

3-D OFFSET HAMMER®

Featuring HAMMER OFFSET TECHNOLOGY

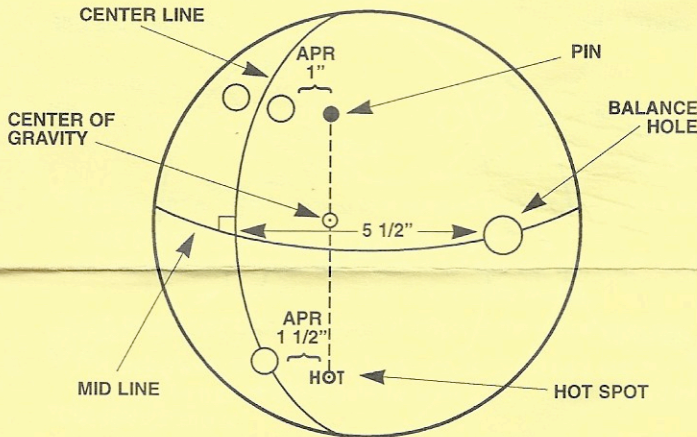
QUICK REFERENCE DRILLING SUGGESTIONS



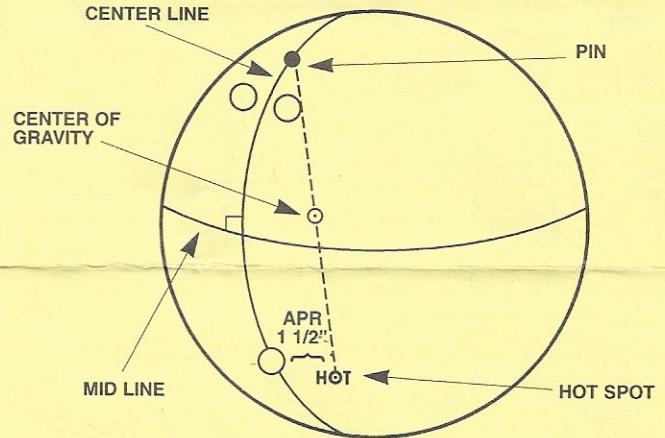
All layouts are for right handed bowlers. For left handed bowlers simply reverse procedures (Mirror Image)

Higher Track Players (ball track within 1 1/2" of thumb hole) and also strokers

MAXIMUM HOOK



MEDIUM HOOK

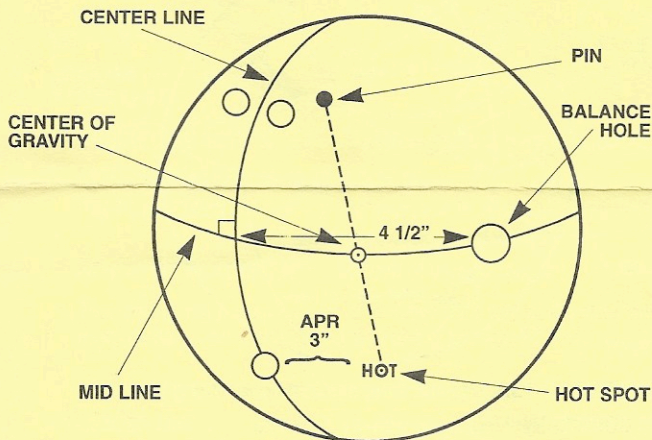


- Select ball with pin 1 - 3" out.
- Position pin approximately 1" right of ring finger.
- Position HOT SPOT approximately 1 1/2" right of center line, as shown.
- If balance hole is required, mark line from center of grip through C.G. and drill balance hole 5 1/2" from center of grip on that line. Balance hole may be drilled above or below midline.

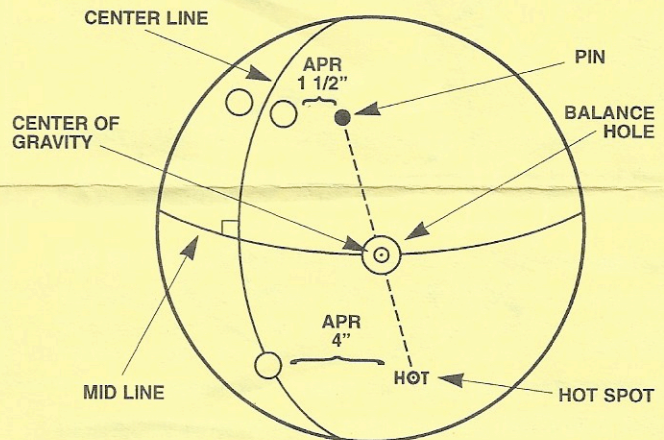
- Select ball with pin 2 - 4" out.
- Position pin above finger holes on center line, as shown.
- Position HOT SPOT approximately 1 1/2" right of center line, as shown.
- If balance hole is required, mark line from center of grip through C.G. and drill balance hole 5 1/2" from center of grip on that line. Balance hole may be drilled above or below midline.

