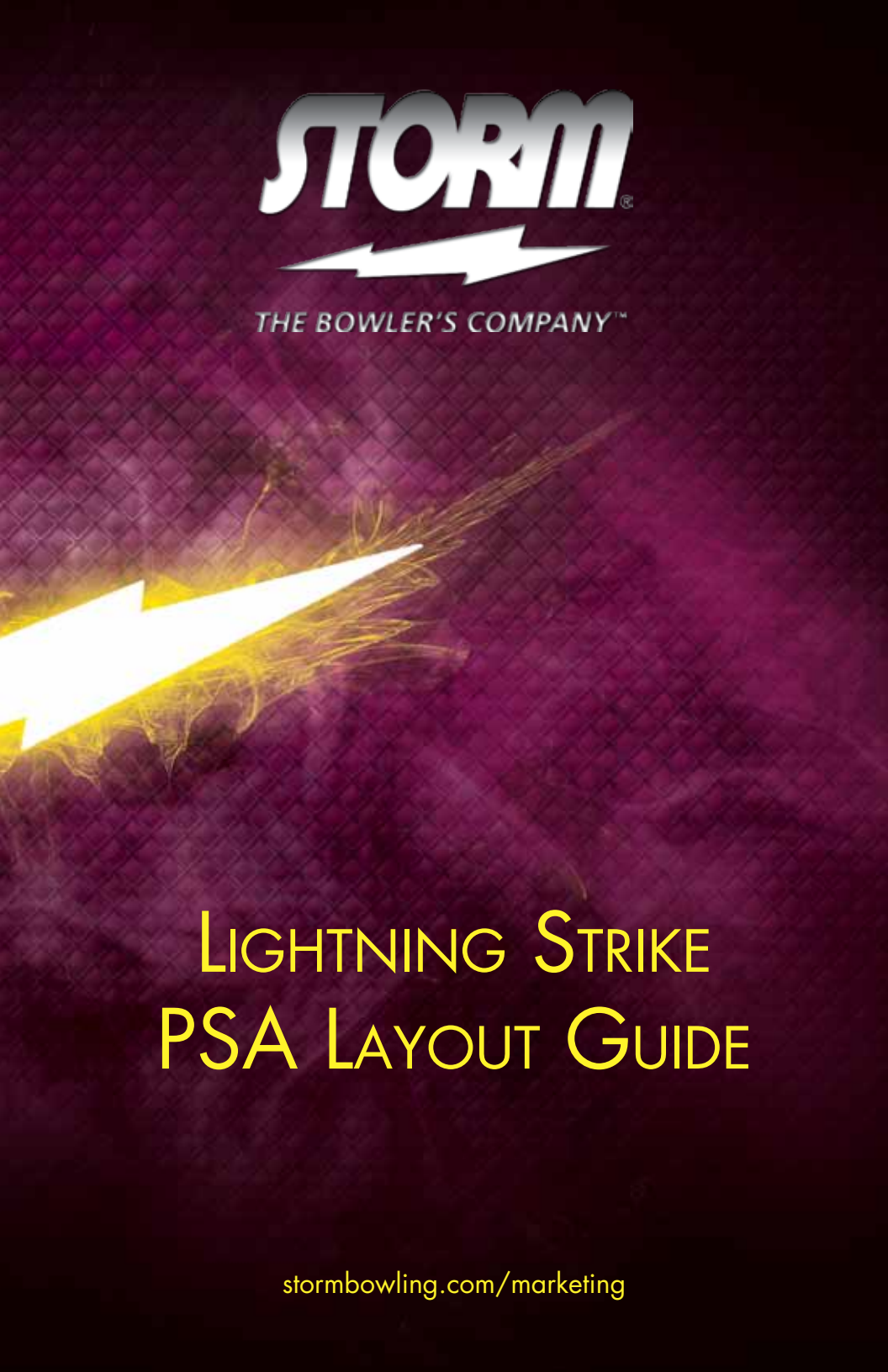


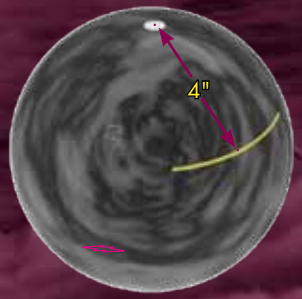
LIGHTNING STRIKE PSA LAYOUT GUIDE

stormbowling.com/marketing

PSA Drilling Instructions

4" x 4" x 2" Example

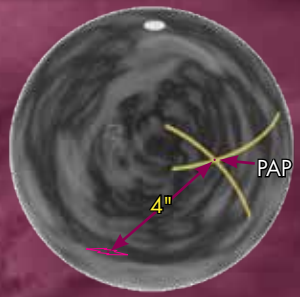
(4" Pin to PAP x 4" PSA to PAP x 2" Pin Buffer to VAL)



