

TOPWEIGHT

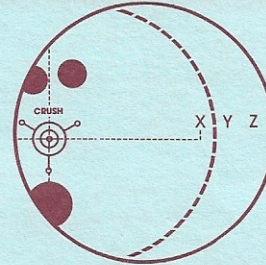
The amount of topweight influences the degree of backend reaction. Players possessing a lower amount of revolutions or a lesser degree of axis tilt would require higher amounts of topweight to create a stronger backend reaction. High revolution players, or those with a greater degree of axis tilt, require lower amounts of topweight to control

the overreaction in the backend. The amount of ball speed of the player is also critical: the slower the ball speed, the heavier the topweight needed to keep the ball hooking; the faster the ball speed, the lower the topweight needed to prevent excess skid.

WEIGHT (BALANCE) HOLES

Large, shallow holes cause a stronger, more violent breakpoint. Small, deep holes smooth out the breakpoint.

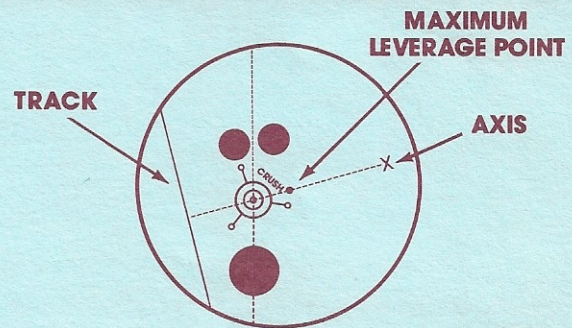
Position of the weight hole is similar to the position of the pin in terms of ball reaction. The least reactive position for the weight hole is on the axis. Moving the hole 1-3/4" past the axis (away from the grip toward the bottom of the ball) increases the intensity of the backend reaction. The most reactive position for the weight hole is 3-3/8" past the axis.



X is on bowler's axis
Y is 1-3/4" past bowler's axis
Z is 3-3/8" past bowler's axis

PIN POSITION FROM TRACK TO AXIS

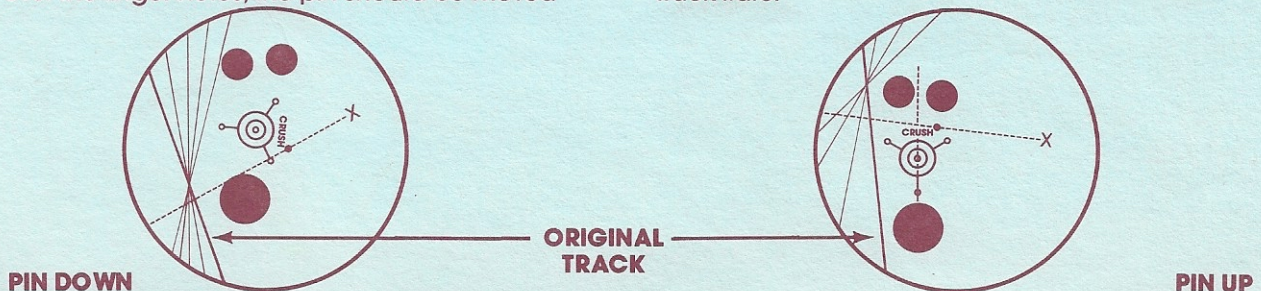
The closer the pin is to the track, the more end-over-end lope the ball will have. This causes earlier hook and less backend reaction. Track flare is minimal. As the pin approaches the maximum leverage point (halfway from the track to the axis) the further the ball travels down the lane and the sharper the ball reacts on the backend. Maximum track flare occurs when the pin is on the maximum leverage point. As the pin moves closer to the axis, the backend reaction smooths out and is more controllable. Track flare is minimal when the pin approaches the axis point.



VERTICAL PIN POSITION

The vertical pin position dictates the narrow point of the track flare. The narrow point of the flare will be located at the point where a line drawn from the axis through the pin intersects with the ball track. If track flare is causing the track to roll over the finger holes, the pin should be moved

vertically upward from its present position. Examination of the bowler's track prior to laying out a new ball will enable the ball driller to position the pin so as to avoid hitting the finger holes. The greater the revolutions and axis tilt, the wider the track flare.



All of the following layouts are relative to each other. The bowler's abilities, the ball's surface characteristics and the amount of oil applied to the lane dominate the equation of ball re-

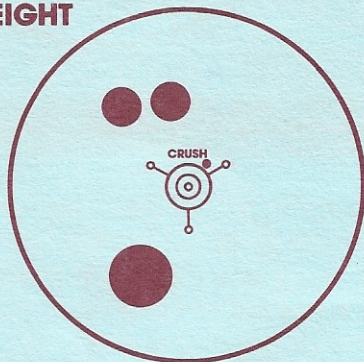
action. Pin positions fine tune ball reaction. When drilling a ball for a customer whose track or axis tilt is unknown, drilling the ball on label, pin in, is the best starting point.

