How to Prevent Jacking Out Live Ones for Cowboy Action Shooters™

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From time to time, we all fall into the rut of jacking out a live round. It happens for a bunch of reasons including, but not limited to: jitters, working the action only part way, a faulty move with the lever or pump, a poorly seated bullet, a mis-shaped case that binds in the chamber, a light hammer strike, or sometimes a poorly seated primer.

Running a rifle fast, as we are all prone to do during a string, and experiencing no response when the trigger is pulled, instinctively brings about racking the lever or pulling back the foregrip in search of the next round. Obviously, jacked-out rounds are frustrating, especially when working against the clock.

At the last few matches I paid particular attention to rounds that were ejected early to see if there was any common denominator. While most of the rounds had no primer hits, I noticed that some of the jacked-out rounds I picked up or examined at the unloading table – mine and others – had light hits on the primers. There were others however, that showed good firing pin strikes on primers but the primers were not fully seated causing them not to detonate.

Fig. 1. Both the .38 and .45LC rounds shown here had good primer hits but were ejected from their rifles without detonating. Both had high primers.

To detonate properly, the primer must have a firing pin strike that dents the center of the primer .018" to .020". The measured "dent" varies and is dependent on: a) the amount of deformation of the cap after detonation; b) the shape of the cap after it is driven back against the bolt; and c) the CUP [copper units of pressure] of the powder charge and how that charge contributed to backing out and reshaping the primer's cap. The .018" to .020" dent in the cap will significantly force the cap into the wafer and crush the wafer between the primer's cap and anvil causing detonation of the wafer. However, in order for the wafer to be crushed, the primer must be fully seated in the case with the anvil pressing against the rim of the case. (If you have ever fired a primer in an empty case to evaluate firing pin strikes, you may have noticed that the primer will typically back slightly out of the case. However, this does not occur on a fully charged cartridge because the detonation of the powder drives the case back against the bolt's face which, in turn, keeps the primer seated.)

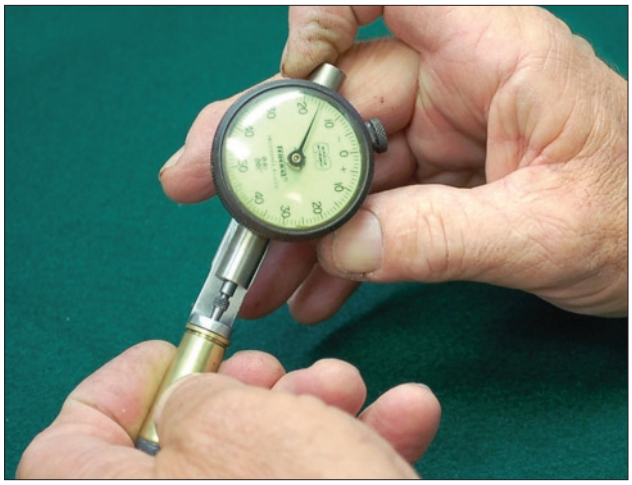

Fig. 2. Primer hits can be measured with a dial micrometer fitted with a special base that measures the depth of the primer's hit below the face of the primer. This primer hit measured .016".

The wafer in most primers today is made of lead styphanate (fulimnate was its predecessor), a highly explosive compound that must be impacted at a high rate of speed in order for it to detonate. Similar to PETN (pentaerythritol tetranitrate) – and other highly sensitive explosives – lead styphanate can be squished, bent, dropped, squeezed, and pressed without detonating. This is why primers do not detonate during normal reloading processes and forces. When a primer is properly seated in a standard reloading press, the wafer is severely compressed between the anvil and the primer's cap. And, no matter how hard you force the loading press's handle, the wafer will not detonate. But, impact it abruptly, and BANG! (Folks in the blasting industry who work with Primacord detonating cord will slowly cut the cord with a sharp, non-sparking knife or scissors, but never with a wire-cutter because the abrupt snap of the cutter's jaws can cause detonation of the powder resulting in ignition of the cord.) This also speaks to the importance of being firm and consistent during reloading, but never overly aggressive.

The primer is designed so the anvil protrudes below the bottom of the primer. In this way, when the primer is pressed all the way into its pocket in the shell casing, the anvil bottoms out against the base of the primer pocket ensuring a sturdy support for the anvil when the firing pin smashes into the primer's cap. If the primer is not fully seated, the anvil can be easily knocked out of the primer's cap. And, depending on the stiffness of the

hammer spring, size and weight of the hammer, speed of firing pin, and height of the anvil above the primer's pocket, the wafer will not be impacted and the primer might not detonate.

