TARGET RIFLES

By Alonzo Garcelon

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When one considers target rifles, one immediately encounters marked variations. However, over the years the problems of making and shooting target rifles seem to have been quite constant and, in fact, amazingly similar.

First, for example, there were and are guns designed to comply with various range situations. Some are designed for indoor gallery shooting at fifty or seventy-five feet. Some are designed for forty-rod shooting. Some are designed for 1,000-yard shooting, and still others for 300-meter shooting ad infinitum.

Second, there were and are guns designed to meet certain weight rules that have been instituted by rule-writers over the generations, primarily to maintain standards and prevent those who would, via some loophole in the rules, evade regulations for personal advantage.

Third, there were and are guns designed specifically to handle particular powders, powder discharge, bullets, and more recently cartridges.

Fourth, there were and are guns designed to fit and be used by individuals of particular physiques.

Fifth, there were and are guns designed to be fired from various positions, with shooter on his back, conventional prone, off-hand, kneeling, sitting, and benchrest.

All of these categories, and I might say there are others, have been and still are common factors over the centuries in the building of fine target guns.

The previous have been and still are considerations for the gunsmith who was and is providing the special weapon used by competitors.

One might consider the usual target gun as a hybrid, the designer usually taking the best aspects of long range, short range, military, and benchrest arms and then compromising to produce an article that would win matches for the rifleman.

To further delve into the matter of the target rifle, and from a different aspect, one should investigate and discuss the various parts of the rifle and their individual importance to the final product — accuracy.

Ignition systems are important to a minor degree in my opinion. This component from flintlock to priming device has been of lesser importance, and from the point of view of accuracy not an unsolvable challenge for the ammunition manufacturer from black powder and cordite through smokeless powder.

Gun actions have to my mind been in the same category, that is, not a major problem when dealing with accuracy. There have been changes, of course, and for the better. However, in examining the great steps forward, and there haven't been many, towards the ultimate in accuracy, actions were not a major factor.

The stocking of the rifle is probably more important in modern times and a greater determinant in the final accuracy than it has been in target rifles of the past. It is a well-accepted principle that with modern guns proper bedding of the metal parts in the wood is essential. The finest metal work will fail without fine inletting in stable wood. I would surmise that some of the old guns would have been more accurate at the target with a different stock. However, here again it is difficult to estimate the possible improvement. I would suggest finally that here again we are considering a particular that is not of overwhelming importance in final accuracy.

I will pass over the matter of sighting equipment and triggering devices by simply expressing the thought that both are of minor importance in the development of the super accurate target rifle.

JOHN WARREN HEAVY BENCHREST RIFLE, 219 WASP, WEBER ACTION, HART BARREL.

JOHN WARREN HEAVY VARMENT CLASS SAKO ACTION, HART BARREL.

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The next component that might logically be considered in this discussion is the projectile or bullet. I believe we are now considering one of the more important factors in the accuracy picture.

Historically, an improvement in the bullet shape, size, composition, and methods of loading and lubricating has resulted in an overall improvement in the delivery of the bullet to the target. These changes, and they have occurred at various times, have changed accuracy standards much more relatively than have priming systems, changes in powder manufacture and composition, or stock forms.

The literature seems to point out that following the round ball, about the year of 1835, some unknown rifleman designed the "picket" or "sugarloaf" bullet. The base of this conical bullet, it is of interest to note, is found in a number of shapes — round, boat tail, square, concave, and convex. The most important thing, however, to note here is that there was a noticeable improvement in accuracy standards when compared with the round ball. The range of accuracy increased markedly, and incidentally so did killing power.

This bullet was not without its faults, however, because of its short bore-bearing surface. It was almost impossible to consistently seat this bullet without tipping to some degree. This tipping resulted in loss of accuracy when the gun was fired because the axis of the bullet was simply not in line with the axis of the bore.

The necessary improvement was made by lengthening the cylindrical base. Accuracy took another step forward, for with this simple change and the use of the false muzzle and the bullet starter the resulting groups at the target became noticeably smaller.

The composite bullet, namely a soft lead base swaged to a hard lead-tin front section, improved the bullet a bit more. The old argument between various rifle-makers as to the best base shape continued. Convex, concave, boat tail or square was, and I might say still is, a matter of varying opinion by the experts.

There were some changes in bullet form occurring in foreign countries at approximately the same time. For example, in England in 1854, Sir Joseph Whitworth patented his hexagonal bore muzzle loader, together with his mechanically fitted bullet. This was hailed by the contemporary writers as "the perfect rifle bullet" and, in fact, it did result in greatly improved accuracy by English standards of the day. From a practical point of view, however, the expense of production, excessive fouling and excessive wear in the barrel soon spelled its death knell. However, major changes in accuracy standards have been chiefly American activities especially since 1840.