LABEL SHIFT

Shifts Off The Center Of Gravity

POSITIVE WEIGHT

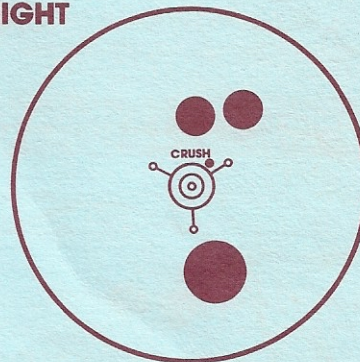
①



Move the grip to the left of the CG to create an imbalance that causes more hook when the ball enters the pins. (Move grip to the right for left-handers)

NEGATIVE WEIGHT

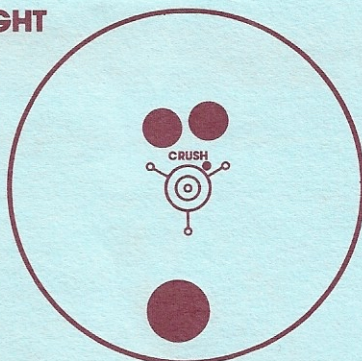
②



Move the grip to the right of the CG to create an imbalance that causes less hook when the ball enters the pins. (Move grip to the left for left-handers)

FINGER WEIGHT

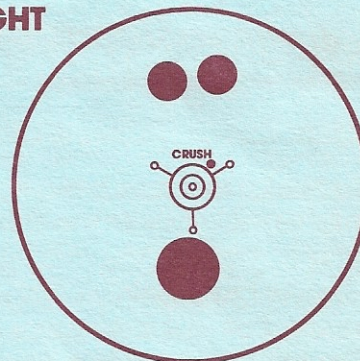
③



Move the fingers closer to the CG to cause the ball to skid longer.

THUMB WEIGHT

④



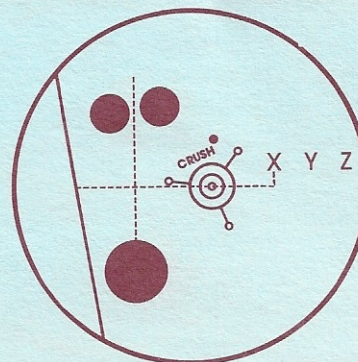
Move the thumb closer to the CG to cause the ball to begin its hook sooner.

WARNING:

Because of the construction, the core location dictates that left-handed bowlers use the mirror image positions (i.e. 1:30 is 10:30; 3:00 is 9:00; 4:30 is 7:30).

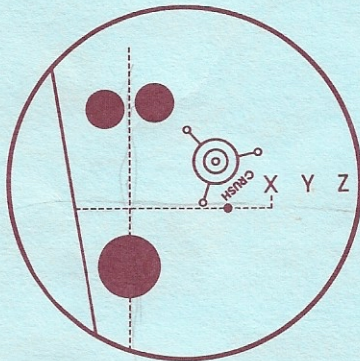
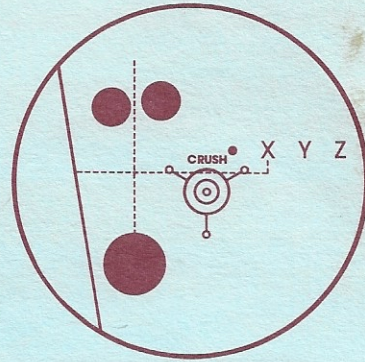
PIN OUT DRILLING RECOMMENDATIONS

Pin up leverage produces maximum skid and a violent snap. Use a pin out 1-1/2" to 2". The pin is placed 2-1/4" inward from the axis (X) and 2-1/4" upward. The CG is placed directly under the pin. Placing the weight hole at X, Y, or Z position influences the severity of the backend reaction.



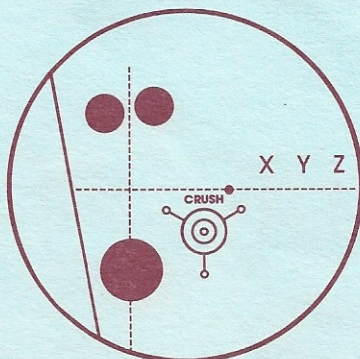
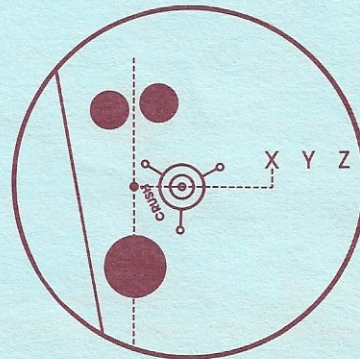
PIN OUT DRILLING RECOMMENDATIONS (continued)

Placing the pin 1-3/4" inward from the axis (X) will give a medium skid and strong backend. Located in between the maximum leverage point and the axis, its reaction will be in between axis weight and leverage weight. A pin in or a small pin out (up to 1-1/2") should be used. Placing the weight hole at X, Y, or Z influences the severity of the backend reaction.