Lower Track Players (ball track more than 1 1/2" from thumb hole) and also crankers

MAXIMUM HOOK



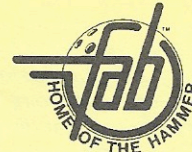
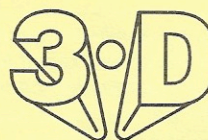
MEDIUM HOOK



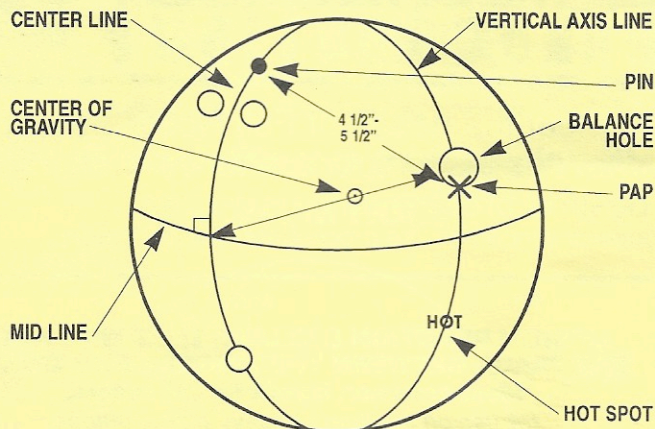
- Select ball with pin 2 - 4" out and less than 3.0 oz top weight.
- Position pin 45°, just above ring finger, as shown.
- Position HOT SPOT approximately 3" right of center line, as shown.
- If balance hole is required, mark line from center of grip through C.G. and drill balance hole 4 1/2" from center of grip on that line. Balance hole may be drilled above or below midline.

- Select ball with pin 2 - 4" out and less than 3.0 oz top weight.
- Position pin 1 1/2", right of ring finger, as shown.
- Position HOT SPOT approximately 4" right of center line, as shown.
- Drill balance hole at C.G. Balance hole may be drilled above or below midline.

Break points for suggested drillings can be easily adjusted with surface changes. A higher lustre of polish will result in more length and a later break point while maintaining back reaction, and duller surface or sanding the ball will result in an earlier breakpoint with the desired back end reaction.



ING SUGGESTIONS



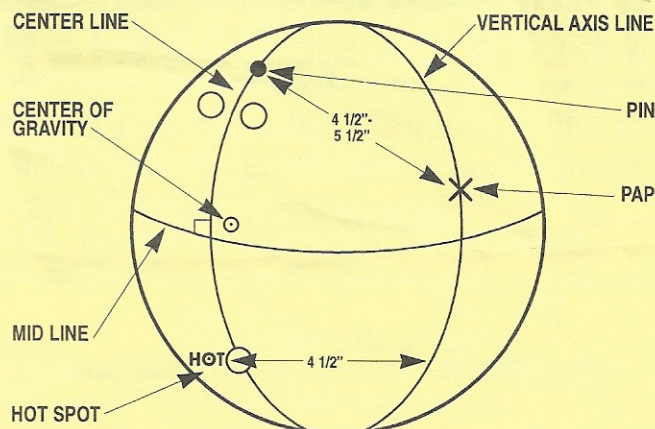
DESIRED REACTION: Medium flare, medium hook, controlled back end.

LANE CONDITION: Medium oil with carry down.

PIN PLACEMENT: 4 1/2" - 5 1/2" from P.A.P. (use ball with pin 2" - 4 1/2" out and less than 3 ounces top weight).

HOT SPOT PLACEMENT: Position Hot Spot on the vertical axis line.

This drilling will produce medium hook, with controlled back end, by generating heavy forward roll from the break point to the pins. Good for wet/dry conditions.



