David Alciatore, PhD ("Dr. Dave")   **ILLUSTRATED PRINCIPLES**
"VEPS GEMS - Part XIII: Corner-5 System Adjustments"

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 my thirteenth 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 and principles within 50 main categories and 5 major areas. An outline of the entire VEPS series and video excerpts from each DVD can be viewed online at: *dr-dave-billiards.com/veps*.

In the last few months, we've looked at examples of the Corner-5 System, which is used to aim two-, three-, and four-rail kicks off a long rail. The system is covered in detail on "VEPS IV - Banks, Kicks, and Advanced Shots." If you don't remember the details of the system, please review my recent articles and **NV B.85**. To summarize, for a rolling cue ball (CB) with running English, the Corner-5 system predicts a third-rail target (T) from the CB's origination-direction number (D) and the first-rail number (F) using the following simple formula: $T = D - F$. If you have been practicing the Corner-5 System, you may have noticed that the system does not work equally well over a full range of CB positions and shot angles. This month, we'll look at several important effects, and learn when and how to make adjustments.

As with any kick or bank system, it is important to understand the effects of speed and English. **Diagram 1** illustrates how speed alone affects Corner-5 System tracks. (Just a reminder, per last month's article, the benchmark-shot 3rd-rail target might be different on your table.) First note that speed doesn't really have much effect on the CB's target diamond on the 3rd rail. With all three speeds shown in the diagram, the CB heads very close to diamond 3 on the 3rd rail, just as the Corner-5 system predicts ($3 = 5 - 2$). This is because the speed-related effects on rebound-angle off the 2nd rail tend to counteract the same effects off the 1st rail. This is not true, however, for the track off the 3rd rail, which is affected significantly by speed. As shown in the diagram, slower speed tends to make the CB come up short of the 4th-rail target (see the blue path), while faster speed tends to make it go long (see the red path). The main reason for this is the amount of sidespin that remains on the CB into the 3rd rail. With slower speed, the 1st and 2nd rails do not reinforce the sidespin as much, and more of it wears off by the time it reaches the 3rd rail. This effect will obviously vary with conditions. Clean balls on slick cloth tend to retain sidespin longer than dirty balls on sticky cloth.
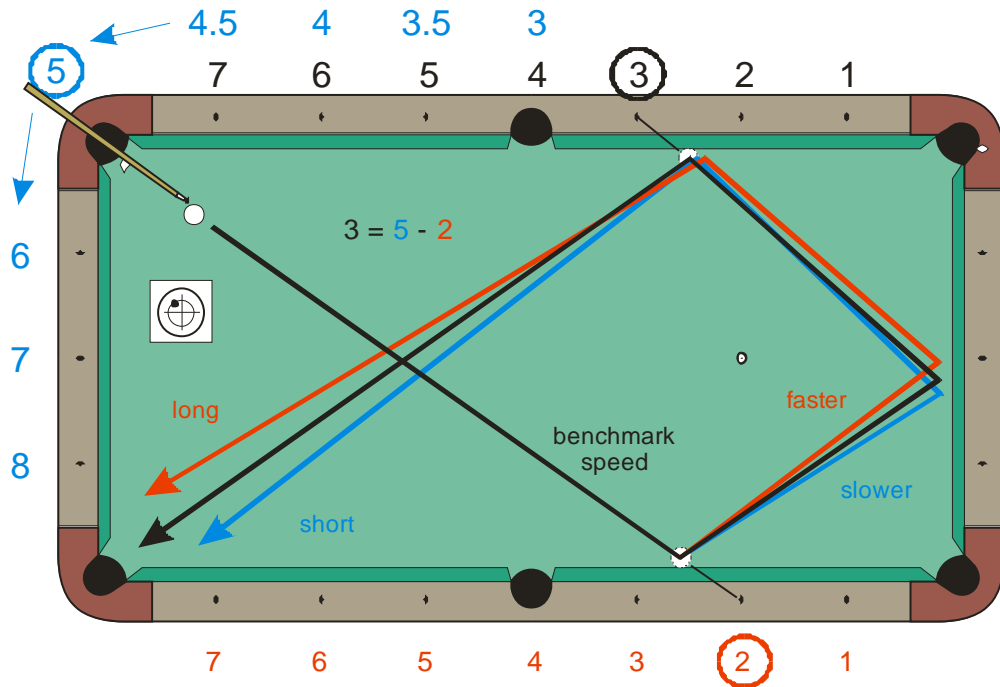
Diagram 1 Corner-5 System speed effects