1. Draw an arc 4" from the center of the Pin.

2. Draw a second arc 4" from the center of the Preferred Spin Axis (PSA) that intersects the first arc from step 1.

   Where these arcs intersect is your bowler's Positive Axis Point (PAP).

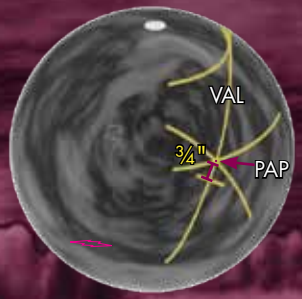


3. Now that you have found the PAP location, you need to find the Pin Buffer. In this example, use a 2" Pin Buffer.

   Draw a second arc 2" from the Pin.

4. Draw a line through the point where the arcs from steps 1 and 2 intersect (PAP). This line should be tangent* to the Pin Buffer. This line is your bowler's Vertical Axis Line (VAL).

   * Tangent: line which only touches the Pin Buffer in one location.

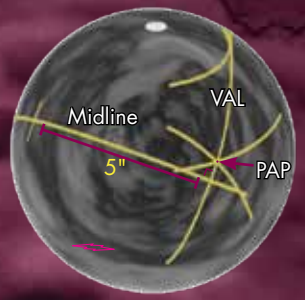


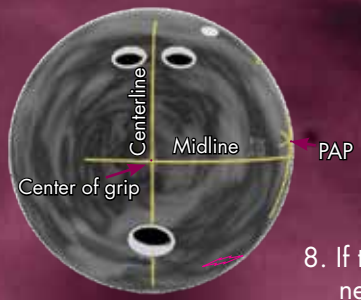
5. Using the VAL from step 4, measure your bowler's PAP backwards.

   This example uses a PAP measured as 5" over x ¾" up. Measure ¾" down from PAP on the VAL and make a tick mark.

6. Use your bowler's span measurements to draw a line perpendicular to the VAL. This is the midline. Using the PAP, measure 5" backward on the midline and make a second tick mark.

   This mark will become the center of grip.





7. Using the tick mark from step 6, draw a line perpendicular to the midline. This line is the centerline.

8. If the Pin will be within 1" of the nearest hole, it is necessary to shift the center of grip to either drill the Pin out or increase the distance beyond 1" in order to meet the manufacturer's warranty requirements.

   For full manufacturer's warranty, see back cover.

Legend	
	Pin
	Center of Gravity (CG)
	Preferred Spin Axis (PSA)
	Positive Axis Point (PAP)

9. Now that you have found the centerline and midline, use your bowler's measurements for the final drilling.

   Drill and scale the ball to determine the need, if any, for a balance hole. If one is needed, see instructions on page 7.

Frequently Asked Questions

What does PSA stand for?
PSA stands for Preferred Spin Axis, and is what most people refer to as the mass bias. However, PSA is a more accurate term.

What does the PSA look like?
The PSA looks like the Storm lightning bolt. You can see it in the legend on page 3.

Can I drill into the pin?
Partially drilling into the pin voids the warranty. However, drilling the pin out entirely is perfectly acceptable.

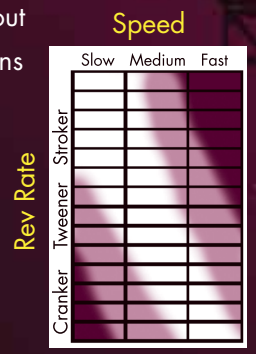
The layout I drew doesn't look like the illustration!
Because all bowlers have different PAP coordinates, your layouts may not match the illustrations exactly. Also, the layouts in this guide are all for right-handed players, so you need to mirror the layout for your left-handed bowlers.

