

TECHNICAL INFORMATION ON NRA SHOOTING

By Mark Miller – Revision 1.2 – 27/9/2002

Preface

Although there are many books on the subject of shooting, I have not seen many that try to simply explain some of the aspects of shooting that we see in NRA shooting. This document tries to explain as many of those aspects that I could bring to mind.

This document is not meant to be a comprehensive guide to teach beginners how to shoot, the sport is far too complex to even begin to try to do that. An experienced shooter who acts as your personal trainer, one on one, is the best method to obtain comprehensive training. It is however designed to answer a lot of the questions that many shooters of all levels of competence ask, hopefully in an enlightening and easy to understand manner.

The following is only a guide based on my personal experience. What works for me may not be the best for you, but it will be a good starting point. Likewise a few points may be raised that experienced shooters may not really have thought about.

I have split this document into different sections to concentrate on just some of the many aspects associated with NRA shooting. Many of these sections will also be relevant to other shooting disciplines.

I hope that you find some enjoyment and maybe a few things of use in the following.

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1. ATTITUDE

Attitude is the first thing that will have the most affect on your shooting.

First you have to decide why you are shooting. In 99% of cases the person is shooting in order to enjoy themselves and the company of like-minded people. Try to remember this, do not worry what other people think or say, just enjoy yourself.

The first thing that usually goes wrong is people try too hard, put too much pressure on themselves and get up tight or tense. This is the first thing that needs to be overcome, relax and you will get better results which in turn means you will enjoy yourself even more.

2. SHOOTING EQUIPMENT

Many types and variations of shooting equipment exist. If they do not exist it usually means you simply have not found the person who makes or sells them.

2.1 Rifle

Many makes and models of rifles exist that are specifically designed for target shooting. As a general rule all hunting rifles and most varmint rifles simply do not make the grade. Some of these varmint rifles can however be tweaked to perform well in the free rifle or scope sighted class.

There are many second hand rifles available that perform well enough even for the most demanding shooter.

Get an experienced NRA shooter to check out any rifle before you buy it!

2.2 Sights

There are several different types and combinations of sights. Any of the common types are acceptable provided they are tight and have any backlash (slop) removed.

Several sighting systems are available. The peep front and rear sights are used for NRA style shooting and scopes for Free-rifle class. Leaf sights (a foresight and a 'V' half way up the rifle) are generally not suitable for NRA style shooting.

2.2.1 Peep sights

Peep sights use a combination of a rear sight close to the eye and a front sight (foresight) at the end of the barrel. The eye is lined up with the centre of the hole in the rear sight. The foresight is lined up with the centre of the rear sight. Then the target is lined up with the foresight and the shot is fired. To aid better sighting the hole sizes of the rear and front sights can be adjusted.

A six hole rear peep is sufficient for a start. Adjusting the hole size is done by sliding a disc or plate until a different hole clicks into place.

An iris rear peep is generally better than a six hole peep. An iris peep is adjusted by rotating a lever or ring until the desired hole size is obtained.

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Two main types of foresights are in common use. A standard fixed foresight is a tunnel mounted on a post at a fixed height. This requires the elevation to be adjusted at the rear sight by raising the rear sight for longer distances.

Ladder foresights have the tunnel mounted on a lockable, height adjustable bracket. This means that the major part of the elevation adjustment for different ranges is done at the foresight, with minor corrections at the rear sight. The advantage of this system is that the rear sight remains at the same height so the shooters head and body position remains the same at all ranges.

Both types of foresights take replaceable rings for foresight hole size adjustments. Also available are variable iris foresight elements, however these have a tendency to cause trouble after a couple of years use. This is because most iris foresight elements are designed for use with small calibre rifles rather than those with larger recoils.

2.2.2 Scope sights

Scope sights come in many forms. Most people find that a power of 14x to 16x is sufficient for target shooting. Powers above 20x can make sighting difficult when mirage (heat waves) is present on the range or off the barrel. The scope should have an objective lens of 40mm to 55mm and must have an adjustment for parallax.

2.3 Spotting scope

Any spotting scope that shows the image in the correct orientation will do. Scopes with larger objective lenses will usually show up mirage (heat waves) to aid wind picking better than those with smaller ones.