Diagram 2 illustrates English effects. As with speed variations, different amounts of English have little effect on the 3rd rail target. Again, the effect on rebound-angle off the 2nd rail tends to counteract the same effect off the 1st rail. With less English, the CB rebounds shorter off the 1st rail, resulting in a shallower approach in to the 2nd rail. The CB picks up some running sidespin off the 1st rail, but the amount is still less than what it would have if there were more English into the 1st rail. With less sidespin, the CB then rebounds shorter off the 2nd rail, redirecting it toward the benchmark 3rd-rail target. The resulting angle off the 2nd rail, however, tends to send the CB a little long off the 3rd rail (see the red path). With more English, even though the CB tends to head into the 3rd rail at a slightly steeper angle, the amount of sidespin will be greater, sending the CB even longer than in the less-English case (see the blue path). Again, as with speed, the degree of these effects depends on table conditions.
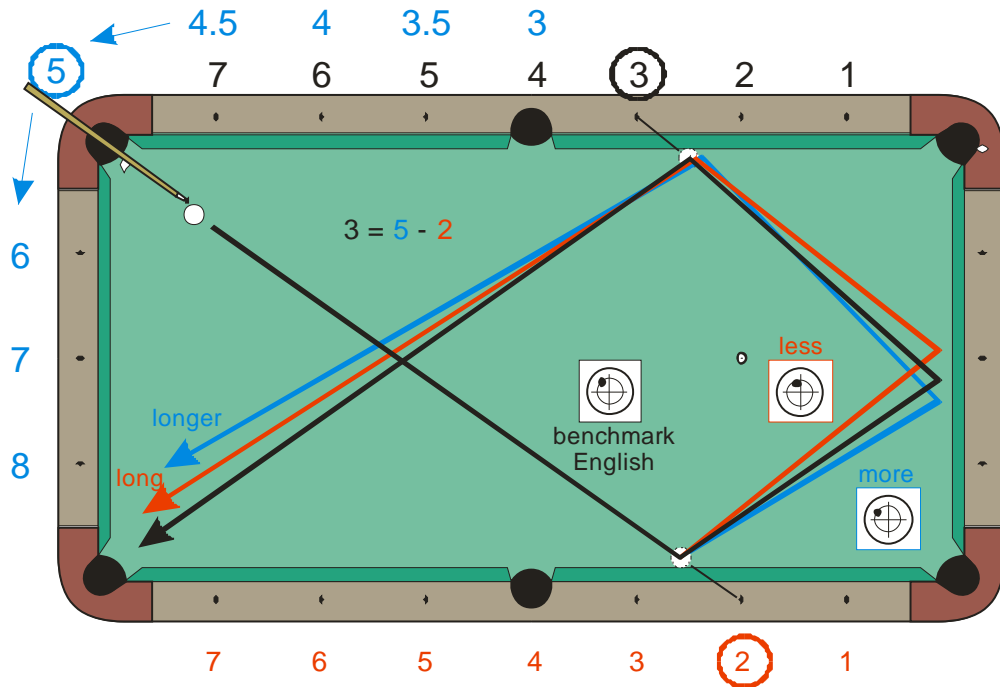
Diagram 2 Corner-5 System English effects

Both Diagrams 1 and 2 illustrate the robustness the Corner-5 System. With a wide range of speeds and English, the formula predicts the 3rd rail target fairly reliably. However, to target a pocket or ball off the 3rd rail, speed and English effects must be considered.

When using the Corner-5 System to aim at 4th-rail targets, you need to be aware of how tracks change as the origination-direction number moves away from the benchmark value (5). As shown in **Diagram 3**, for CB positions farther down the long rail (i.e., as the origination number decreases from 5), the CB tends to go a little short of the 4rd-rail target. Therefore, you need to compensate to go a little longer by shifting your 1st-rail aim point a little down table (i.e., reduce the 1st-rail number slightly). The smaller the origination number, the more the adjustment. This is illustrated in the diagram by the dotted tracks in black, red, and blue, corresponding to origination numbers of 5, 4, and 3.5. The benchmark track (black) leads to the corner, but the track from 4, comes up a little short of the pocket, and the track from 3.5 comes up even shorter. For the shot shown in blue, the aim is adjusted about a third of a diamond. You can develop a feel for how much to shift on different tables through practice. Speed and the amount of English can also be adjusted, per Diagrams 1 and 2. Some systems have also been suggested that calculate a correction (e.g., the "Seattle Kid allowance" presented in Byrne's "New Standard Book of Pool and Billiards").
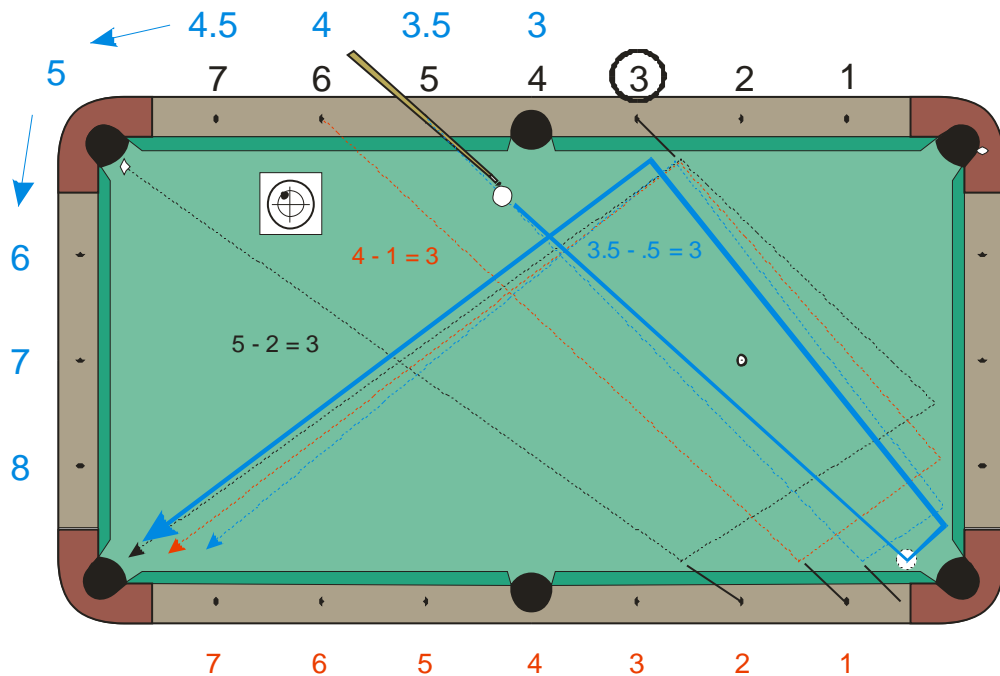
Diagram 3 **4th-rail track adjustment for smaller origination numbers**

