

SORTING BULLETS FOR LONGER RANGES?

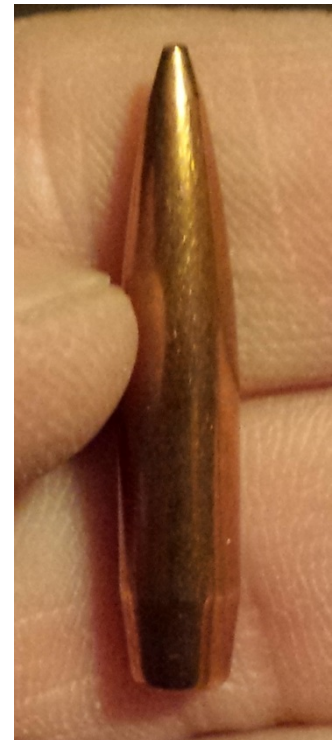
By Tom Helak

INTRODUCTION

This experiment is the manifestation of conversations I have had with several people over the past few months, as well as several posts on internet forums that I have seen over the past year. I have seen people ask, and been asked, on a few occasions, what the best way to sort bullets for long range is, and why. As it relates to this, shooters fall into 4 groups. The first group just pulls the bullets of a box and proceeds to seat them in a charged case. The second group either sorts by length or base-to-ogive, based on their reasoning for which one **should** matter more. The third group sorts by weight. The last group sorts using a combination of methods (weight, length, and/or base-to-ogive) in an effort to eliminate as many variables as possible.

In addition to the theoretical debate of bullet sorting, I have heard rumors (or complaints) from at least two capable shooters of Sierra's new pointed Match Kings causing vertical flyers due to being sorted incorrectly before they are pointed at the factory. Both shooters mentioned experiencing several X's shot, followed by a vertical 9, and then a shot right back into the X ring, without changing the sights.

To date, I do not know of any experiments published to shed light on how much bullet sorting matters, or whether a shooter can sort them to eliminate any inconsistencies that may be caused by variations in how they were grouped before being pointed. The closest to a definitive answer I have managed to find was in a series of articles published by the Army Marksmanship Unit, where the various methods of bullet sorting were discussed. However, only one group was included in this article, with nothing to compare it to. These articles also predate any rumors of a bad pointing job on the part of Sierra. I personally sort bullets for longer ranges based on the AMU's published writings, but have never actually had the opportunity to see if the techniques do, in fact, matter, at least as it relates to me and the shooting sport I take part in.



*Sierra's new pointed 90gr
Match King*

In an effort to get some peace of mind before the onset of winter, and subsequently loading bullets that could lead to frustrating vertical flyers at a match the following spring or summer, I set out to test some of the theories, and see if I could replicate what other shooters were experiencing, and what caused them. What follows is a short experiment designed to answer my own personal questions. Does bullet sorting matter? If so, how much difference did it make? Are Sierra's new pointed bullets responsible for these annoying flyers being reported? If so, could the bullets be sorted, much like the AMU had previously written, in order to reduce or eliminate this?

METHOD

Rifle – The rifle selected for testing the bullets was an AR built by Joe Carlos for the sole purpose of shooting Fullbore and Palma. It has a 32" Bartlein 6.8 gain twist barrel, chambered to headspace .001 off of Lapua 223 Remington brass, with .16 freebore. The rifle has a Geissele Match Rifle trigger, Warner rear sight, RightSight front sight, and Competition Machine stock.



I debated which rifle to use for this experiment (Service Rifle or Fullbore Rifle), but ended up selecting my Fullbore Rifle due to the time constraints of the project. It already had a workable load with Berger's 90gr BT bullet, which would be used as a "control" group should the test go awry with the Sierras. In addition, it is a much easier rifle to shoot, so I felt it would lessen the effects of the biggest variable in the experiment: the shooter (me).

Control Group – 12 Lapua cases were loaded with 90gr Berger BT bullets. 2 would be used for sighters to center the group, and 10 would be fired for record in the experiment, should the accuracy of the rifle or ammunition loaded with the Sierra 90s come into question. This load was shooting a solid 5/8 minute 10-shot group prior to working up a load with the Sierra 90s. All 12 brass cases were the same weight (95.6gr), primed with a Remington 7 ½ small rifle primer. They were seated to a .007 jam into the rifling, with a powder charge of 24.50gr of N150, loaded to +/- .02gr accuracy. The velocity of this load was 2760 fps, with an SD of 19.