2.4 Shooting coat

The shooting coat is designed specifically to provide several functions. It reduces the apparent recoil by distributing it over a larger area on the shoulder. Pulses normally transmitted to the rifle via the sling are reduced by means of added padding. Elbow abrasion while lying supporting the rifle is eased via elbow padding. Correct body position is encouraged and supported through a properly designed and fitted coat.

2.5 Ground sheet

This can simply be a canvas sheet that keeps you off the wet ground, or that cow pat. It is important that the surface of the sheet is not slippery, a rubber mat helps in this matter but there is a maximum thickness specification. Specially designed groundsheets are available.

2.6 Hat

Wear a hat! No-one can see well with good contrast with the sun shining in their eyes. A simple cap is all that is needed. Top grade shooters use a cap with side flaps to eliminate distractions but they also make it harder to see changing winds and for others (e.g. Personal coach) to alter your sight setting.

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3. AMMUNITION

Most clubs have an ammunition officer who can supply preloaded ammunition or components for reloading to people with a firearm licence.

3.1 Preloaded

Hunting ammunition is not accurate enough for NRA distances. Some military ammunition is accurate enough but not as accurate as match ammunition. The rifle range you attend may be certified for the use of hollow tip match ammunition but not solid tip military ammunition. All preloaded military ammunition should be inspected and cleared for use by the range officer before being used.

3.2 Reloading

Match ammunition components can be obtained from several sources. Those bought from the NRA via your club are of the highest and most consistent quality found at very competitive prices.

Consistent and safe loads are essential. There is a vast knowledge base on reloading within rifle clubs. These club members will be only too happy to share their knowledge and help you set up your equipment.

4. POSITION

The complexities of the shooting position are too vast to explain without writing a book. Some points to keep in mind though follow.

The arm holding up the rifle should form a straight line from shoulder through the elbow to the wrist when viewed from above (see figure 4A). This means that the sling can do its job properly and hold up the rifle, not your muscles. Remember, relax, let the sling do the work.

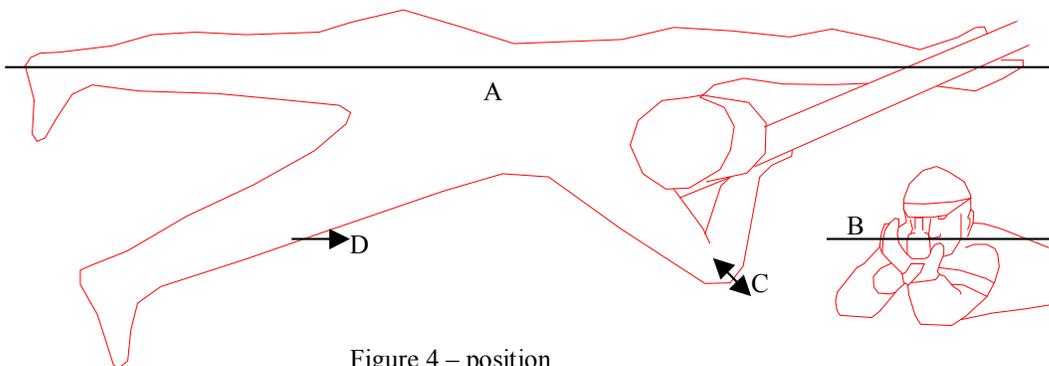


Figure 4 – position

Ensure the rifle sits over the supporting hands thumb and wrist, not in the palm of the hand. This means that the rifle will be supported by the bone structure of the wrist and not the flexible muscles associated with the hand. As a result the rifle will not twist or wobble as much. Lie down in position with the sling on and try the two hand positions with a friend trying to twist the rifle. See the difference for yourself.

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Adjust the sling properly. A quick way to check this is to push forward with the hand supporting the rifle then relax. If the rifle points low tighten the sling or if it points high loosen it. Then if the butt of the rifle is loose on the shoulder move the sling swivel forward. If the butt is so tight on your shoulder that it pushes it back, twisting your shoulders out of square, then move the sling swivel back (i.e. butt moves toward sling swivel).