Diagram 4 shows what happens in the other direction. For CB positions farther down the short rail (i.e., as the origination number increases from 5), the CB tends to go a little long of the 4th-rail target. Therefore, you need to adjust by aiming to go a little shorter by shifting the 1st-rail aim point a little up table (i.e., increase the 1st-rail number slightly). The farther from the benchmark, the more the adjustment. This is illustrated in the diagram with the dotted tracks in black, red, and blue, corresponding to origination numbers of 5, 6, and 7. The benchmark track (black) heads to the corner, but the track from 6 goes a little long of the pocket, and the track from 7 goes even longer. For the shot shown in blue, the aim is adjusted about a third of a diamond farther up the 1st rail.
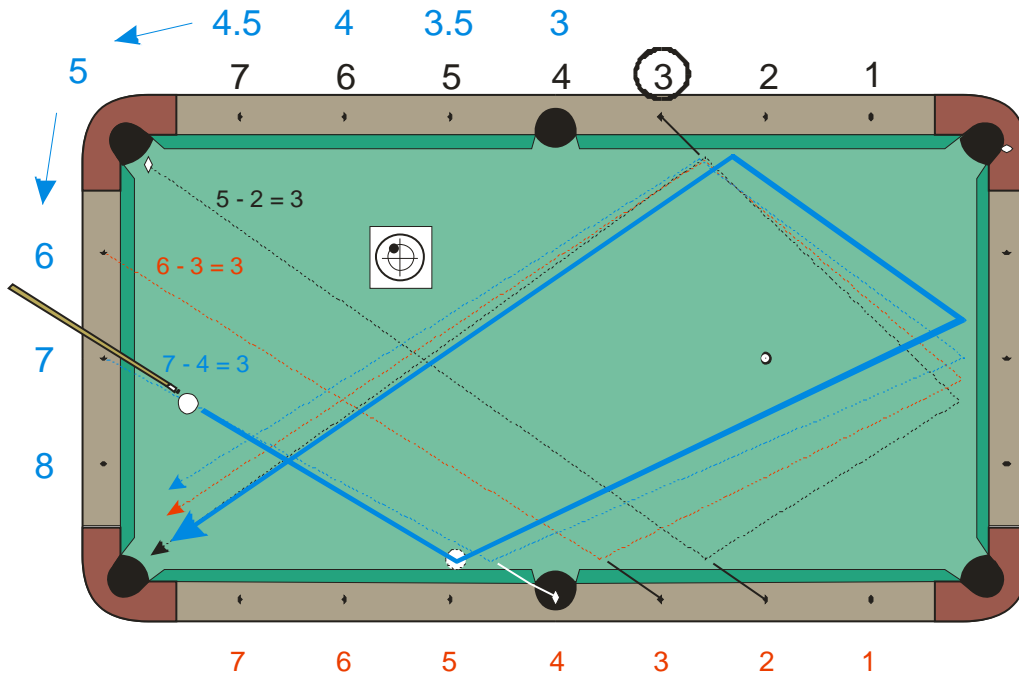
Diagram 4 4th-rail track adjustment for larger origination numbers

Example shots from the fourth VEPS DVD 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

I hope you are enjoying and benefiting from my series of articles featuring shots from the "*Video Encyclopedia of Pool Shots (VEPS)*." Next month, we'll take a look at a non-math-based "spot-on-the-wall" kicking system and see how it is related to the Plus and Corner-5 Systems.

Good luck with your game,
Dr. Dave

PS:

- I want to thank Dave Gross (previously ranked three-cushion-billiard player, and a top regional pool player). He provided some good insight and recommendations related to the information in this article.

- I know other authors and I tend to use lots of terminology (e.g., squirt, throw, stun, ball-hit fraction, etc.), and I know not all readers are totally familiar with these terms. If you ever come across a word or phrase you don't fully understand, please refer to the online glossary on my website.

- I want to thank Jim Valasina. He graciously proof-reads my articles every month to help find errors and make suggestions. My article quality is better as a result of his efforts. Thanks again Jim!

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."