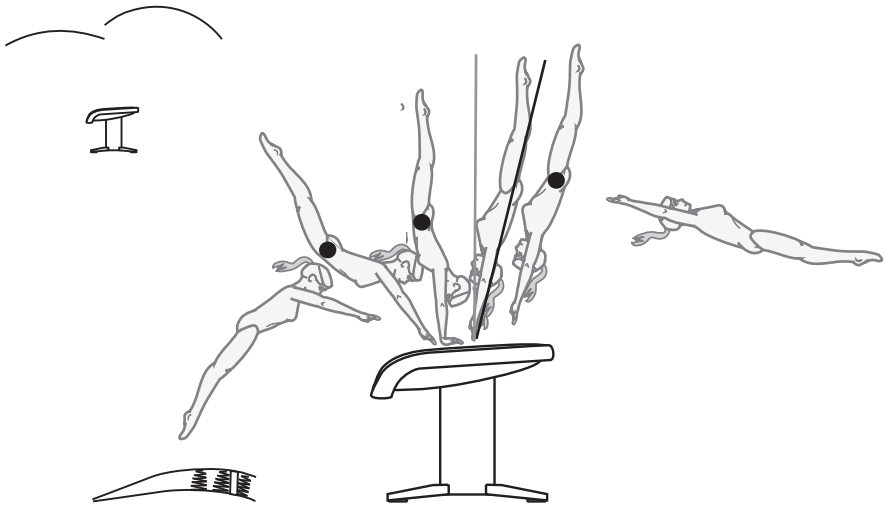
The Pretty Good Vault

Angle Off	**.15**
Time In Support	**.1 - .15**
Height	**.15 - .2**
Dynamics	**.05 - .1**
Pre Flight	0
On Table	0
Post Flight	0
Distance	.05

Score Range: 9.35 - 9.5

NAWGJ Education Committee

#5

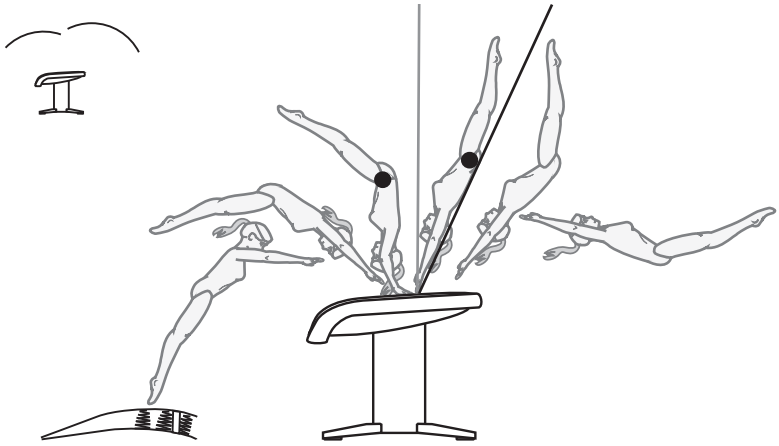


The Arch Hollow Vault

Angle Off	**.15**
Time In Support	**.1 - .15**
Height	**.15 - .2**
Dynamics	**.05 - .1**
PF Arch/Head	.3
On T. Arch/Head/Sh	.15 - .2
Post Flight Pike	.1
Distance Guess	0 - .05

Score Range: 8.75 - 9.0

#6

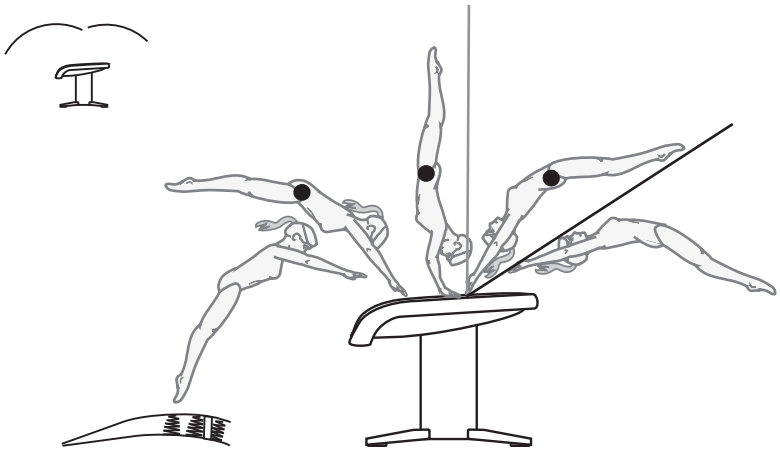


The Piked Roll Over Vault

Angle Off	**.25 - .3**
Time In Support	**.25 - .3**
Height	**.35**
Dynamics	**.2**
PF Pike	.3
On Tbl. Pike/Sh/Head	.4 - .45
Arm Bend	.2
Post Flight Pike	.3
Distance Guess	.1 - .2