It is important to have your shoulders flat and square (see figure 4B) as this reduces your ability to push the rifle forward with the shoulder causing a flinch. This can be aided by pushing the trigger arms elbow as far away as possible then drawing it back toward the rifle about 20mm (see figure 4C). If the sight hits you, it is probably because you have allowed your shoulders to go out of square and slid your head forward.

A straight line should be observed from the hand supporting the rifle through the elbow, the shoulder, the hip on the same side, the knee and ankle (see figure 4A). This means that the body will be supported on bone structure and the back will be straight for good posture. The other legs knee should be bent toward the rifle (see figure 4D) to a relaxed position to take weight off the stomach area. This will reduce heart pulse affects. Lifting the knee too high will cause twisting of the back, bad posture and may introduce pressure to the stomach.

An experienced position coach is of great assistance in setting up the correct position and is highly recommended. In the absence of a position coach, or as an aid in repeating the correct set-up, try the following. Get a video camera and plug it into the TV. Lie down in position aiming at the TV so that you can see the video cameras picture in the TV. Get a friend to move the camera to different positions around you so you can see how you are positioned and make the appropriate adjustments yourself.

5. SIGHTING

Sighting is the first technical aspect that needs to be understood. Everyone is different and what suits one person will not even come close for another. However there are a few simple guidelines which will help.

It is important to ensure that the head and eye are consistently in a position to align the foresight with the centre of the rear sight. The target is then aligned with the centre of the foresight. The correct combination of the following items will help to make this easier.

5.1 Rear peep

The size of the rear peeps hole depends on your eyesight and how far away from the rear peep your eye is. Two methods of adjusting the rear peep are generally used.

- a). Close the rear peep down until the target is sharp but starts to go grey then open it slightly.
- b). Close down the rear peep so that the sighting picture looks like an overcast day with a clear sharp target.

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5.2 Filters

Many people use filters in the rear peep. These can be used to increase contrast, make the sighting a more comfortable colour, reduce contrast, brightness and reflections. These filters have different effects in different conditions, some of which can be disastrous.

The only filter that I personally use is a smoke grey filter to reduce the brightness. If the filter becomes too dark the peep size can be enlarged to counteract the problem.

5.3 Foresight

There are two main sighting pictures in use with peep sights. The ideal sighting pictures for these are explained here. Sighting pictures outside of the sighting pictures explained here work for some people but generally give inconsistent results.

Aiming at the aiming mark. The most common method is to place a ring around the black aiming mark. The foresight ring should be of a size that leaves a band of white around the aiming mark. The width of this white band should be a third the width (fig 5.3A) to half the width (fig 5.3B) of the aiming mark.

Aiming at the whole target. This is the method that an increasing number of shooters are using. The foresight ring should be large enough to just cut the corners off the target (fig 5.3C) through to just being bigger than the target (fig 5.3D i.e. does not touch the target).

