David Alciatore, PhD ("Dr. Dave")   **ILLUSTRATED PRINCIPLES**
"VEPS GEMS - Part VII: Contact-Point Mirror Kick"

Note: Supporting narrated video (NV) demonstrations, high-speed video (HSV) clips, and technical proofs (TP), and all of my past articles, can be accessed and viewed online at ***billiards.colostate.edu***. *The reference numbers used in the article help you locate the resources on the website. If you have a slow or inconvenient Internet connection, you might want to view the resources from a CD-ROM or DVD. Details can be found online at:* ***dr-dave-billiards.com***.

This is the seventh article based on the "*The Video Encyclopedia of Pool Shots* (VEPS)," an instructional DVD series I recently created with past BD columnist and good friend Tom Ross. VEPS contains 750 shot types within 50 main categories and 5 major areas. Many clips in the series are also designated as "gems," indicating shots or concepts important to know as a pool player, whether understood explicitly or in a more intuitive way. An outline of the entire VEPS series, the complete list of shot types in each major area, the gem designations, and video excerpts from each DVD can be viewed online at: ***dr-dave-billiards.com/veps***. Last month we looked at some basic systems for one-rail kick shots from the fourth DVD: "VEPS IV - Banks, Kicks, and Advanced Shots." This month we'll look at a system for slow-roll kicks where the cue ball (CB) and object ball (OB) are both fairly close to a rail. If you recall from last month, the common through-diamond rolling-CB system breaks down at larger approach angles as the aiming angle gets shallower relative to the rail.

NV B.83 (VEPS Shot # 498) demonstrates the shallow-angle contact-point mirror kick system for a slow-rolling CB. Everything below is demonstrated in NV B.83, and if you have a computer with an Internet connection nearby, it might help to watch the video before proceeding so you can better relate to the discussion and illustrations. As shown in **Diagram 1a**, this system is based on finding the mirror image of the OB contact point relative to the nose of the cushion. This is different from the mirror bank and kick systems in previous articles, where the mirror distance was measured relative to the rail groove (see **Diagram 1b**). Remember, the rail groove is the line where the bottom (resting point) of a ball sits when it is in contact with a cushion. Again, with the system discussed in this article, we measure the mirror distance from the OB contact point to the nose of the cushion, not from the center of the ghost-ball to the rail groove.
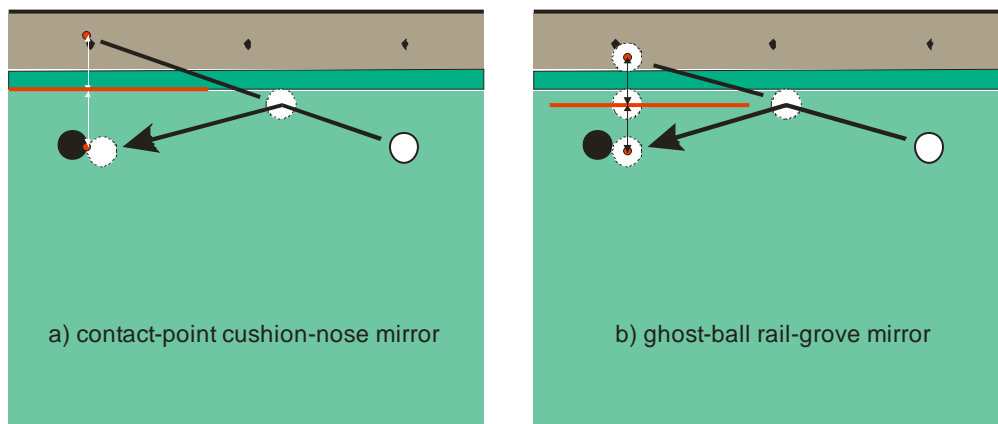