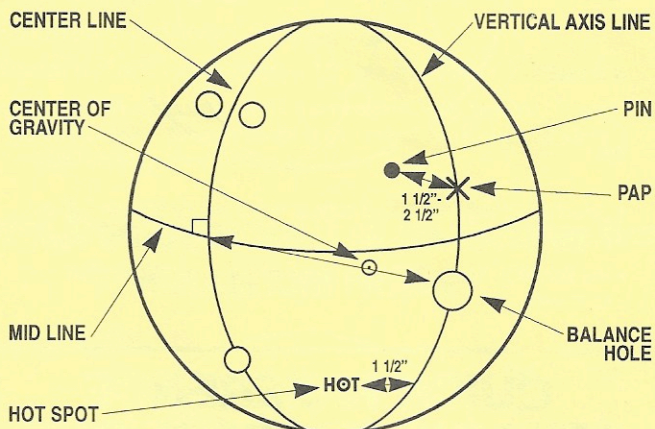
DESIRED REACTION: Medium flare, smooth arc.

LANE CONDITION: Medium to light oil with a hooking ball track.

PIN PLACEMENT: 4 1/2" - 5 1/2" from P.A.P. (use ball with pin 2" - 4 1/2" out).

HOT SPOT PLACEMENT: 4 1/2" left of vertical axis line. Hot Spot will be left of the center line.

This drilling will produce an even arc reaction. Not recommended when playing a deep inside line.



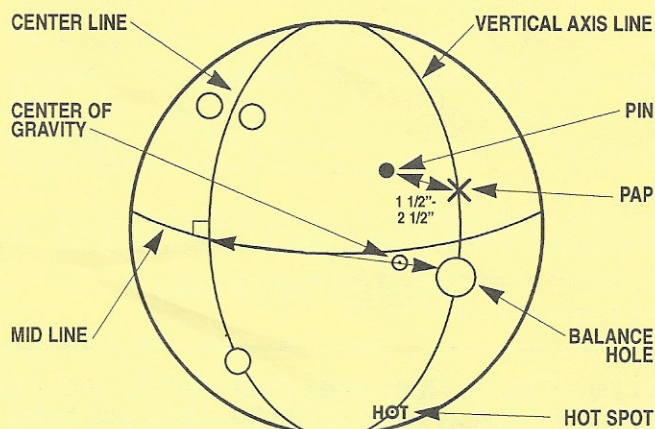
DESIRED REACTION: Early revolutions, strong back end reaction.

LANE CONDITION: Medium to light oil.

PIN PLACEMENT: 1 1/2" - 2 1/2" from P.A.P. (use ball with pin 1" - 3" out and less than 3 ounces top weight)

HOT SPOT PLACEMENT: 1 1/2" left of vertical axis line.

This drilling will produce early revs in the front part of the lane with medium flare and a strong reaction at the breakpoint.



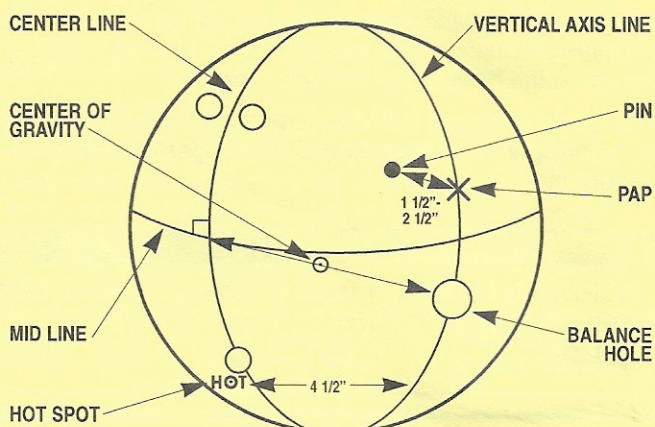
DESIRED REACTION: Early revolutions with controlled back end.

LANE CONDITION: Medium to light oil with strong reacting back end.

PIN PLACEMENT: 1 1/2" - 2 1/2" from P.A.P. (use ball with pin 1" - 3" and less than 3 ounces top weight)

HOT SPOT PLACEMENT: Position Hot Spot on the vertical axis line.

This drilling will produce early revs in the front part of the lane with controlled reaction at the break point by generating strong forward roll from the break point to the pins. Great for wet/dry conditions.



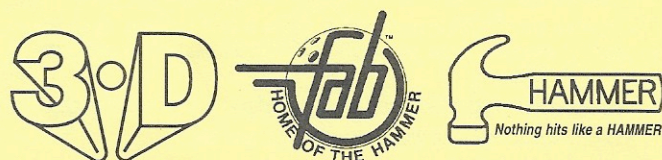
DESIRED REACTION: Early revolutions with a smooth arc.

