The Importance of Sight Alignment vs Sight Picture

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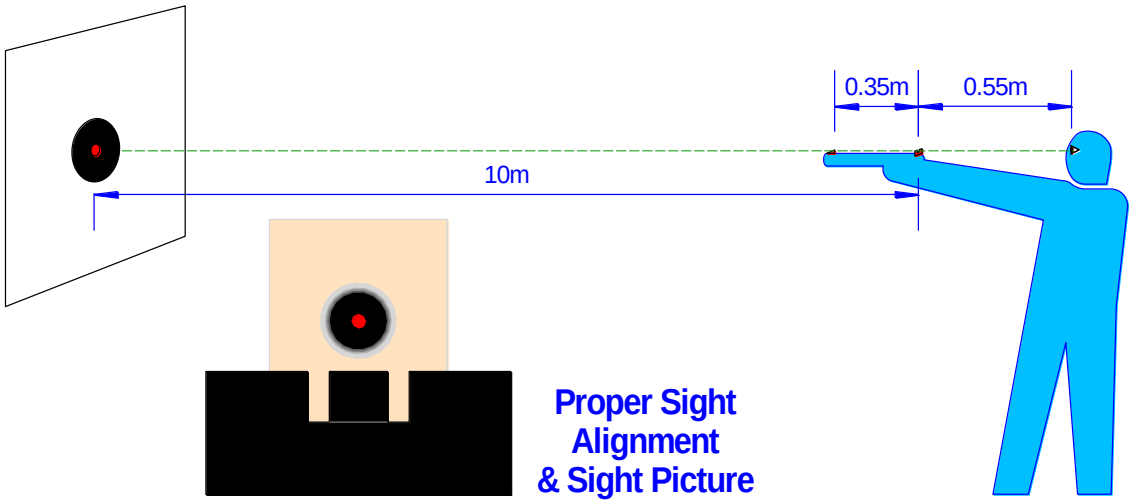
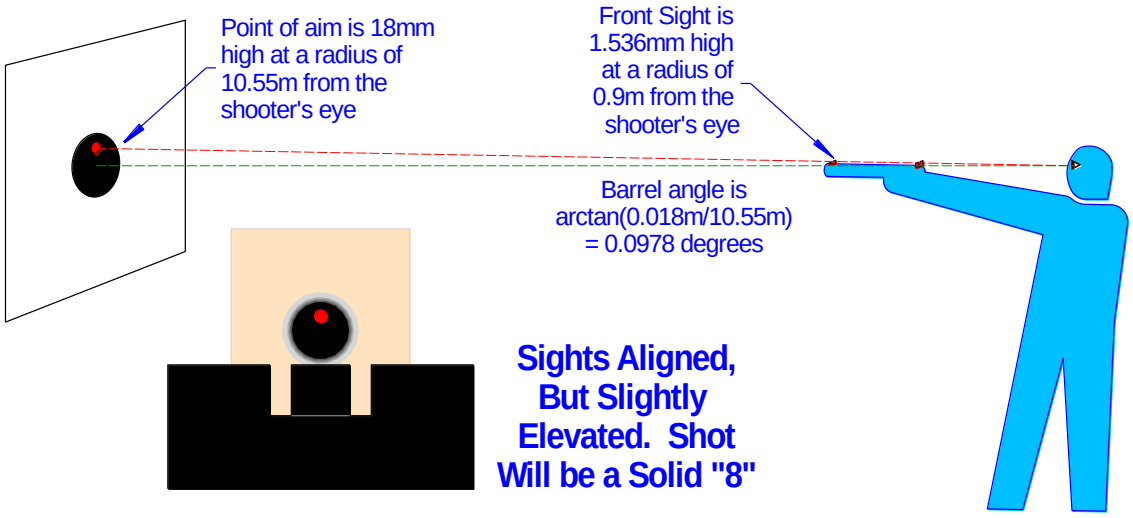
I thought the idea that sight alignment is more critical than sight picture was an accepted fact. Like so many things, there are dissenting opinions out on the Internet. I decided it was time to "do the math" and see just how much difference it makes. The figure below (very much not-to-scale) shows the geometry of an air pistol shooter, with the approximate distances involved. I've assumed the 10 meters is measured from the location of the rear sight, just to use the closest existing reference point. Although the target/sight images shows a "sub-six" hold, the analysis is done using a center hold to simplify the math. This doesn't affect the results in any way.