a) contact-point cushion-nose mirror   b) ghost-ball rail-grove mirror

Diagram 1 Ghost-ball-rail-groove vs. contact-point-cushion-nose mirror image

Diagram 2 illustrates how the system is used. The first step in aiming the shot is to use your cue or hand to measure the distance from the desired OB contact point (CP) to the nose of the cushion. The next step is to find the mirror image of the CP relative to the nose of the cushion by doubling the measured distance, which can easily be accomplished by shifting your cue or hand from the CP to the cushion nose. With the CB aimed directly at this mirrored point, the system predicts that you should pocket the ball. It is very important, though, that the CB is rolling with slow speed. And it is also important that the CB not have any English, intentional or otherwise, so be sure to contact the CB along its vertical centerline. This is particularly important with steeper angles relative to the rail, where English has a larger effect on rebound angle.
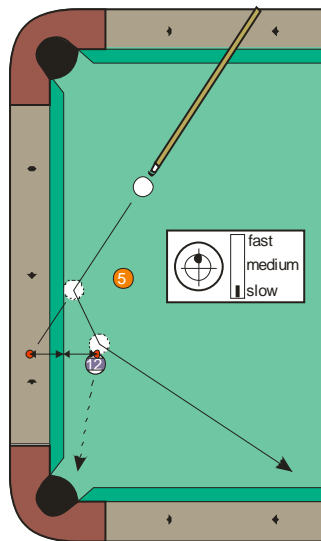

Diagram 2 Example shot

As demonstrated in **NV B.83**, when practicing, it helps to place a piece of chalk on the rail to mark the mirrored contact point. In actual play, this would not be legal, but a good alternative is to identify a feature in the grain of the wood or just visualize where the point is relative to the nearest diamond. This can be useful with all kick and bank methods to help provide you with a clear target.

If you've practiced various kick and bank systems, I'm sure you will know that they don't always work. They can be sensitive to angle, speed, and spin, and often work better within some angle and speed ranges as compared to others. To test the shallow-angle contact-point mirror kick system, I did a set of experiments for the shots illustrated in **Diagram 3**. I encourage you to do the same. First put down adhesive hole-reinforcement donuts (available at any office supply store) at each ball position (1, 2, and 3), and "set" each ball by tapping down with another ball. This will make it easy to re-spot the balls in the exact same place when doing multiple attempts at different angles. The 2-ball is a full ball away from the rail across from the second diamond. This is easily positioned by temporarily freezing it to another ball frozen to the cushion. The 1-ball and 3-ball centers, in turn, are directly under the edges of the 2-ball. Place donuts there and also measure and mark the aim point on the rail for each ball with a donut. An "angle template" available on my website (in the "Instructor and Student Resources" section under "Templates and Diagrams") can be used to accurately determine different CB angles into the rail. You can trim the template and hold it down over a ball's aim point with a piece of chalk. The chalk and the lines on the template make it easy to visualize the aim line.
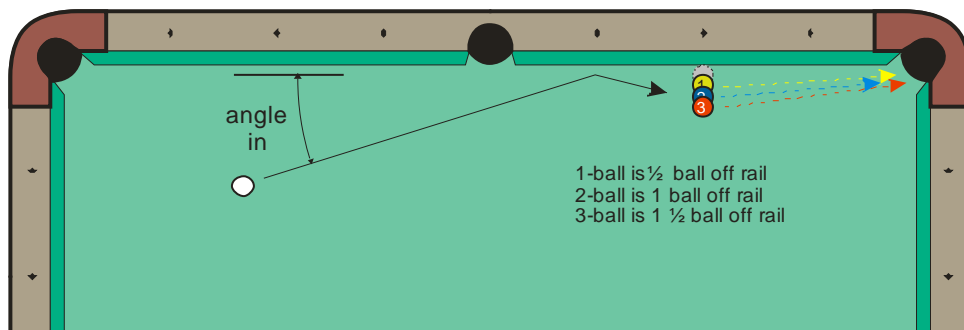
Diagram 3 **Setup for experiment**

After doing the experiment on my table, I found that the system worked best when the OB is one ball away from the rail (i.e., the 2-ball shot). I pocketed it over an extremely wide range of angles from 5° to 35°. I actually didn't expect the system to work this well. It's an indication of the auto-compensation capabilities of the system (for more info, see TP B.11, where I compare theoretical and experimental results showing why and when the shallow-angle contact-point mirror kick system is effective). With the 1-ball shot, however, the system did not work as well. In fact, the ball was overcut and missed the pocket at every angle except at about 35°, and was only barely made at very slow speed. With the 3-ball shot, on the other hand, the ball was undercut at small angles (< 25°) and was overcut at larger angles (> 35°). For medium angles (25°-35°), the ball was pocketed if I varied the speed a little. More speed makes the CB rebound shorter, thus increasing the amount of cut; and less speed makes the CB go longer, decreasing the amount of cut.