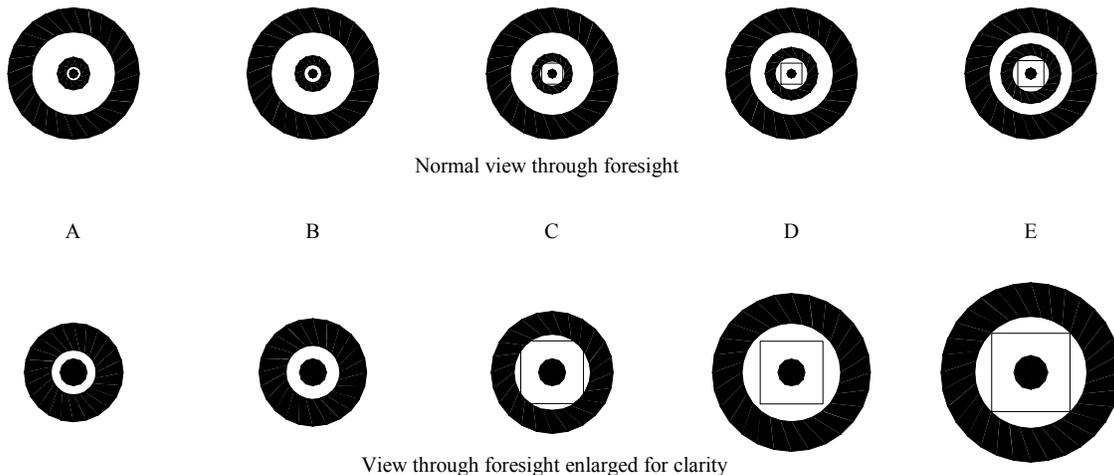


Figure 5.3

5.4 Eagle-eyes

Eagle-eyes are lenses that can be added to the foresight. This is especially useful for those with poor eyesight. They have the effect of increasing the visual size of the target (fig 5.3E). The foresight will usually have to be made about 1mm bigger making concentration on the sighting picture easier. Their drawback is that the target will go

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slightly blurry but this generally does not reduce performance while confidence in sighting is improved. A second draw back is their optics can change and make sighting impossible if they get wet. Use of a 0.3 dioptre for short ranges (300 to 600 yards) and 0.5 dioptre for longer ranges is recommended.

5.5 Corrective lenses

In shooting one of the most important things is to be able to see properly. This is not always as straight forward as it may seem. Seeing properly is not seeing everything clearly and sharp.

‘What is important’ is seeing the foresight sharp and clear. The target can actually be quite blurry and still not reduce the shooting accuracy, it just makes it really hard to decide to squeeze the trigger. A really sharp target and foresight is actually a little hard to look at. The high contrast makes it hard to make sure the ring and aiming mark are aligned properly. The best sighting picture is usually a sharp clear foresight with a clear but slightly soft edged aiming mark.

5.5.1 Lens in the rear sight.

A lens in the rear peep is one method of correcting eyesight problems. The dioptre correction (focal length) required for this lens will be different from that of your glasses correction due to the distance from the eye to the lens. The lens has the advantage that it is always square to the line of sight and you look through the centre of the lens. The disadvantage is that if it gets wet or fogs up, considerable effort and dexterity is required to clean it. Problem is that this happens mostly on still warm mornings when lying on damp ground, the most common time for best scores and important team shoots.

An additional problem for short sighted people is that the corrective lens stays in the sight. Seeing the flags for wind strength and direction becomes impossible.

5.5.2 Dioptre rear peep

A dioptre rear peep has a lens with a changeable focal length lens built into it. There are two big advantages to this lens. The focus can be adjusted for the best sighting picture at all ranges and it also acts as a weak telescope making sighting easier. The disadvantage is that it is hard to adjust correctly for best results. These devices are best left until a solid understanding and foundation of the other aspects of shooting have been achieved.

As the lens is still in the rear sight the additional problem for short sighted people still exists. Seeing the flags for wind strength and direction becomes impossible.

5.5.3 Glasses

Corrective glasses are the most common method of eye correction used. Glasses fog-up and get wet easier than a lens in the rear sight but are easier to clean. The prescription will be for seeing the foresight clearly (600mm) through to long distances. This may

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mean that a magnifying glass is required to read the setting of the sight due to it being so close to the shooters eye.

Standard glasses work well. The disadvantages are that they lay at an angle to the line of sight and this angle changes with position variations. The line of sight is through the corner of the lens rather than the optical centre.

Specialised shooting glasses (e.g. Nobloc). The focal length of these glasses may need adjusting to allow for the extra distance from the eye to the lens. The lens can be adjusted in angle to ensure it is square to the line of sight. The position of the lens can be moved to ensure the line of sight is through the optical centre of the lens. The main disadvantage of these glasses is they require the shooter to be further away from the sight so the glasses do not get hit with the recoil. They are also costly and so specialised they can only be used for shooting (and maybe snooker).

5.5.4 Contacts

Soft and disposable contacts are suitable for shooting. These can provide better vision than glasses and normal corrective prescriptions apply. Contacts do fog up and get wet but two blinks and they are back to normal. The disadvantages are that they can dry out and if too dry come loose or pop out. Some people can not wear contacts due to their prescription or due to allergies. Ask your optometrist for further details.

Hard contacts should not be used. This is because when you blink they rise up then slide back down the eye disturbing the sighting picture.

5.6 Canting

Canting is when the rifle, when viewed from behind, leans to the side instead of being vertical.