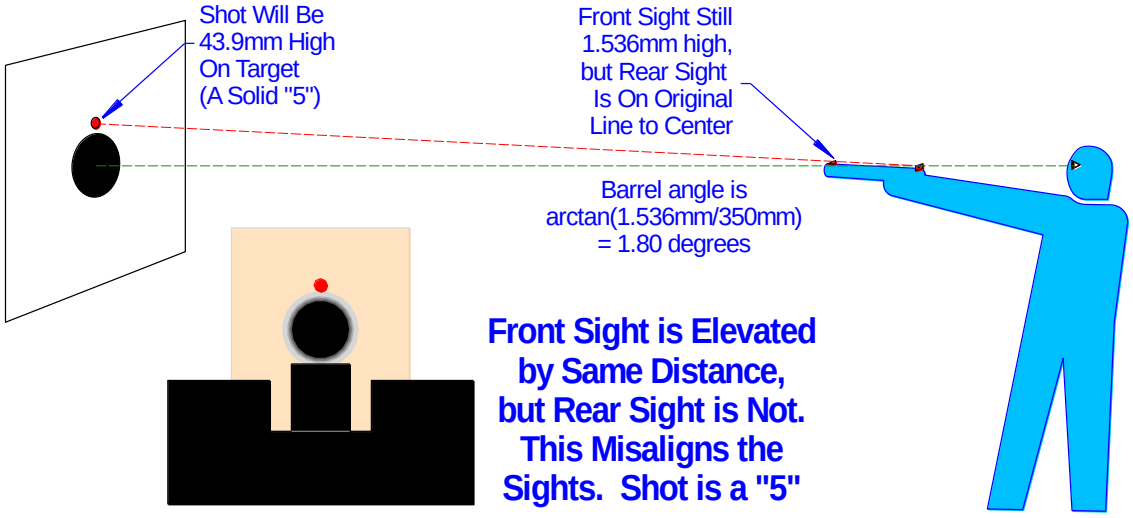


Next, the shooter wobbles a bit, but keeps his sights aligned. In this case, the entire pistol is raised slightly, enough that the shot will be a twelve o'clock "8." The middle of the 8-ring is roughly 18mm above the center of the target. Using the similar triangles created by this geometry, the front sight is ~ 1.54mm above the original line to the center of the target. The rear sight is elevated slightly as well, in order to maintain sight alignment.

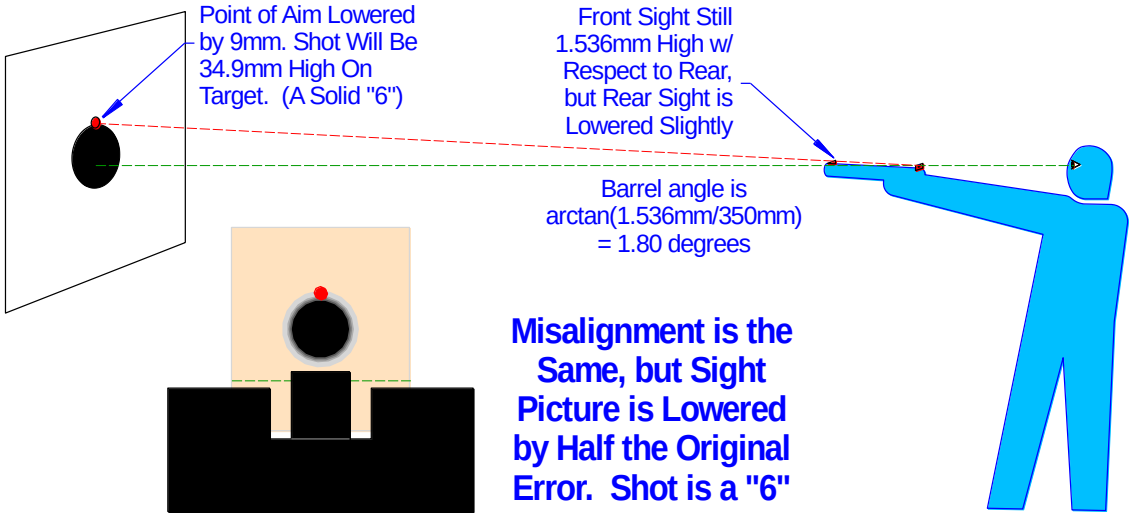


The next scenario shows the shooter with the exact same error in the height of the front sight, but the sights are now misaligned. The smallest change one can make to misalign the sights while maintaining

the rest of the geometry is to lower the rear sight slightly so that it is still on the original line from the eye to the center of the target. Only the front sight is out of alignment. Now, the similar triangles involved start at the rear sight, not the eye. The angular error is determined by the height of the front sight and the relatively short sight radius. The angle of the bore increases from about 1/10th of a degree to 1.8 degrees, and the resulting shot will be ~ 44mm above the center of the target. This puts the center of the shot just shy of the ring between "4" and "5" on target, resulting in a solid "5."



Some people might question my approach for maintaining the "same" sight picture while misaligning the sights. A slightly more complex option would be that the height of the sights relative to the target should be based on the average of the heights of the front & rear sight. That would look like this:



The large angular error still exists, but now the sight picture is lowered by half the original error used when the sights were aligned. All that does is move the shot down by half the distance of the "aligned but high" scenario, which would be 9mm. The rings on an air pistol target are 8mm apart, so all that does is change the shot from a "5" to a "6."

I think I would rather work on keeping my sights aligned and get the "8"...