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*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](http://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](http://dr-dave-billiards.com).*

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This is the second article in a series on pool rules. The series features shots from a pool rules quiz I recently created with fellow BD columnist Bob Jewett. The quiz can be viewed online in **NV B.61**. **NV B.62** provides answers and brief explanations for each shot. **NV B.63** provides thorough instruction in each foul category. All calls in the quiz and this article series are based on the internationally-recognized **World Standardized Rules** published by the World Pool-Billiards Association (WPA). The complete rules can be viewed online at [www.wpa-pool.com](http://www.wpa-pool.com). Last month, I introduced the quiz and supporting resources and looked at examples of kiss-back and rail-frozen shots. This month, we will look at shots where there is a small gap between the cue ball (CB) and object ball (OB), and also where the CB is frozen to the OB.



[NV B.61](#) – Pool rules quiz for referees and players, with Bob Jewett

[NV B.62](#) – Answers to pool rules quiz for referees and players

[NV B.63](#) – Instruction for pool rules quiz

Here are the pertinent WPA rules concerning small-gap and frozen-ball shots:

### **6.7 Double Hit / Frozen Balls**

*If the cue stick contacts the cue ball more than once on a shot, the shot is a foul. If the cue ball is close to but not touching an object ball and the cue tip is still on the cue ball when the cue ball contacts that object ball, the shot is a foul. If the cue ball is very close to an object ball, and the shooter barely grazes that object ball on the shot, the shot is assumed not to violate the first paragraph of this rule, even though the tip is arguably still on the cue ball when ball-ball contact is made.*

*However, if the cue ball is touching an object ball at the start of the shot, it is legal to shoot towards or partly into that ball (provided it is a legal target within the rules of the game) and if the object ball is moved by such a shot, it is considered to have been contacted by the cue ball. (Even though it may be legal to shoot towards such a touching or “frozen” ball, care must be taken not to violate the rules in the first paragraph if there are additional balls close by.)*

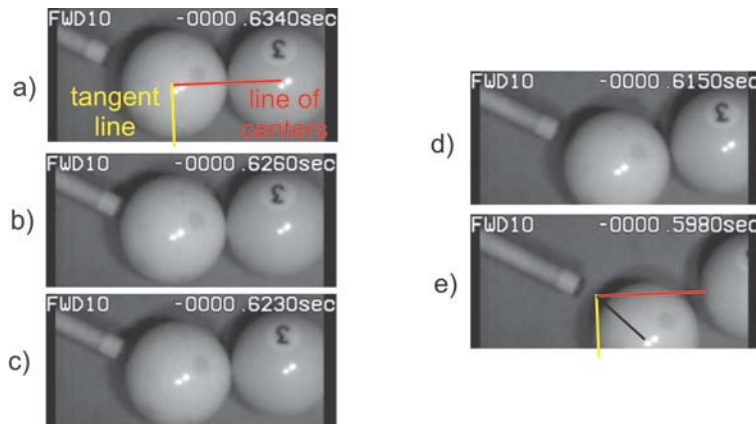
*The cue ball is assumed not to be touching any ball unless it is declared touching by the referee or opponent. It is the shooter’s responsibility to get the declaration before the shot. Playing away from a frozen ball does not constitute having hit that ball unless specified in the rules of the game.*

### **6.8 Push Shot**

*It is a foul to prolong tip-to-cue-ball contact beyond that seen in normal shots.*

**Diagram 1** has some still images from **NV B.63** (part 1) showing a cut shot where the CB is frozen to the OB (before the shot). The still images don’t do the video justice, so try to view the video online when you get a chance. You can clearly see in the video and diagram that the CB cleanly and quickly separates from the cue tip, as with a normal shot. There is no double hit or push. Therefore, it makes sense to allow this type of shot, as is the case with the WPA rules

(although, I never liked that this type of shot is allowed in pool, because the shot still feels and looks like a “push,” even if it isn’t). Diagram 1a illustrates some important terminology. The **line of centers** passes through the centers of the CB and OB at impact, and the **tangent line** is perpendicular to the line of centers. With a typical cut shot, where the CB is not frozen to the OB initially, the CB immediately heads in the tangent-line direction after impact with the OB. This is called the **90° rule**. However, when the CB is frozen to the OB, the CB does not head in the tangent-line direction (see the black line relative to the yellow line in Diagram 1e). In fact, there is a useful CB aiming system for frozen-CB cut shots (see **NV B.55**). There are also interesting ways to control CB travel distance with straight-on frozen-CB shots (see **NV B.48**).