With no wind, when the rifle is held with the sight vertical the trajectory resulting is vertical. The projectile rises vertically as it travels down the range then falls vertically until it goes through the target.

When the rifle is canting with the sight leaning to the side, the trajectory is not vertical. Instead the barrel is now pointing at an angle upward and slightly to the side. As a result the trajectory is up and down but this time it also travels sideways. The bigger the cant or lean the more sideways movement there is.

At short distances this effect is minimal, however at long distances this effect can be more substantial. To make things worse this effect looks like the wind is altering the flight of the projectile. This means that you think you can not pick the wind when in fact a varying cant is the culprit.

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It is a good idea to keep the rifle vertical with no canting. There are a couple of ways to do this:

- When sighting, raise your head and compare the horizontal bar of the rear sight with the targets or horizon. Then when it is horizontal carefully lower your head back down to continue sighting and fire the shot.
- Some foresights or sighting elements have a horizontal bar. Compare this bar with the targets or horizon. When it is horizontal, continue sighting and fire the shot.
- Most modern foresights have a level built into them or can have one fitted. Check the level indicates you are not canting then continue sighting and fire the shot.

6. WIND

Understanding the way the wind affects the projectile and how much to allow for this is the hardest part of NRA shooting. If anyone tells you they have tamed it and know everything there is to know about wind, laugh in their face. After thirty years of experience I do not know of anyone who has tamed the wind, they only know how to avoid the worst of its affects.

Judging how much wind to allow is learned through experience and is dependent on distance, wind strength and wind direction. A good wind calculator is strongly recommended combined with advice from experienced shooters on what to keep an eye open for.

6.1 Flags

Flags are used to indicate the strength and direction of the wind.

Strength is indicated by how far the tip or angle of the flag lifts. Once the tip of the flag lifts to a certain point, the rate at which it flaps increases with stronger wind strengths.

Imagine the positions of the tip of a flag are represented by the fingers of your hand. Hold your hand out with the ring finger horizontal, the thumb pointing down and the fingers naturally splayed apart (gently but not forced). With the wind travelling directly across the path of the bullets flight (at 90 degrees, 3^oclock or 9^oclock) the finger positions can be associated with a wind strength (see figure 6.1). This wind strength is different for different distances.

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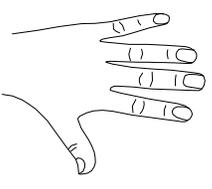
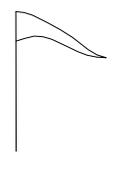
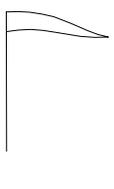
					
300 yards	1	1.5	2	3	4
500 yards	2	3	4	6	8
800 yards	4	6	8	12	16
1000 yards	6	9	12	18	24

Figure 6.1

At 500 yards the thumb position would be associated with two minutes of left wind allowance. This would get a very good hit on the target. Likewise the index finger would be three minutes of wind allowance. The middle finger four minutes of wind. The ring finger six minutes of wind and the little finger eight minutes of wind.

As a general rule the flag nearest the shooter has the greatest effect. The reason for this is the wind nearest the shooter starts the projectile moving sideways. Any wind after this has to first stop it moving then move it back. So the wind further down the range has to be going the opposite way twice as strong just to cancel out the wind nearest the shooter. See the section on affects of the surroundings for some exceptions.

6.2 Strength

Obviously the stronger the wind the more the projectile gets pushed around by it. Wind strength is measured in minutes of angle allowed on the sight. One minute of angle is about one inch on the target for every hundred yards the target is away from you (i.e. 1minute is 3" at 300 yards and 8" at 800 yards).

At 300 yards it is rare to get over 3 minutes of wind. In a wind of 5 minutes at 300 yards you will start finding it difficult to stand upright.

6.3 Distance

The longer the bullets flight, the longer the wind has to push on it. As a result more wind allowance is required at longer ranges. A wind that requires 3 minutes of allowance at 300 yards would require more than 15 minutes of allowance at 900 yards.

The wind allowance at 300 yards will be approximately half that of 500 yards. Likewise the wind allowance at 800 yards will be approximately twice that of 500 yards. At the extreme distance of 1000 yards the wind allowance will be approximately three times what you would allow at 500 yards.