Score Range: 7.4 - 7.65

#7



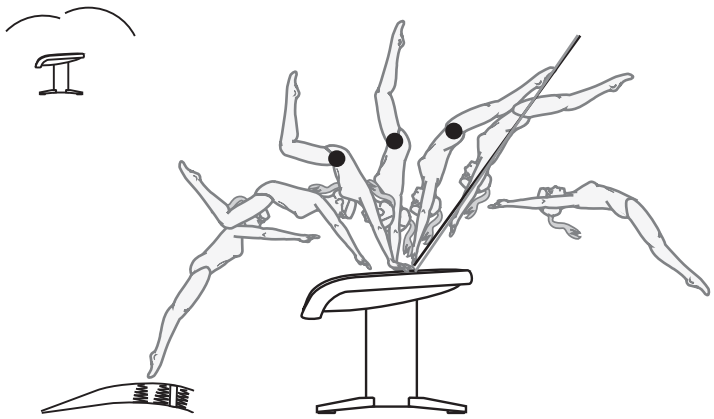
The Handstand Vault

Angle Off	**.65**
Time In Support	**.4 - .45**
Height	**.5**
Dynamics	**.3**
PF Pike	.2
On Tbl Arch/SH/Head	.3 - .4
Arm Bend	.3
Post Flight Arch	.2
Distance	.25 - .3

Score Range: 6.7 - 6.9

NAWGJ Education Committee

#8



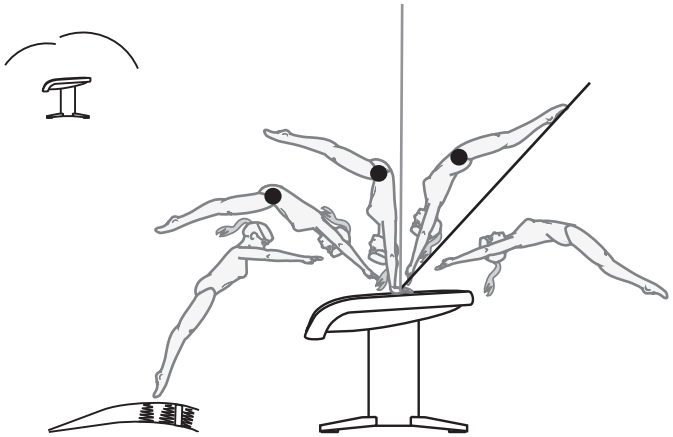
The Tuck Kick Out Vault

Angle Off	**.35 - .4**
Time In Support	**.2 - .25**
Height	**.4 - .45**
Dynamics	**.2 - .25**

Pre Flight Pike/Knees	.3 + .3
On Table Pike/Knees	.2 + .1
Arch Off	.2
Distance Guess	.2

Score Range: 7.35 - 7.55

#9



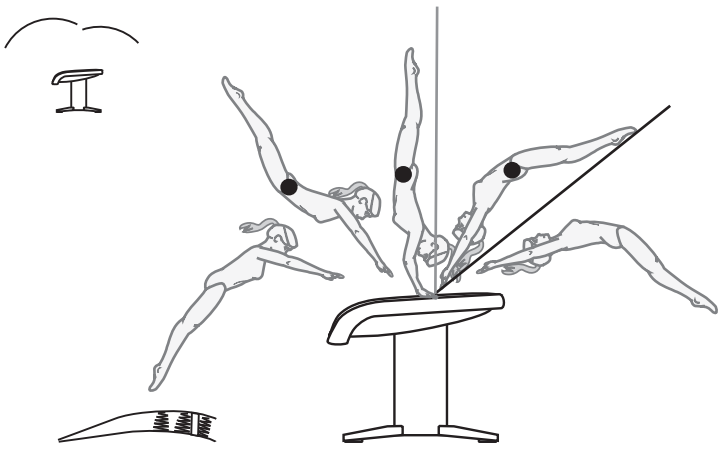
The Pike Whip Over Vault

Angle Off	**.45 - .5**
Time In Support	**.3**
Height	**.4 - .45**
Dynamics	**.2 - .25**

Pre Flight Pike	.35
On Table Pike	.35
Head Alignment	.1
Arch Off	.2
Distance Estimate	.2

