Dear Colleagues

**Converting a 2 MOA bullseye group into a V-bull or X-ring group**

***The Problem*:**fullbore shooters have for decades been accustomed to scoring a bullseye that measures about 2 MOA. Yet smallbore shooters have since the 1950s scored a group within 0.5 MOA. This latter group is today the objective of F Class fullbore shooters. However, confusion appears to exist for many TR and F Class shooters on how to convert a group on one side of the V-bull or X-ring into a group exactly in the centre.

As a result, in the 2020s shooters appear to be in need of a simple set of techniques which enable them to produce a small group in the centre of the X-ring or the V-bull.

***Discussion*:**  there are several techniques which must be used when reducing a 2 MOA group to 1 MOA (or 0.5 MOA):

*First techniques*

* preventing adrenaline tremors from causing movement of the muzzle at the moment when a projectile departs
* centralizing every shot not close to the centre of the X-ring or V-bull
* overcoming the effect of muscle tension in the supporting arm and shooting with it limp, letting the sling do all the work
* balancing the supporting arm and weight of the head and shoulders upon the elbow with the fulcrum located directly under the stock
* sling tension to avert arm muscles being used to support the rifle.

However, there are other techniques which need to be utilized at the same time (or not at all).

*Second techniques*

* loading hand applying tension uniformly for every shot: to the pistol grip via fingers that position the hand, via three large muscles of the palm, via placement of the thumb and via the index finger releasing the trigger at the first joint
* hand tension against the pistol grip for a RH shooter: if greater (then shots to right), if less (then shots to left)
* light refraction (bending of light rays down the range) changes visible target height
* tension due to cheek against the butt (if additional for a RH shooter; shots go to left)
* hand absorbing recoil at the sling swivel; if RH, diagonal shots high-left to low-right
* follow-through; occupy the mind for the full period of trigger release, e.g. with wind changes

***Practical*: m**ost shooters finally decide to take the plunge and reduce groups from 2 to 1 MOA. When they have gained greater skill, all experience difficulties due to the second techniques. It appears to many F Class shooters that they are unable to produce a 0.5 MOA group centred exactly within the X-ring. As a result it is common to find the majority of groups occur to one side of the X-ring..

It has been found that all techniques listed among the first and second groups, need to be implemented at the same time. That is, there is no progression from one technique to another. Each can do serious damage to a group so that it is difficult to identify which technique has done the most harm.. When more than one affects a shoot at the same time, a shooter may not understand what is happening. That is, he/she performs some techniques well, then finds that one only, e.g. absence of centralizing of a group or incorrect tensions applied by the loading hand, may result in complete devastation of the shoot.

Note that individual shooters may utilise these techniques with differences. As a result of distraction, the writer has never been able to count the seconds while delaying release of a shot. This has been due to a need to keep the mind focussed upon wind readings. When shooting at Stickledown Range, Bisley, where flag readings can be most important (while waiting for a partner to release his/her shot), it is often necessary to count 16 right, 18, 21, 25, 23, 21 MOA, then finally release at 19 MOA of wind. It was as a result, quite convenient to work slowly from the moment of trigger bite, allowing 4 to 6 seconds before release occurs.

Each of these techniques has been previously described in detail. Here, it is necessary only to indicate that a shooter, who is prepared to master the technique for centering a group, may find that a much smaller group results and it can be placed in the centre of the V-bull or the X-ring.

***Personal experience*:**  in a typical shoot, where the elevation and wind zero have been recorded from a previous shoot, it is usual for a shooter conscious of all these techniques, to commence with a shot near the V-bull or X-ring line. The first thing done is to note the exact flag position when release occurred. With one eye watching to see that the flags remain unchanged, the shooter alters ¼ MOA for a shot near the V-bull line or 1/8 for a shot near the X-ring line. If the next shot remains close to the first, then the shooter immediately moves again the same amount. There is no risk that this second move will overdo it, because this amount of movement is termed statistical. That is, it is based upon the probability that the group size is unknown but less than the distance across the V-bull or X-ring. Note that there are 4 such statistical moves for a projectile to finally reach the other side of the V-bull or X-ring. The shooter is dealing with a group and not a single shot measuring 7.62 mm diameter.

Perce Pavey considered that the hand on the pistol grip is the most sensitive. A slight change in comfort that increases tension between the right hand and the grip, will often send the next shot to 3 o’clock, right next to the edge of the bullseye. The shooter considers that he/she wants to continue releasing with this level of comfort, so the group is centred with a move of ¼ MOA to the left (there are 4 of these across the whole bullseye). Then on that day, it may happen that light refraction may cause the next shot to drop to 6 o’clock, just underneath the bullseye. The shooter immediately moves up 1!2 MOA and finds that the next shot is just within the bullseye line at 6 o’clock. Another immediate move of 1/2 MOA upward may be found to result in a shot low in the V-bull. So there really was light refraction present! A ¼ MOA move upward, may then result in a group within the V-bull measuring as small as 0.5 MOA. This F Class objective is well within the capability of TR shooters.

***Conclusions*:**  learner shooters who demonstrate they are able to group within the V-bull or X-ring appear to be few and far between. However, when asked to shoot with a coach who quickly adjusts the sight for every shot, surprise is often expressed when a personal best for V-bulls or Xs can be scored.

The differences between considering and forgetting the techniques listed here, can be dramatic. A shooter may produce a 0.5 or 1.0 MOA group within the centre of the target, which may far exceed scores of other shooters in a match. Otherwise, shooters feel themselves lucky to produce a group that fills the V-bull or 6-ring.

A shooter who finds he/she can produce a group the size of the X-ring, will soon have evidence for him/herself that this is reproducible.

Now have a better shoot

Geoff