Clearly then, as shown in **Diagram 4**, adjustments need to be made when the OB is not in the ideal position of one ball-width from the rail. When the OB is closer, the system results in an overcut. You can adjust by shifting the mirrored aim point down-rail a little (see **Diagram 4a**). And when the OB is farther than one ball from the rail, the system results in an undercut. Here, a slight increase in speed provides the necessary adjustment (see **Diagram 4b**). Alternatively, you can shift the mirror point up-rail a little and still use slow speed.
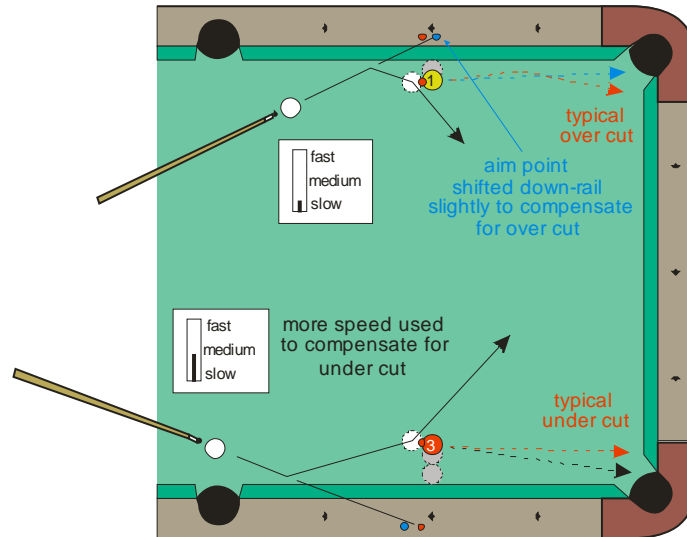
Diagram 4 Adjustments to the system

In summary, if the OB is about one ball-width from the cushion, you can use the contact-point mirror system with confidence over a fairly wide range of angles. When the OB is closer to the rail, you need to shift the aim point slightly down-rail; and when farther, you need to shift the aim point slightly up-rail or increase the speed slightly.

As with all kick and bank systems, results will also vary slightly from table to table, and sometimes even from one side of the table to the next. In view of all of this, isn't it amazing how effective top-notch kickers and bankers can be? But even they miss occasionally ... kicking and banking is tough. That's why it helps to know all of the systems and "tricks." The more tools you have in your toolbox, the more effective you can be when faced with these difficult shots. It also helps to practice an insane amount, which is what all great players do.

Example gems and other shots from the fourth VEPS DVD, including the ones discussed above, can be viewed on the VEPS website or at *billiards.colostate.edu* under **NV B.81** through **NV B.86**.

NV B.81 – Bank and kick shot terminology and basics, from VEPS IV
NV B.82 – Rolling-cue-ball through-diamond kick-shot aiming system, from VEPS IV
NV B.83 – Shallow-angle contact-point-mirror-image kick-shot aiming system, from VEPS IV
NV B.84 – Plus System for aiming two-rail kick shots, from VEPS IV
NV B.85 – Corner-Five System for aiming three-rail kick shots, from VEPS IV
NV B.86 – Cut-induced throw (CIT) and spin-induced throw (SIT), from VEPS IV

normal video

TP B.11 – Shallow-angle contact-point mirror kick system

technical proof

Well, I hope you enjoy and benefit from my series of articles highlighting shots and gems from the "*Video Encyclopedia of Pool Shots (VEPS)*." Over the next few months, we'll look at gems from the fourth DVD dealing with multiple-rail kick shots.

Good luck with your game,
Dr. Dave

Dr. Dave is author of the book, DVD, and CD-ROM: "The Illustrated Principles of Pool and Billiards," the DVD Series: "The Video Encyclopedia of Pool Shots," and the DVD: "High-speed Video Magic."