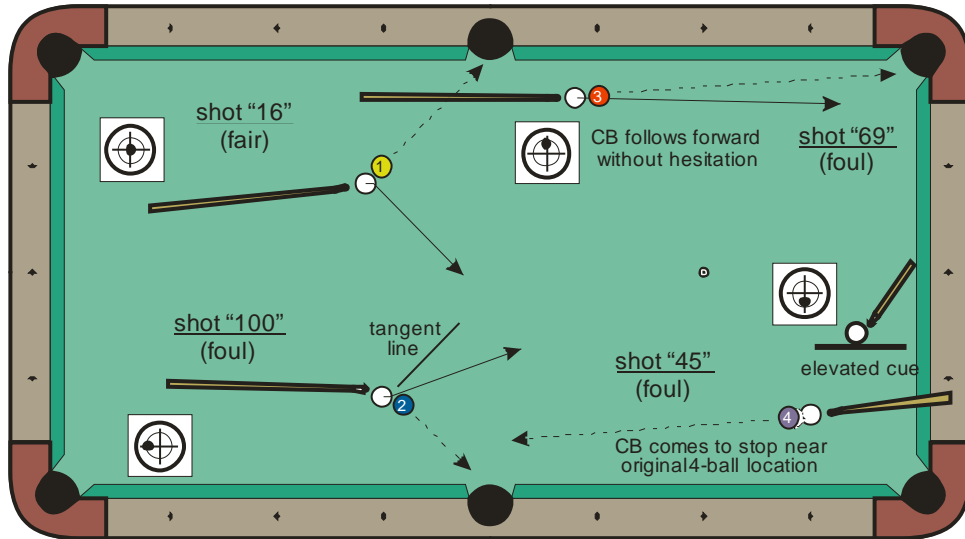


**Diagram 1** Frozen CB shot in super slow motion



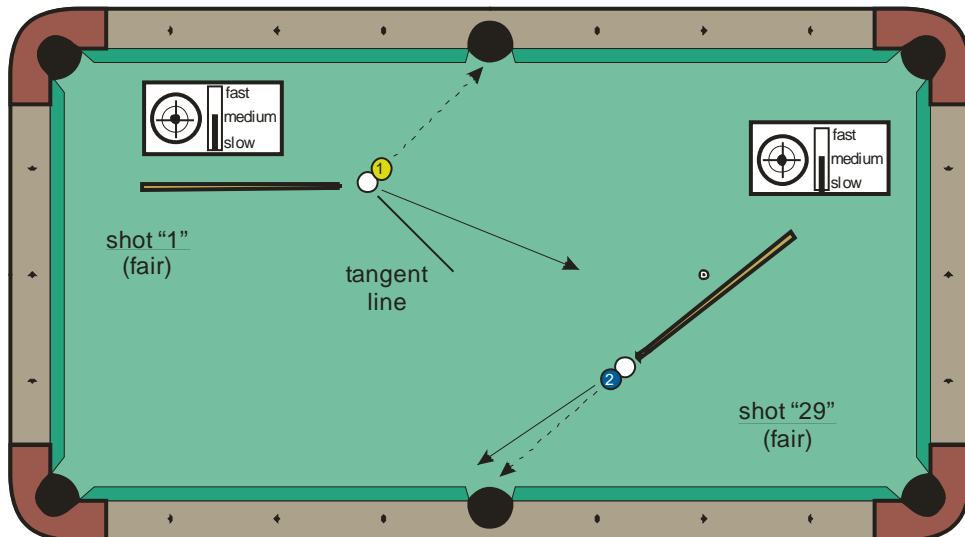
[NV B.55](#) – Bob Jewett's two-times-fuller frozen-cue-ball aiming system  
[NV B.48](#) – Frozen cue ball position control options