Double Sorted Group – 12 Lapua cases were loaded with 90gr Sierra Match Kings that all measured the same length (1.172) and had the same base-to-ogive measurement (.6605). This length was close to the center of the bell curve, among the approximately 200 bullets measured for length when pulled out of the box. They were all seated to jump .004 off the lands, pushed by a charge of 24.80gr of N150, loaded with +/- .02gr accuracy. All of the cases weighed 95.5gr, and



Bullets loaded in their respective groups for the experiment

were primed with a Remington 7 ½ small rifle primer. 2 rounds would be used to get the rifle centered on paper, and 10 would be fired for a record group.

Bad Sorted Group – 10 Lapua cases were loaded with 90gr SMKs, each of which had a different overall length. These bullets were also seated .004 off the lands, and loaded with 24.80gr of N150, with +/- .02gr accuracy. All cases weighed 95.4gr, and were primed with a Remington 7 ½ small rifle primer. The cartridges were arranged for the overall bullet lengths to be shot in the following order: 1.175, 1.174, 1.173, 1.171, 1.170, 1.169, 1.168, 1.166, **1.155**, 1.172.

The 90gr SMK loads were chronographed at 2800 fps, with an SD of 5. At 100 yards, the 10 shot group at the end of the load work up measured .4 moa.

Firing Procedure – All shots were fired at 600 yards, on the NRA MR-1 target. The two 90gr SMK sighters were fired first to get on paper. Then the Double Sorted Group was fired to establish a baseline for comparison against the Bad Group. Finally, if neither SMK group performed, the Berger Control Group would be shot to further diagnose whether the problems were the fault of the ammunition or the shooter. No sight knobs were touched after the initial sighting shots.

HYPOTHESIS

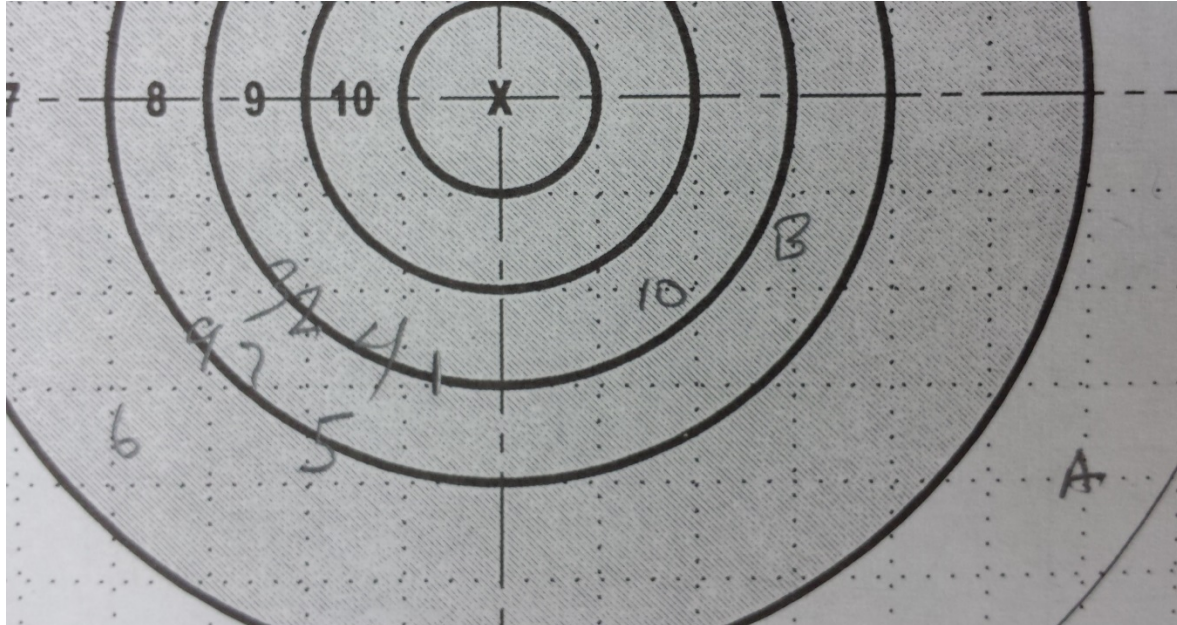
After sorting enough bullets for the experiment, and varying them as much as possible for the Bad Group, I thought I had already found the cause of any vertical flyers induced by bullet length. The 1.155 inch long bullet stuck out dramatically when compared to the others. It stuck out so much that I measured it **three** times just to be sure. Ordinarily, I would have never loaded this bullet for a match, except maybe for a fouling shot before I left home. However, for the guy just pulling bullets out of the box, this would seem to be the problem, if the flyers they were experiencing were, in fact, bullet-related. For the most part, the bullets were within a few thousandths of an inch in length of each other on the bell curve, more than likely without enough variation to cause a flyer out of the 10-ring, **until they picked out one that measured 1.155 and shot it in between two that are in the center of the bullet length bell curve.** If the bullets were the cause, I'd imagine that would be pretty frustrating if the shooter didn't know what was going on. As my luck would have it, I thought the anomaly of a 1.155 inch bullet was the best thing to happen to the experiment. If bullets, or incorrect pointing procedures, really caused a dramatic elevation change, this would be the bullet to show me that. The Bad Group was going to be shot from one length extreme to the other, followed by the rarity that was a full .02 inches shorter than the longest. The last shot to be fired in the Bad Group would be an exact duplicate of the 10 fired in the Double Sorted Group. If any of the suspicions were true, I would see a vertical flyer on Shot 9, followed by a well-centered X on Shot 10.