Over the years there were other changes in bullet design with, in some instances, minor improvement in accuracy.

It is my opinion, however, that two other incidents have occurred in bullet manufacture that resulted in real changes in precision shooting.

First, Harry Pope's two-diameter bullet that he refined from the multi-diameter bullet of George Schalck and then later the bullet-making dies of Ray Beihler and Walter Astles which when combined with excellent Sierra jackets helped to develop modern standards of accuracy.

Pope, coincidentally, with his barrels, did develop an excellent bullet design and made excellent moulds in which to cast them. His bullets, in fact, when cast in correct mixture and used in his guns established new record groups and established new standards of accuracy that lasted to modern times — to 1950 as a matter of fact. Pope, by the way, used a flat-based bullet.

It was in the 1950's and 1960's that Professor Ray Beihler and his assistant, Walter Astles of Rochester Institute of Technology, developed the idea of a Mr. Jonas Halgrimson of Iceland and Boston and produced the now famous "B & A" bullet making dies. Using these dies, the "expanding up" principle, and the fine copper jackets made by Sierra bullet company, jacketed bullets were made and used in target shooting with great success. B & A bullets were much closer to perfection than any others available in the country and probably in the world. These bullets were certainly very important in the smaller groups that appeared and the improved accuracy that occurred in the late "fifties." This improvement was actually one of the major changes in rifle accuracy during the past 135 years, and has continued at a lessened rate right up to the present.

I would point out that once again in 1971 there is much debate as to the correct bullet base, concave, convex, boat tail, or square. It is my opinion that they all shoot well if precisely made.

And further opinion, almost all of the new benchrest records in recent years have been established using B & A bullets usually made by the shooter or some friend of the shooter sufficiently fortunate to have a set of these dies.

Finally, let us examine rifle barrels and their relationship to the target rifle, in fact, to all rifle accuracy over the generations.

Target competition, one can assume, probably started in the 1700's in a formal way, with the establishment of the first (according to Greener) gun club in Geneva, Switzerland. I must say though, that I would suspect that target shooting started when the second gun was made, and the shooters decided to see which gun shot best. I won't argue this because my personal definition for this paper, target guns became important in the early and middle eighteen hundreds when experimenters improved on the round ball bullet.

It is my humble opinion that improved rifle barrels, plus and/or coincidentally with the development of an improved bullet, have occurred when great improvements in rifle accuracy have occurred.

There has been, historically, phenomenal progress in precision shooting, on amazingly few occasions over the years from 1835 to the present. I would submit to you that these outstanding developments have occurred about three times in 135 years, and that each step forward is the result of one or more barrel makers who were, in fact, geniuses of their day.

If one is fortunate enough to have an opportunity to inspect barrels with air gauge and bore scope and to shoot target rifles of various eras from good benchrests with chronographs, one arrives at certain conclusions. These conclusions appear to stand firmly under severe inspection when compared with existing accuracy records of the past and present.

Briefly, in England the Whitworth rifle combined with the Whitworth bullet established its superiority over previous guns. The Lee-Metford barrels and the Henry and the Rigby barrels also performed excellently. I have owned, inspected, and shot all of these guns. To my mind, excellent barrels in combination with the new bullets of the day were the basic reasons for their success in lowering group sizes to new standards.

In the United States the names of certain gun makers are clearly visible in the records of target competition from 1840 to the present. The names, William Billinghurst, Norman Brockway, Edwin Wesson, Horace Warner, George Ferris, H. V. Perry, and Morgan James, stand out. These men who made barrels and complete rifles were also in most cases skillful shooters and practiced their skills from about 1840 to 1890. Of these rifles, I have worked with a number with varying success at the target, my best results were obtained with a George Ferris and a Morgan James. The striking thing about these guns was the amazing evenness of the bores, and the fine finish therein. For the period Morgan James was outstanding and I believe it was his skill in barrel making that placed him at the top in accuracy. These men as a whole changed the standards and records in the shooting game markedly. The groups shot with their rifles were phenomenal, and new standards of accuracy for rifles were established that stood until the day of Pope and his contemporaries.