Placing the pin on the maximum leverage point with the CG located above will produce a medium skid with a strong backend. A pin out of 1-1/2" to 2" can be used. The finger holes may have to be drilled deeper to bring the finger weight to within ABC specs. Placing the weight hole at X, Y, or Z influences the severity of backend reaction.

For a milder reaction, placing the pin in the center of the grip with the CG between the center of grip and the axis point produces an earlier breakpoint with a rolling backend reaction. For lower track players with lesser revolutions, place the pin 1-1/2" inside of the track (between the track and the center of grip). Placing the weight hole at X, Y, or Z influences the amount of backend reaction.



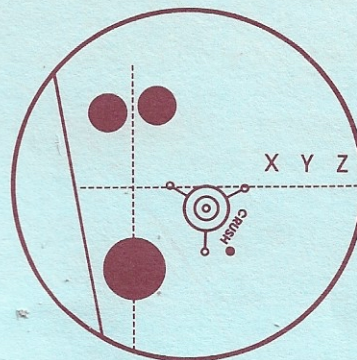
Place the pin 1-3/4" off the axis and slightly below the center of grip line. Lay out the CG between the pin and the grip center so as to get 3/4 oz. thumb weight before drilling. Choose a lower topweight with a pin out 2" to 3". Placing the weight hole at X, Y, or Z influences the amount of backend reaction.

Recommended for crush drilling only.

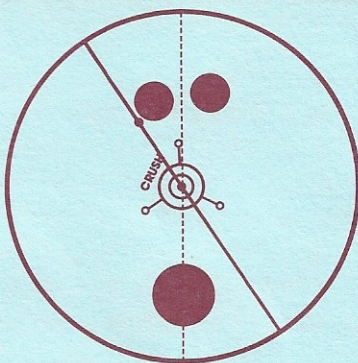
PIN OUT DRILLING RECOMMENDATIONS

Pin down leverage produces an early breakpoint with a strong backend reaction. Using a pin out 1-1/2" to 2", the pin is placed 2-1/4" inward from the axis and 2-1/4" down. The CG is located above the pin. Placing the weight hole at X, Y, or Z influences the amount of backend reaction.

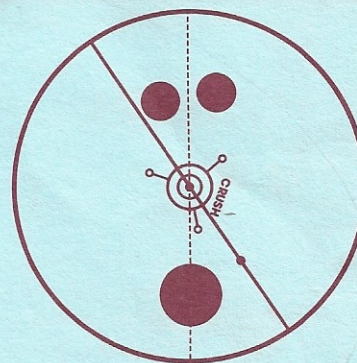
Recommended for crush drilling only.



FULL ROLLER LAYOUTS



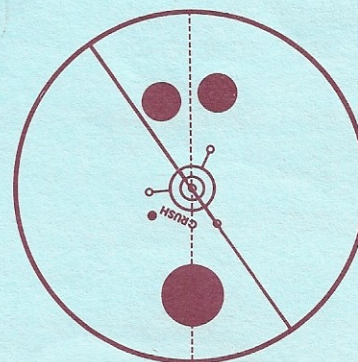
A 10:30 pin position is used if the track has a tendency to roll over the middle finger hole. The pin needs to be located even with the middle finger. Use a pin out 2" or more.



A 4:30 pin position is used if the track has a tendency to hit the right edge of the thumb hole. The pin needs to be located even with the thumb hole. Use a pin out 2" or more.

A negative pin placement in the area of 8 o'clock to 9 o'clock will cause a leverage type reaction. The track flare will go away from the fingers, thereby missing any grip holes. Maximum reaction is attained when the pin is 3-3/8" from the center of the grip.

NOTE: The Crush/R must be drilled with sharp drill bits and at a slow speed due to the soft material of the inner shell.



Due to the increased backend friction associated with the reactive resin shells, we would recommend to choose from the following pin position layouts:

Label Shifts — #1, 2, 3, 4
Pin Out Drillings #1, 2, 3, 4

As well as standard pin in leverage and pin in axis weights.

If earlier roll is desired, a topweight change or a ball surface change would be the next step.



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