RESULTS

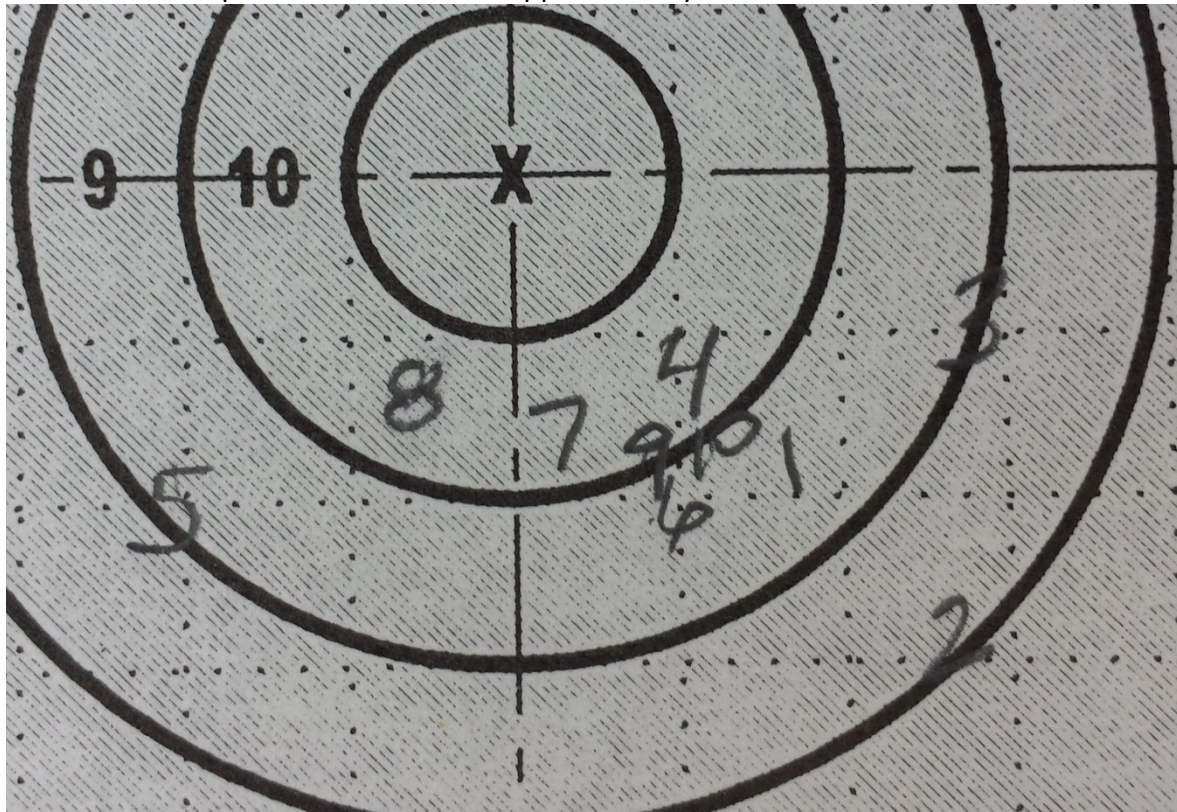
Both Sierra loads held under X-ring elevation (1 moa) at 600 yards. The Double Sorted Group did have less vertical than the Bad Group. However, the reason for the increased vertical on the Bad Group was **shooter error!** Shots 2 and 3 for that group were the second and third worst shots I made that day (only Sighter B was worse). **Both** shots were called flyers. Had it not been

for those two miffed shots on my part, I would feel confident in saying the elevation was the same size for both groups: right at $\frac{3}{4}$ moa at 600 yards over **twenty** (or rather, 18) shots fired, with me behind the rifle, using a sling and iron sights.