Prior to the appearance of Harry Pope on the scene, most target shooters used Maynard rifles made in Chicopee, Massachusetts, with fair success. One man of this time should be mentioned and that was George Schalck of Pottsville, Pennsylvania. Schalck was a superb craftsman and it was his influence on Pope that was important. It was the combination of the multi-dimension Schalck bullet refined by Pope to a two bearing-surface bullet and Pope's marvelous barrels that resulted in new records. It required several years of shooting before competitors accepted Pope's guns as the finest.

But, once this happened and the best shooters began to use Pope's rifles, group sizes started to shrink. And, of course, the Rowland target stood as the standard for accuracy until about 1950.

There were occasional groups fired that were better, but no one could or did lower the records of Pope guns consistently. Before I pass to the relatively modern records, I should state that Schoyen, Zischang, Peterson, and a few others also produced super accurate rifles during this period from 1890 to 1950, and basically it was because they produced smooth, uniform barrels and good bullets.

It was in the early 1950's that benchrest shooting was revived and organized in the United States. At first the one-inch group was the aim of the custom gunsmith-shooter members of the benchrest organization, but then another barrel maker appeared on the shooting scene — Clyde Hart of LaFayette, New York. Hart barrels combined with B & A bullets brought the accuracy picture to its present state — one-quarter inch group spread or less, center to center of the widest bullet holes in the target!

The truth is the benchrest shooters have in the past few years been playing with a one-hole group of one-tenth of an inch spread with five and ten shot targets.

And the simple answer to this one-hole accuracy is the Hart barrel in combination with the B & A bullet.

It has been my pleasure to know and to visit with Clyde Hart for a number of years. I have watched him make barrels and guns. I have shot Hart guns of all types from Heavy Benchrest to Sporter in a variety of calibers. I have never seen a Hart barrel or gun that did not meet the highest standards of accuracy.

The two factors that make a barrel superbly accurate are uniformity of bore and smoothness of bore. It's as simple as that.

The attaining of these two factors is the problem, and this is not a simple matter. That is why there has only been one Morgan James, one Harry Pope, and one Clyde Hart. There was one Leonardo da Vinci, there was one Rembrandt, one Utrillo.

Perhaps, we part company here in our thinking, but to me the beauty in a gun is in its performance at the target. Now, I wish to qualify this statement a bit. I like a beautiful piece of wood and a good finish and inletting job on a gun. I admire and puzzle over the principles of the mechanisms of guns; however, the gun is made to deliver a bullet to a certain point, and the more accurate the gun, the closer it comes to the exact point of aim, the closer it comes to fulfilling its purpose in life.

In making a barrel first is the selection of the metal, and this is today, and has been in the past as well, extremely important. The machining qualities must be weighed against the wear resistance and the stability of the metal and compromised.

Next, the barrel blank is carefully drilled. Following this, it is reamed to dimension and in the case of Hart his hand is on the reamer "feeling" it through the bore. It is important that no tool marks, gouges, sulphur inclusions, or defects remain in the barrel after this procedure. Hart rifle barrels are not cut, they are "buttoned," in other words, the rifling is ironed into the steel. This is followed by heat treatment to remove all stresses and strains in the steel. It is then "lapped."

The lapping or polishing of the bore brings it to its final size. I am sure that Pope, James and others that produced top-notch barrels lapped their barrels although they used other terms. Pope called it "emerying up." All of these craftsmen produced finished barrels that were extremely smooth.

It is interesting, and one might do some surmising I suppose, but when you look at barrels made by the old masters with a bore scope and compare them with a barrel by Hart, it is like looking at a plowed field and a well-tailored golf green. The difference is as distinct as night and day.

However, when one compares the factory rifle barrels of Pope's day and Pope barrels, the same relative difference can be seen. When one measures the various barrels with an air gauge, the same picture appears. The uniformity of the bore of the barrels of the master gunsmiths is clearly superior to any factory barrels or the barrels of guns made by less skilled barrel makers of the same period.

I could continue ad nauseam about barrels, but let this suffice.

I have attempted in this paper to present two basic thoughts.

First, the really great steps forward in rifle accuracy are amazingly few over a period of almost 150 years. There have been possibly three radical changes.

Second, these improvements in standards of accuracy are the result of changes in bullet design and bullet manufacture that were coincidental with the arrival on the barrel making scene of a genius. In the percussion era I would place the name of Morgan James before you as possibly the greatest. This statement is, I agree debatable.

With the era of the muzzle-breech loader, I would place Harry Pope as the man most influential in the attempt to reach the ultimate in accuracy.

And, in modern day it has been Clyde Hart barrels that have approached the group size of 0.000 — the true ultimate in rifle accuracy. This statement, I feel, is not debatable.