LANE CONDITION: Medium to light oil with a hooking ball track.

PIN PLACEMENT: 1 1/2" - 2 1/2" from P.A.P. (use ball with pin 1" - 3" out)

HOT SPOT PLACEMENT: 4 1/2" left of vertical axis line. Hot Spot will be left of Center Line..

This drilling will produce early revs in the front part of the lane with smooth arc. Good for playing a direct trajectory when the ball track is hooking.



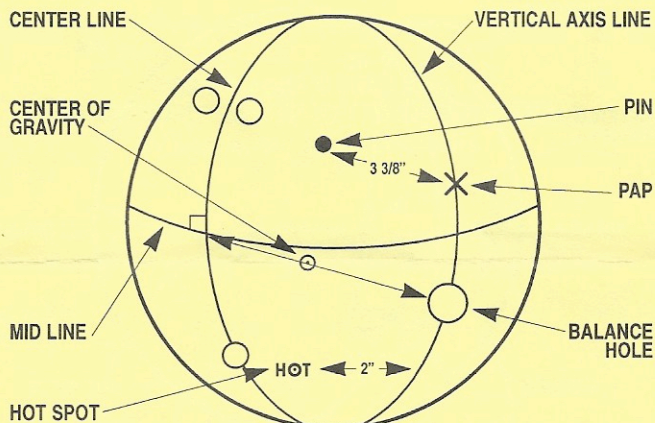
P R E C I S I O N D R I L L

THE P. A. P. IN THE DRILLING SUGGESTIONS IS THE BOWLERS POSITIVE AXIS POINT

The suggested layouts are for right handed drilling. Reverse the drilling procedure (mirror image) for left handed drilling.

The Center Of Gravity (C.G.) is identified by an engraved 1/4" circle. The suggested drilling illustrations show the C.G. located on a visual line from the Top Pin to the Hot Spot (Locator Pin) and is strictly for reference. With the core body offset, C.G. can fall left, right or be centered on the visual line from Top Pin to the Hot Spot.

When balance hole is required, mark line from Center of Grip through C.G. and drill balance hole on that line at the intersection of the vertical axis line. Balance hole may be drilled above or below the mid line.



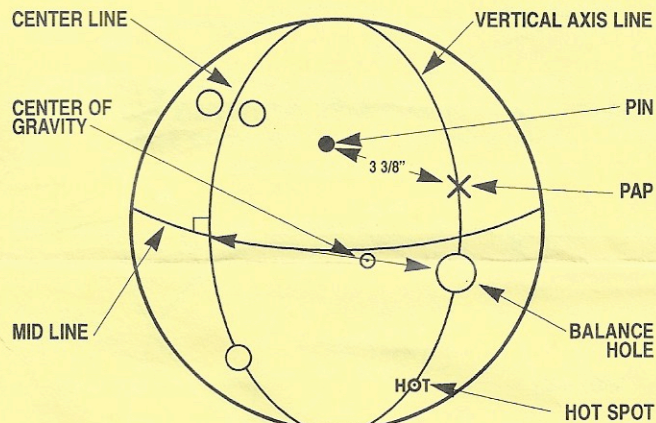
DESIRED REACTION: Large flare, maximum hook, strong back end.

LANE CONDITION: Medium to heavy oil blend.

PIN PLACEMENT: 3 3/8" from P.A.P. (use ball with pin 1" - 4" out).

HOT SPOT PLACEMENT: 2" left of vertical axis line.

This drilling will produce the sharpest break point obtainable in the 3-D Offset Hammer. Use this layout when trying to open up the lane and create area on a blended lane condition. Too reactive for wet/dry conditions.



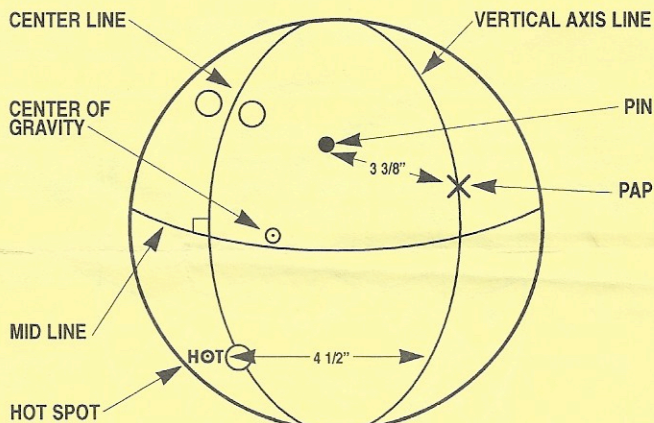
DESIRED REACTION: Large flare, large hook, controlled back end.