**Diagram 2** shows examples of shots with a small gap between the CB and OB. The quiz shot numbers appear in the diagram. When trying to judge whether or not a small-gap shot is a double hit or not, it is important to understand the tangent line and the expected motion of the CB. With a single-hit cut shot, the CB should head in the tangent line direction immediately after impact with the OB (see shots 16, 30, 36, 74, and 93 in part 2 of NV B.63 – part 2). If the CB heads away from the tangent line almost immediately after hitting the OB, then there must have been a double hit, and the shot is a foul (see shots 17, 72, 90, and 100 in part 2 of NV B.63). In Diagram 2, shot “16” (the 1-ball shot) is clearly fair because the CB heads exactly along the tangent-line direction, perpendicular to the OB’s motion. Shot “100” (the 2-ball shot) is a foul because the CB moves forward of the tangent line, indicating a double hit. Shot “69” (the 3-ball shot) is a foul because the CB follows forward immediately off the tip, showing no hesitation. With a single hit of the tip, the CB would lose all of its forward speed after striking the 3-ball (as with a stop shot), and only then gradually accelerate forward as a result of the topspin. Shot “45” (the 4-ball shot) is also a double-hit foul. With a single hit below center, the CB would stop in place or draw back. Instead, the CB is driven forward before stopping. This can happen only with a second strike of the tip. As with many of the shots in this series, you can’t usually see the actual foul directly (e.g., a small-gap double-hit is usually too fast to see or hear), but the foul is obvious indirectly by observing the motion of the CB.



**Diagram 2** Small gap between the CB and OB

**Diagram 3** shows two shot examples where the CB and OB are frozen. Both shots are fair because the CB is hit with a normal stroke and there is no double hit. The CB does head forward of the tangent line in both cases, but this is to be expected with a frozen-CB shot. Compare shot "1" in Diagram 3 with shot "100" in Diagram 2. The shots are nearly identical, yet one is a foul and one isn't, based solely on whether or not the balls are frozen. If there is a fraction of a millimeter gap between the balls, the shot is a foul. If there is no gap, the shot is fair. I personally don't like this distinction; but the rules are the rules, and we must comply.



**Diagram 3** CB and OB frozen

You can view demonstrations of all of the shots in Diagrams 1 and 2 (and many other related shots) in parts 1 and 2 of **NV B.63**. The video includes the appropriate ruling (fair or foul) and the reason behind each ruling. For more advice and instruction on how to detect double hits with various types of shots, see **HSV B.6** and **NV B.2**. My "[High-speed Video Magic](#)" DVD also covers this topic in detail. For some interesting techniques to prevent double hits, where cue elevation and/or large cut angle are not desirable or possible, see **NV B.49**, **NV B.50**, **NV B.51**, and **NV B.52**.

[NV B.2](#) – Mike Page's double hits, push shots, and frozen balls

[NV B.49](#) - Using your knuckles to prevent a double hit and stop the cue ball, with Bob Jewett



normal video

[NV B.50](#) - Using your knuckles to prevent a double hit and get follow, with Bob Jewett

[NV B.51](#) - Using your natural forward stroke limit to prevent a double hit and get draw, with Bob Jewett

[NV B.52](#) - Using a fouette shot to prevent a double hit, with Bob Jewett



high-speed video

[HSV B.6](#) – double hit detection and avoidance

Well, I hope you are enjoying and benefiting from my series of articles dealing with pool rules. Please encourage all of your pool-playing friends, teammates, and league members to take the quiz and view the instructional videos online. If people had a better understanding of all of the rules and how they are applied, maybe there would be fewer "differences of opinion" and "heated debates" during league night. Next month, we will look at several examples of rail cut shots, where the OB is close or frozen to a rail.

Good luck with your game,  
Dr. Dave

PS:

- If you want to refer to any of my previous articles and resources, you can access them online at [billiards.colostate.edu](http://billiards.colostate.edu).
- I know other authors and I tend to use lots of terminology (e.g., squirt, throw, stun, impact line, 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.

*Dr. Dave is author of the book, DVD, and CD-ROM: "[The Illustrated Principles of Pool and Billiards](#)," and the DVD: "[High-speed Video Magic](#)."*