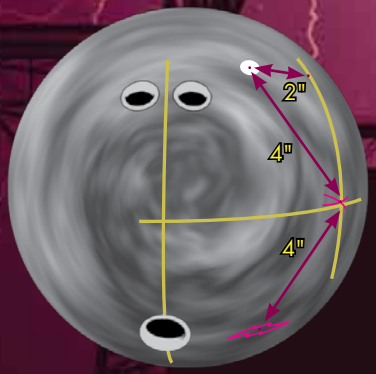
What else should I be aware of?
Always keep the PSA at least 2" from the bowler's initial ball track, toward the bowler's PAP.

How do I read these graphs?
Dark red means this layout may be less effective for the bowler's rev rate, ball speed, or both. Light red means the layout may be effective on certain lane conditions, and white indicates the layout should work on the widest range of conditions.

4" x 4" x 2"

- High flaring, strong layout
- Good on multiple patterns
- Strong entry angle

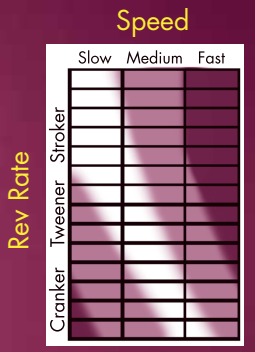


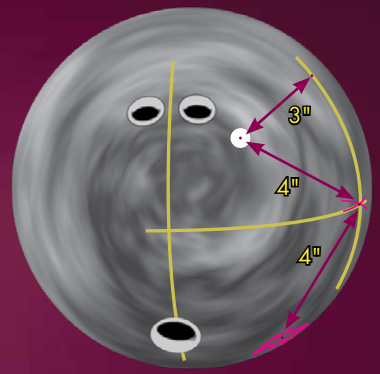


Note: Some layouts may require balance holes (see page 7).

4" x 4" x 3"

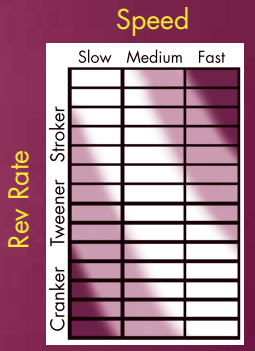
- Strong reaction
- Good for strokers & tweeners
- Starts early with sweeping arc

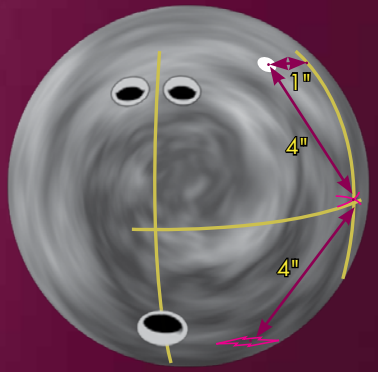




4" x 4" x 1"

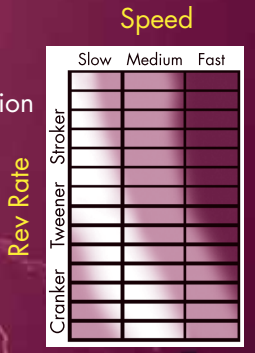
- Easy through heads
- Solid midlane read
- Strong backend reaction
- Great for multiple conditions

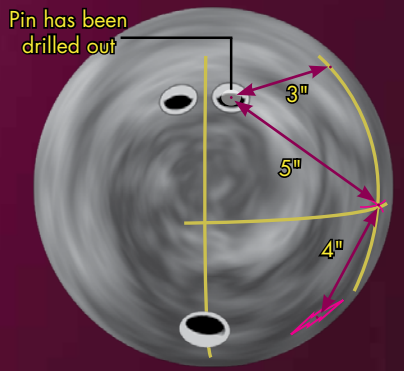




5" x 4" x 3"

- Good combination of length & backend
- Very controllable reaction
- Late midlane

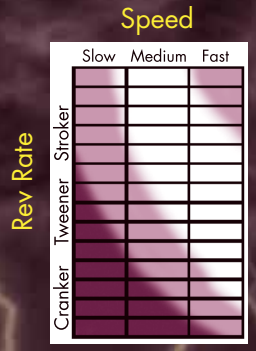


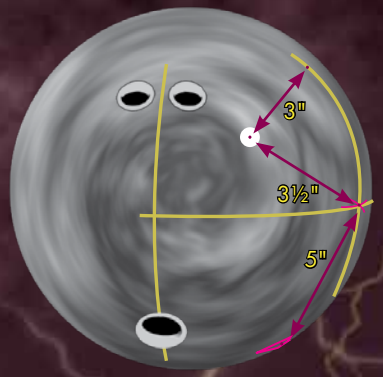


Note: Some layouts may require balance holes (see page 7).