Double Sorted Group: total elevation was approximately 4.5"



Bad Sorted Group: total elevation was approximately 5.25"



I also did a little post-test scoring, just to see how well I would have done had I actually managed to center up before I starting shooting for the experiment. I used Berger's ballistics calculator to get on paper from my 100 yard zero, and it got me reasonably close. The reason for the lower groupings after my second sighter was a bonehead move of clicking the elevation the wrong direction (doh!).

Double Sorted Group: 99-5X

Bad Sorted Group: 98-6X

TOTAL: 197-11X

All shot without clicking on the sights! All points would have been lost due to bigger wind changes that, in all honesty, I was not trying to pick up. The focus was on shooting perfect shots. When comparing the two groups, it should also be noted that the Bad Group is a little more center-weighted than the Double Sorted Group. This was in part due to conditions, but my mentality as a shooter also changed between the groups. These strings were shot at the conclusion of a match (in which I did not compete), so the pits were unsealed between strings. I did not feel as pressured to finish within a time limit for the second string, which allowed me to take the extra half second to make a better shot.

CONCLUSION

First and foremost, this rifle and ammunition combination is extremely accurate. I could not be more pleased with the results of the experiment, even though they disproved my theories. Both groups of Sierras performed so well, and without any adverse effects, that I did not feel the need to shoot the Berger control group. Neither group of Sierras showed any signs of inconsistencies on paper.

The initial hypothesis going into this experiment was that sorting by length would create a smaller vertical when compared to a randomly loaded string of bullets, especially as distance increased. The second prediction was that Shot 9 on the Bad Group, being the anomaly, would cause a vertical flyer within the second group. In theory, it should also be the farthest away elevation-wise from Shot 1 in that same group. Neither of these predictions could be further from what actually showed on the target. Shots 9 and 10 were about as close to the center of the group as possible. If wind was taken out of the equation, I'd bet Shot 1 would have been right next to them as well. In any case, the difference in elevation between the two extremes in bullet length was negligible.

Based on the results of this experiment, I think sorting bullets in the hopes of increased accuracy downrange is a waste of time in most instances. While I have no way of knowing if other pointed Match Kings (like the 107gr 6mm) are affected by increased vertical from supposed improper pointing, this particular lot of 90gr .224s most definitely is not. I would feel confident pulling bullets out of the box at random to shoot for the long line. I may still sort for 1000 yards, but that is more because I've already done it. It is still possible that increasing the

distance to 1000 yards or beyond could cause unsorted bullets to have a larger vertical than sorted ones. The same may hold true for using a more stable firing platform, such as an F-Class rifle in a rest or on a bipod, or a benchrest rifle. However, I think the vast majority of shooters would benefit more from a few extra hours of dry fire than they would from a few hours of sorting bullets, especially for games like High Power or PRS-style shooting.

Lastly, when considering the unexplained vertical flyers that another shooter was getting with the same lot of 90gr bullets, I now think seating depth is the most likely culprit. When playing with seating depth during the initial load work ups for this bullet, the rifle shot a nice ½ moa 9-shot group at 100 yards that then opened up to 1 ¼ moa thanks to a single unexplained vertical flyer. That group was shot with the same powder charge, but had a .008 jump, instead of the .004 jump finally settled on. The .004 jump also noticeably shrank the size of the group even further.

Thanks to the results of this experiment, and Sierra's published G1 BC, a whopping .563, this is the bullet and load I will be using for this rifle next season, and I'm pretty excited about it.

ACKNOWLEDGEMENTS

There were many people that helped me in various ways to make this project a reality. I could not have done it without them. Tawny Wilson, without you none of this would have been possible. Your support of my shooting endeavors means the world to me. Thank you also for distracting Xanthus so I could finish the load work up late in the day. Cora McGee and Sylvia Haynes, thank you for taking care of my son so I could go to the range and conduct the experiment. John Bair, thank you for allowing me to show up and shoot at the end of your match. Thank you to you and Dave Babits for pulling my target for the first string. Nick Nickelson and Dakota Turner, thank you for volunteering to stay and pull my target for the second string, so I could conclude the experiment. Rick Maxian, thank you for staying to communicate with the pits on the radio. Aaron Loreman, thank you for the crash course on proper bullet pointing procedures. Lastly, in a quote made famous by Isaac Newton, "If I have seen further it is by standing on the shoulders of giants." Joe Carlos, in the shooting world, you are my biggest giant. Your experience and hand loading advice was invaluable to the success of this project, as well as many of my previous shooting successes. Given the small window of opportunity I had to conduct this experiment, the baselines you provided made a quick load work up possible. Thank you, also, for providing the bullets to be tested.