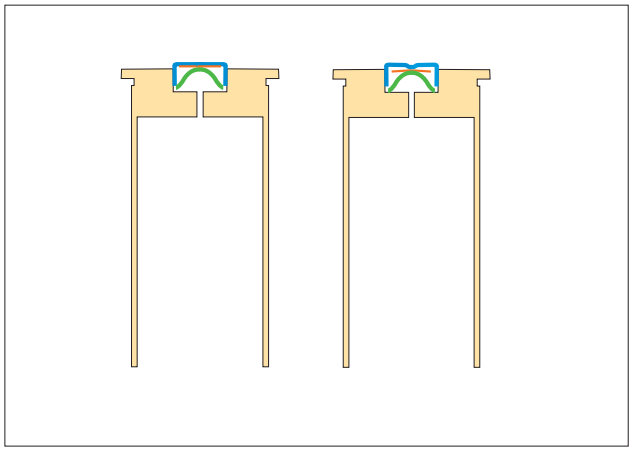

Fig. 3. If the primer is not fully seated, a strike on the primer can easily knock the anvil free preventing the wafer from being deformed.

Most cowboys and cowgirls glide their fingers over the primers in a box of rounds for a quick "feel" of any high primers. And, we often reject high primers on pistol loads at the loading table because high primers cause the obvious problem of preventing the cylinder from turning freely. (Sometimes, experiencing a cylinder that does not rotate freely is how we find a high primer in the first place.) Often, these rounds will be relegated to the rifle because we don't envision a problem with high primers in a tubular magazine, and some folks think closing the rifle's bolt against a high primer will help it seat better. However, not all rifles have little or no rim space. Some rifles, especially those with low mileage, may close with zero rim space, and closing the bolt can force a high primer further into the primer pocket, but this is the exception, not the rule.

With primers that are not fully seated, when the hammer drops, the firing pin can dent the primer's cap and exert a load against the wafer. But, if the anvil is not fully seated against rim of the case, the impact can result in knocking the anvil out of the primer rather than detonating the charge.

What to do with cartridges with high primers?
If you have already cycled the bullet through the gun, and it has a firing pin hit on the primer, the very best and safest thing to do is pull the bullet, pop out the primer on a hand-press (and discard the primer), save the powder, and reuse the case. (And, according to how severely the bullet was crimped, you can mostly likely reuse the lead). For safety reasons, neither the author nor The Cowboy Chronicle recommend reseating a high primer in a loaded bullet due to the potential risk of detonation. However, I'd be remiss if I didn't meniton that some shooters will put a loaded bullet in a hand press to fully seat a high primer.

Well-seated primers may cure some jack-out-round problems, and a bit more diligence at the reloading bench to ensure that primers are fully seated will pay off big time.

Anatomy of a Primer

Fig. 4. The three components of a primer.

The primer is comprised of three parts: a cap, a small paper-like wafer of a highly explosive material called lead styphanate, and a tapered lower portion referred to as an anvil. The anvil is lightly pressed into the cap – with the wafer between the cap and the anvil. When the primer is struck by the firing pin, the lead styphanate

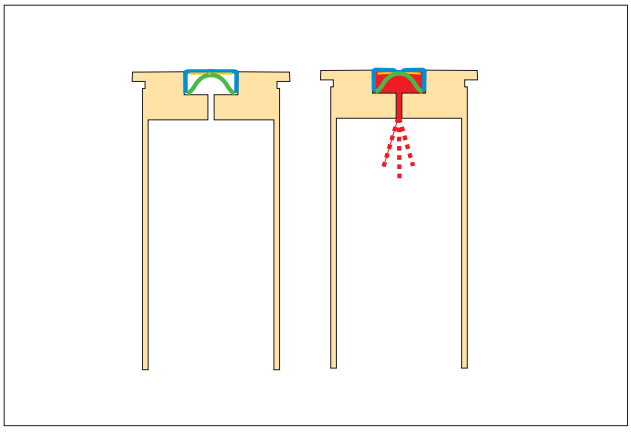

Fig. 5. This diagram shows the cap (blue), the wafer (orange), and the anvil (green). When the firing pin dents the cap, the wafer is rapidly compressed against the anvil causing detonation.

wafer is crushed between the anvil and the cap, and the quick physical deformation causes a chemical reaction that in turn causes the lead styphanate to explode.

The primer is designed so that the anvil protrudes from the bottom of the cap about .010" (Fig. 6). During the re-loading process, the primer is forced into the case's

Fig. 6. The anvil in the new CCI primer on the left protrudes from the base of the primer by .010" for an overall height of .119". Once the primer has been installed in a case and compressed (right), the anvil gets squeezed into the cap about .005" but the anvil still protrudes from the base of the primer. (Look carefully at the two primers, the primer on the right has its anvil set slightly lower into the cap.)

pocket until the anvil is pressing against the case. Typically, the slight additional pressure during the primer setting phase of reloading, compresses the anvil, wafer, and cap about .004" or .005" more. However, the primer is designed so that only the anvil comes in contact with the base of the case's primer pocket to ensure a rigid support during the firing pin's impact; the primer's cap sits slightly off, and does not touch the base of the primer pocket. As previously stated, if the primer is not fully seated in the pocket, the anvil can be knocked free of the cap when struck by the firing pin.

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