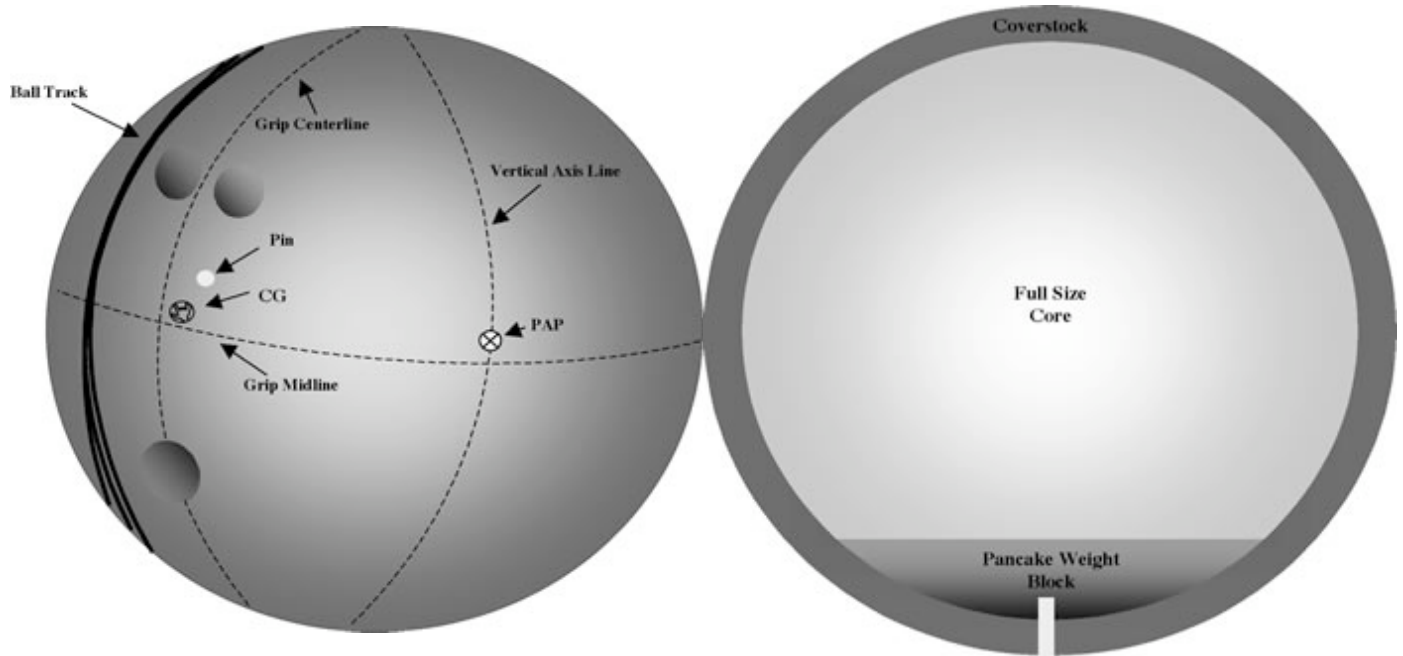


## Three Piece Drilling Instructions



These are basic drillings and are recommendations to provide a starting point from which to obtain variations in ball performance. As with any 3 piece core configuration these balls can be drilled many different ways and can be fine tuned to meet the needs of an individual bowler. Do not hesitate to adjust the drill pattern to match the lane conditions and the bowler's own characteristics as ball speed, revolutions and axis rotation.

The illustrations of the drill patterns show the Pin, CG (Center of Gravity), PAP (Bowler's Positive Axis Point) in relation to the bowler's Grip midline, Grip Centerline and VAL (Vertical Axis Line). In the diagrams the PAP and the center of span is used to show different drilling patterns to reference the CG placement. Depending on the bowler the PAP position may look different from that shown in the diagrams.

The drilling instructions shown are for right handed bowlers. Reverse the drill instructions for left handed bowlers. The drilling instructions apply for 6 to 16 lb. balls.

The 3 Piece constructed balls of full size core configuration are generally higher in RG (Radius of Gyration) and low in Differential RG. Having a higher RG tends to cause the ball to produce a delayed breakpoint. While having a low RG differential results in a manageable, controllable lower hook potential. The design features of 3 piece cores is best suited for novice bowlers just learning the sport or for average to more experienced players in drier lane environments, slower ball speeds and for those who like to play a straighter line to the pocket.