LANE CONDITION: Medium to heavy oil with carry down.

PIN PLACEMENT: 3 3/8" from P.A.P. (use ball with pin 1" - 4" out and less than 3 ounces top weight).

HOT SPOT PLACEMENT: Position Hot Spot on the vertical axis line.

This drilling will result in a more controlled back end by generating heavy forward roll from the break point to the pins. Great for low track players.



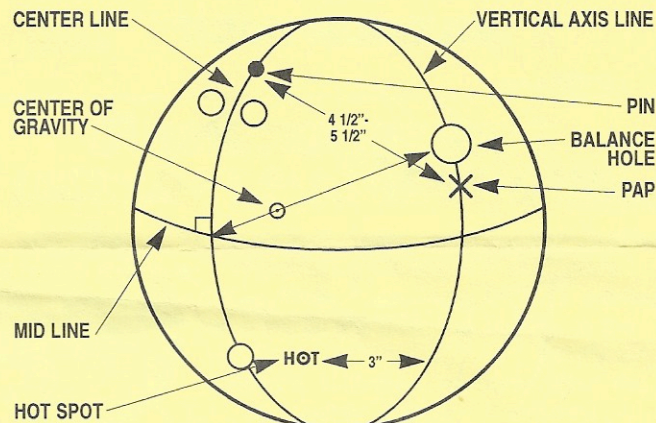
DESIRED REACTION: Large flare, medium hook, smooth arc.

LANE CONDITION: Medium to heavy oil with a hooking ball track.

PIN PLACEMENT: 3 3/8" from P.A.P. (use ball with pin 1" - 4" out).

HOT SPOT PLACEMENT: 4 1/2" left of vertical axis line. Hot Spot will be left of the center line.

This drilling produces a smooth arc with a large flare pattern. Not recommended for an inside line.



DESIRED REACTION: Medium flare, medium hook, strong back end.

LANE CONDITION: Medium oil with dry back end.

PIN PLACEMENT: 4 1/2" - 5 1/2" from P.A.P. (use ball with pin 2" - 4" 1/2" out).

HOT SPOT PLACEMENT: 3" left of vertical axis line.

This drilling will produce Medium hook with a late break point. Good for playing inside the ball track.

Break points for suggested drillings can be easily adjusted with surface changes. A higher luster of polish will result in more length and a later break point while maintaining back reaction, and duller surface or sanding the ball will result in an earlier breakpoint with the desired back end reaction.

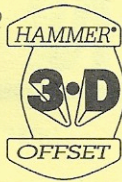
WEIGHT REMOVAL CHART

WEIGHT REMOVED:	1.0 oz	1 1/2oz	2.0 oz	2 1/2oz
DRILL BIT SIZE:	7/8"	1.0"	1 1/8"	1 1/4"
DEPTH:	2 1/2"	2 1/2"	2 1/2"	3.0"

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FULL ROLLER DRILLING SUGGESTIONS

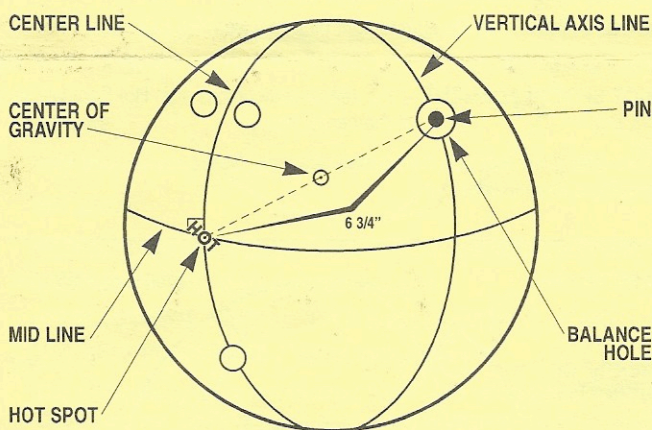


3-D Offset Hammer balls can be easily drilled to meet the needs of Full Roller Bowlers. The layouts below are suggested drilling patterns. It is also important to work with the ball surface to obtain the desired break point.