Score Range: 7.3 - 7.45

#10



The High Flying Arch Over Vault

Angle Off	**.55**
Time In Support	**.3 - .35**
Height	**.45 - .5**
Dynamics	**.25 - .3**

Pre Flight Arch/Head	.3
On Tbl. Arch/Head/Sh.	.3 - .4
Bent Arms	.3
Arch Off	.2
Distance Estimate	.2

Score Range: 6.9 - 7.15

Handspring Vault Line Art Analysis:

DISCLAIMER: It must be noted that all of the actual deductions assessed to each line art illustration is a visual hypothesis based on assumptions drawn from body positions and the resultant potential trajectories. There are many more variations than illustrated in this project. These illustrations are an attempt to stress the close association and collective deductions within the categories of Angle of Repulsion, Time In Support, Height and Dynamics. These are the categories that most clearly define the nature of this vault.

Vault #1 - The Perfect Handspring - the ideal model.

All great vaults begin with a great run. Horizontal velocity achieving horizontal acceleration before board contact is critical. Upon board contact the horizontal acceleration of the body is rapidly and forcefully translated to angular velocity to invert the body in the shortest possible flight time to the table. The longer the body remains in free flight the faster the body loses the stored energy of the take off.

The angle of entry to the table is critical. The optimal angle will depend on the amount of stored energy the athlete is able to achieve in order to leave the table at the desired vertical angle. The more stored energy that is combined with the optimal angle will produce a time in support that is a literal ricochet/block from the table to result in a maximum height parabolic arc.

The body shape must be condusive to these forces and impacts. A straight-hollow shape with head in line and maximum internal amplitude results in a dynamic and explosive vault.

Vault # 2 - The Slingshot Vault

This vault gets some of its power from the change in shape from an arched to a piked position. The vault is relatively quick, height is average and the vault has some dynamics but the body shape errors take the score down by 1.0. The vault itself has potential and as soon as the body shapes improve without loss of power the vault will be workable.

Vault #3 - The High On Flat Off Vault

In contrast to #2 this vault has very nice body position and from that standpoint it will always appear to be a good vault. The problem, however, is that the high on trajectory wastes the stored energy of the take off and by the time the athlete gets to the table she has slowed down enough that the angle off is negatively affected and there is little opportunity to block for height. The vault still scores fairly well but it is mostly from the lack of body position errors.

Vault #4 - The Pretty Good Vault

This vault is a good vault and scores well. It is very close to the model and as soon as the athlete adds more speed and more angular acceleration she will have the chance to get off at vertical and achieve maximum height. It is the buildable vault that gets better and better with speed and power.

Vault #5 - The Arch Hollow Vault

A bit similar to #2 but because the athlete goes from the tight arch to a hollow shape there are fewer body position deductions and going forcefully into the hollow shape produces a quickness off the table in time in support, angle and height. Sometimes this type of technique will lend itself to the development of front salto vaults as soon as the athlete matches the vault with more speed and a greater degree of angular acceleration. However, body position pre flight deductions will always continue to be penalized.

Vault #6 - The Piked Roll over Vault

Typically this vault has a moderate to quick run but the athlete pikes and ducks the head, often producing an arm bend and a pike on the table. The athlete then extends from the pike and if done quickly there will be a very small amount of height produced by the extension from the pike along with the push from the arms. This type of vault is a very ineffective progression.

Vault # 7 - The Handstand Vault

This is the typical slow beginner vault. The run is often slow to moderate. The athlete tries for a straight body but without enough power, upon arrival on the table, the momentum fades, the elbows bend, the body arches to create an arc and the gymnast rides the table.

Vault #8 - The Tuck Kick Out Vault

Another beginner vault, the athlete has moderate speed but body shape errors in all three phases. Once on the table the knees and hips are extended to an arch shape but the entire vault is moderately slow so the result is a average quickness off the table and the only height to be attained is from the extension from tuck to arch so the height deduction is heavy as well as those for angle and dynamics.

Vault #9 - The Pike Whip Over Vault

This vault has body shape errors in all three phases. The vault slows down on the table as is evidenced by the low angle off which affects the time in support and the height. It is very similar to Vault #8 but with a bit more energy!

Vault #10 - The High Flying Arch Over Vault

The high pre flight trajectory loses angular acceleration and the athlete then collides with the table and the impact causes arm bend and head alignment problems and the result is that the athlete rides the table for a low angle off, a long ride on the table and little to no height.

NAWGJ

Education Committee