High top weight tends to make the ball skid further and store more energy through the front end of the lane. We recommend higher tops weights for drier lanes or bowlers with low ball speed. We further recommend for medium ball speeds or medium oil use medium top weights and for heavy oil or high ball speeds use low top weights.

### **Drilling #1 - Label Drilling**

Ball Motion: Delayed breakpoint with moderate backend

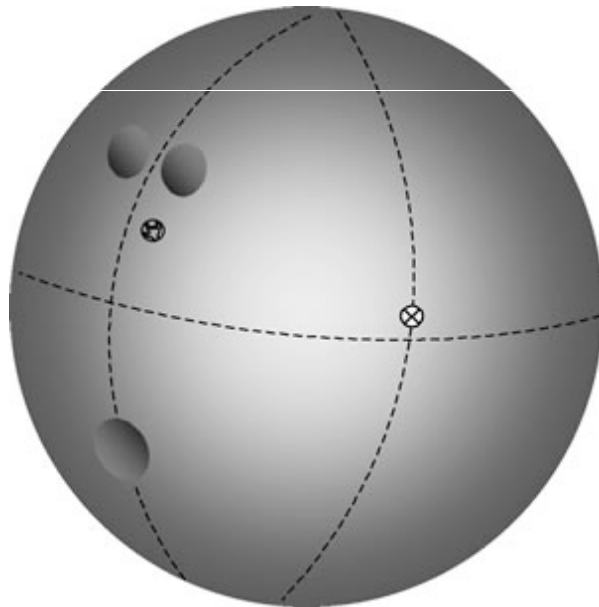
Lane Condition: Light to Medium Oil

Flare Potential: Low (1-3")

Options: Slower balls speeds, drier heads and as spare ball

CG Placement: Up grip midline 1 1/2" and 1/2" right of grip centerline

Weight Hole: None needed



### Drilling #2 - Leverage Drilling

Ball Motion: Medium length with strong backend

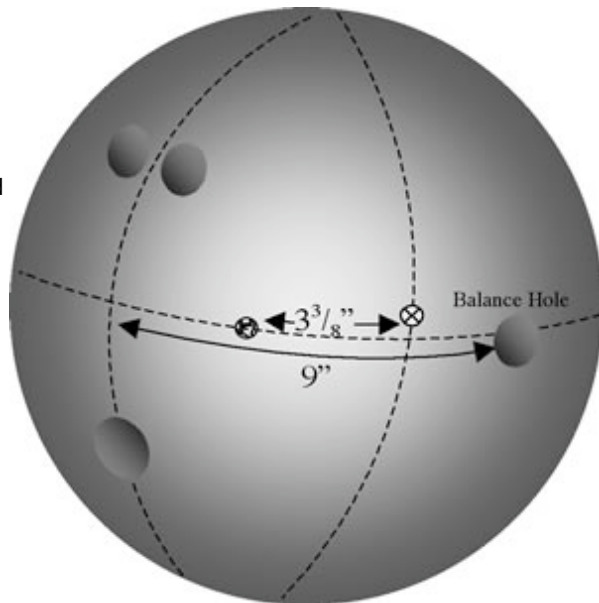
Lane Condition: Light to Medium Oil

Flare Potential: Low (1-3")

Options: Higher balls speeds, drier lanes and as spare ball

CG Placement: 3 3/8" from the PAP on the grip midline

Weight Hole: Drill balance hole 9" from the center of span and bring back to 1/2 ounce positive side weight



### Drilling #3 - Block Weight Drilling

Ball Motion: Early breakpoint with smooth backend

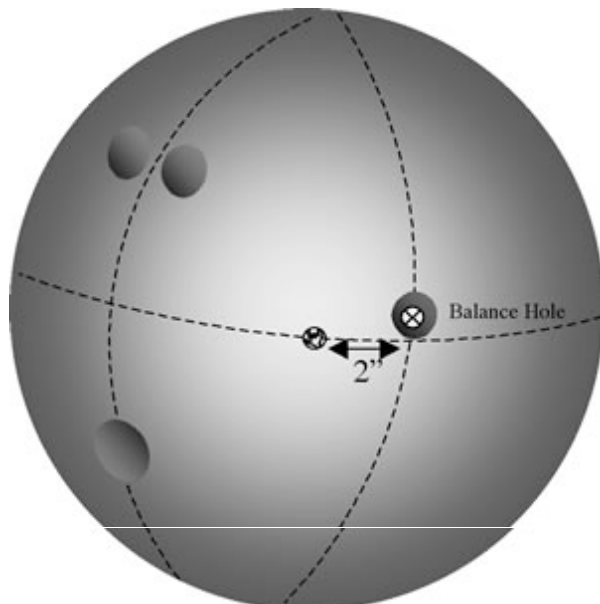
Lane Condition: Light to Medium Oil

Flare Potential: Low (1-2")