All layouts are for right handed bowlers. For left handed bowlers simply reverse procedures. (Mirror Image)

NO FLARE DRILLING THAT PRODUCES END OVER END ROLL.

for use on dry lane conditions

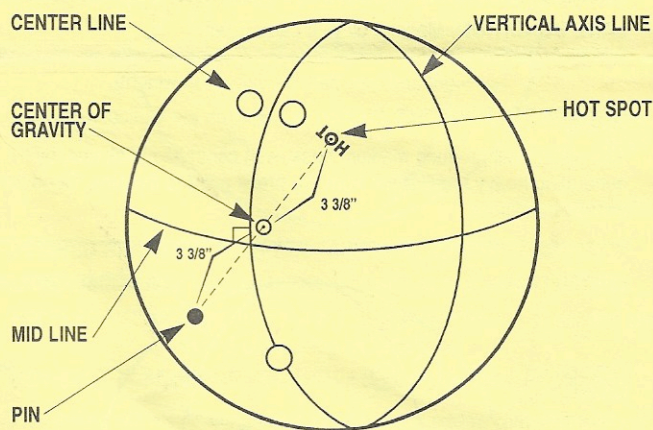


- Select a ball with less than 3 ounces of top weight and pin 3-4" out.
- Position pin 6 3/4" from center of grip in a 1:30 position, as shown.
- Position HOT Spot in center of grip, as shown.
- Drill the balance hole through pin.

MEDIUM REACTION DRILLING THAT WILL KEEP THE TRACK BETWEEN THE FINGERS AND THUMB.

Most common layout for full rollers.

for use on medium to heavy oil conditions.

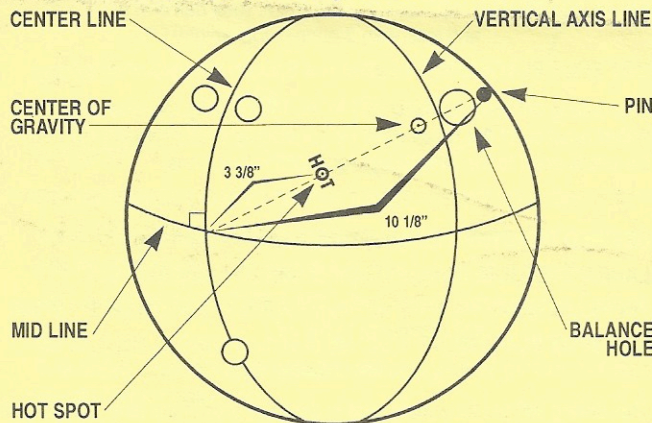


- Select a ball with less than 3 ounces of top weight and pin 3-4" out.
- Position pin 3 3/8" from center of grip in a 7:00 position, as shown.
- Position HOT Spot 3 3/8" from center of grip in a 1:30 position as shown

MAXIMUM REACTION DRILLING FOR FULL ROLLER.

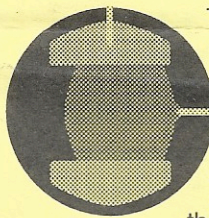
This pattern may result in the bowlers track being outside the fingers and thumb since pin position is beyond the vertical axis line.

for use on heavy oil conditions



- Select a ball with less than 2.7 ounces of top weight and pin 3-4" out
- Position pin 10 1/8" from center of grip in a 1:30 position, as shown.
- NOTE: this will put the pin on the bottom of the ball in relation to the center of the grip
- Position HOT Spot 3 3/8" from center of grip in a 1:30 position, as shown
- Drill balance hole half way between C.G. and pin.

QUICK REFERENCE DRILLING SUGGESTIONS:



The Center of Gravity (C.G.) is identified by an engraved 1/4" circle. The suggested drilling illustrations show the C.G. located on a visual line from the Top Pin to the Hot Spot (Locator Pin) and is strictly for reference. With the core body offset, the C.G. can fall left, right or be centered on the visual line from Top Pin to the Hot Spot.

When using a balance hole, it may be placed above or below the midline. Balance Hole location, as suggested, will bring the ball to the desired top and side weights.

The following Weight Removal Chart can be used when positioning weight holes according to the suggested drilling instructions.

WEIGHT REMOVAL CHART

WEIGHT REMOVED:	1.0 oz	1 1/2oz	2.0 oz	2 1/2oz
DRILL BIT SIZE:	7/8"	1.0"	1 1/8"	1 1/4"
DEPTH:	2 1/2"	2 1/2"	2 1/2"	3.0"