3½" x 5" x 3"

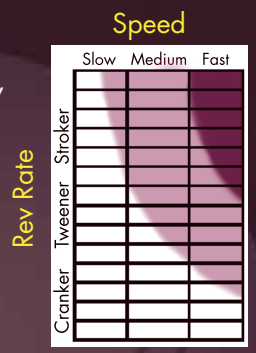
- Very strong layout
- Great for long patterns
- Not recommended for crankers or extremely high track players

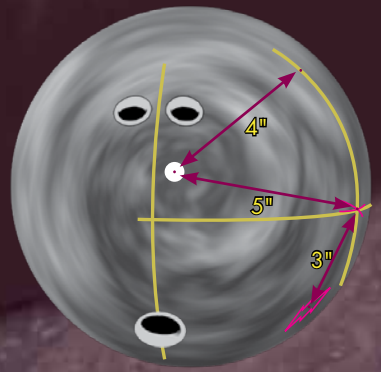




5" x 3" x 4"

- Good length
- Late midlane
- Control type of layout
- Low volume or wet/dry

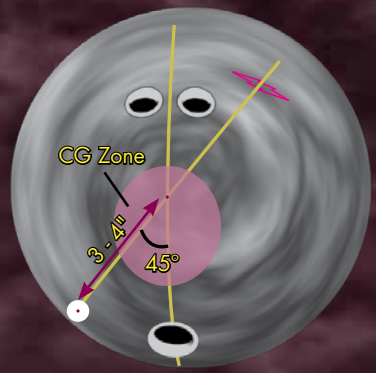




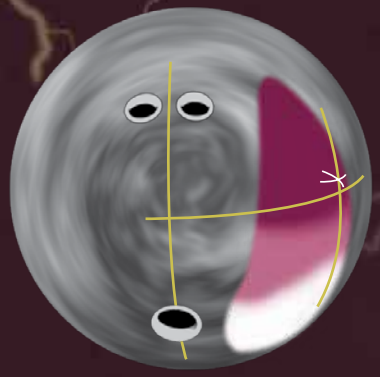
Note: Some layouts may require balance holes (see page 7).

Full Roller 45°

- Strongest layout for full roller
- Strong arcing motion
- Works best with 3 - 4" pins
- For more reaction, drill fingers deep
- For less reaction, drill thumb deep
- Make sure to stay within USBC specifications for static weights



Balance Hole Placement



Example: 5" x ¼" up

- Balance holes in red decrease flare potential
- Balance holes in pink may have little effect on performance
- Balance holes in white increase flare potential

A balance hole outside these zones will have the highest chance of tracking over the balance hole during use, or pulling the track over the fingers or thumb.

In general, crankers or high track players should keep balance holes within 4" of the center of grip. Low track or low rev players are normally safe with balance holes within 6" of their center of grip.

Disclaimer: Unique PAP distances or releases may make balance hole placement difficult. If balance hole placement is questionable, have the bowler throw the ball first. Make sure the intended balance hole is no closer than 2" to the nearest flare ring, otherwise tracking issues may result.

LIMITED ONE YEAR WARRANTY – BOWLING BALLS

Congratulations on the purchase of your new Storm bowling ball. Storm Products, Inc. prides itself on manufacturing the highest quality bowling balls in the industry today and warrants them to be free of defective workmanship and/or materials when used for the purpose intended, under normal conditions and provided they have been cared for properly. All merchandise covered under this warranty must be returned, with a sales slip showing date of purchase, to the dealer from whom it was purchased. This warranty does not cover incidental costs including, but not limited to, freight, measuring and drilling.

Storm agrees to replace this ball if at any time during the warranty period it is found to be defective in material and/or workmanship. Storm Products, Inc. shall for no reason be responsible for any damage caused by the following:

- Ball plugging or the installation of inserts for the fingers and/or thumb
- The width of the bridge being less than ¼"
- A bridge that has been weakened by holes that intersect or by insufficient lateral pitches
- A minimum ¾" difference in lateral pitches must be used
- Holes lacking sufficient bevel
- The distance between any hole and the pin being less than 1"
- Damage caused by pinsetters, ball return systems, gutters and/or lanes
- Bowler abuse
- Exposure to extreme temperatures (above 140°F or below 40°F)

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

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Brigham City, Utah 84302

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