Options: Low ball tracks or faster ball speeds

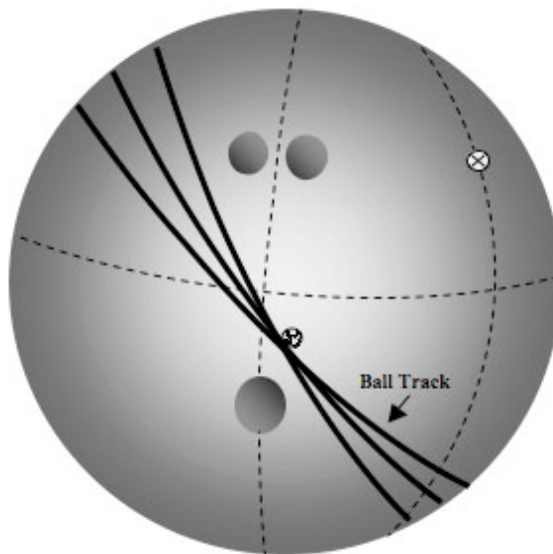
CG Placement: 2" from the PAP on the grip midline

Weight Hole: Drill balance hole on PAP, bring back to 1/2 ounce positive side weight



#### Drilling #4 - Full-Roller Drilling

Ball Motion: Delayed breakpoint with moderate backend hook  
Lane Condition: Light to Medium Oil  
Flare Potential: Low (1-2")  
Options: Full Rollers  
CG Placement: Down grip midline 1" and 1/2" right of grip centerline  
Weight Hole: None needed



#### Drilling #5 - Full-Roller Leverage Layout

For Full-Roller Ball Track Only  
Ball Motion: Strong arcing ball motion  
Flare Potential: Medium  
Pin Placement: Place pin 3 3/8" from grip center at 7:30  
CG Placement: Place CG within 1" of grip center

### General Information & Tips

**Static weights** - Higher top weights create a ball reaction that skids further down the lane and has a stronger backend hook. Conversely lower top weight causes an earlier breakpoint and a smoother hook motion. Outside of changing the surface, drilling to manipulate the CG location is a primary vehicle for changing ball reaction in 3 piece low differential balls. Moving the CG towards the fingers increases the skid characteristics of the ball. Moving the CG towards the thumb causes an early breakpoint. Positioning the CG to the right of the span (to the left for left handed bowlers), creates positive weight and increases overall hook. While positioning the CG to the left (to the right for left handed bowlers), creates negative weight and which reduces overall hook.

**Surface** - The surface of today's balls play an extremely important role in matching the bowler's performance expectations with the lane conditions being played. To create the best ball reaction, adjusting the surface by sanding or polishing may be necessary. To add control and move the breakpoint closer sand the ball's surface. The more aggressive the finish applied, the earlier the breakpoint and stronger the move off the breakpoint. To delay the breakpoint and decrease the flip potential in the backend of the lanes, reduce the friction of the ball by polishing.

Bowling balls are interactive with their environment and conditions during play. The surface picks up oil, dirt and debris while being bowled. In time any ball's ability to perform will diminish from this wear and tear. So cleaning the ball on a regular basis will not only help to provide a consist reaction but prolong the life and performance of the ball. Using a Microfiber towel before and after each use will help minimize excessive oil, dirt and other unwanted contaminants on the surface of the ball. We recommend using performance ball cleaners for stubborn buildup.

More information can be obtained by going to [www.columbia300.com](http://www.columbia300.com) and visiting the tech docs section for more details on drilling and technical information.

Thanks for choosing one of the best brands in bowling, and remember we're here when you have questions or need help; our support line is ready with trained professionals to assist you in optimizing your bowling experience.