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6.4 Direction

The flag always tries to point down wind. An obvious statement I know but as a result the direction of the flag can be used to determine the direction of the wind relative to the path of the projectile. Remember to assess the direction of the wind relative to the path of the projectile not relative to the direction that you are looking at the flag from.

Now to elaborate on the statement that the flag ‘tries’ to point down wind. Due to the weight of the flag and the manner in which it has to ripple to change direction, the flag takes time to align itself with the wind. In strong winds this happens almost instantly but in gentle winds this may take several seconds.

The wind direction has an affect on how much allowance has to be made. If the wind is moving directly across the path of the projectile from 3 o’clock (the right) or 9 o’clock (the left) this has the maximum affect. If the wind is coming from 6 o’clock (going in the same direction as the projectile) or coming from 12 o’clock (toward the shooter) the projectile will not be pushed sideways. Varying angles of wind will have affects in between these extremes.

A wind coming at the projectile from an angle of 30 degrees from across the flight path (2, 4, 8 or 10 o’clock) will be about 85% as strong as one going directly across the path of the projectile (i.e. $\cos(30^\circ)$). A wind coming at the projectile from 45 degrees (1:30, 4:30, 7:30 or 10:30) will be about 70% as strong as one going directly across the path of the projectile (i.e. $\cos(45^\circ)$). A wind coming at the projectile from 60 degrees (1, 5, 7 or 11 o’clock) will be about 50% as strong as one going directly across the path of the projectile (i.e. $\cos(60^\circ)$). This is fine if you are a mathematician who can do these calculations in your head. It is much easier to spend a couple of dollars and buy a wind calculator. These devices are easy to use and work. To use one you simply line the flag strength up with the angle the wind is coming from, and read off against the distance scale what wind is required.

To make matters more complicated a ‘strong wind’ going in the same direction as the projectile will reduce the wind resistance and cause the shot to go high. Also a ‘strong wind’ going in the opposite direction to the projectile will cause more wind resistance slowing it down faster and causing it to go low. This affect is usually only noticeable with strong winds that change direction from sideways to in line with the projectile or suddenly stop. If the wind is consistently in the same direction as the projectile it will hit consistently high or consistently low. Normally in light to moderate wind this effect can be ignored.

Additionally there is an effect due to the clockwise spin of the projectile. This will cause the projectile to climb if the wind comes from the right and drop if it comes from the left. This effect can normally be ignored as it takes a change in wind strength in excess of ten minutes of wind to have a noticeable affect. But remember a change in wind direction also has other affects mentioned elsewhere in this text.

Beginners should ignore the climbing and falling affect caused by the wind discussed above. However if you get a high or low shot this may be the cause, or maybe you just fired a bad shot.

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6.5 Mirage

This is the wiggly optical effect caused by heat waves. As mirage is as light as air it reacts quickly to changes in direction and strength of the wind usually before the flags react.

Mirage is at its most useful in light winds, below 3 minutes of allowance at mid ranges, 5 minutes at long ranges. This can be used to very good effect when it is hard to tell which way the wind is going by looking at the flags. It can also be used to check that a change observed on the flags has reached the flight path of the projectile.

When the wind comes from the left the top of the target appears to have small waves which run from the left to the right. Likewise if the wind comes from the right the waves will run from right to left. The flatter and faster the waves move the stronger the wind.

If there is no wind (i.e. zero wind allowance) the waves on the top of the target will appear to boil. Also waves usually appear on the sides of the target and go from the bottom to the top. As a general rule it is a bad idea to fire when the wind stops and the mirage boils. This is because the same optical effect, which makes the mirage boil and go up, will usually make the target appear higher than it really is. The result is that the shot will go high.

In order to see mirage focus your spotting scope short of the target. Mirage is picked up by the scope from a specific focal distance. Changing the focus of the scope can change this distance.

A word of warning. Mirage tends to come from closer to the target than the shooter. Also focusing the scope close to or past the target will tend to pick up the wrong area of mirage, sometimes making it appear to run the wrong way.

6.6 Changing winds

When the wind changes suddenly it pays to wait a short time, say 20 seconds. This is to allow the wind to have enough time to get across the range to where the projectile flight is. If the sights are adjusted and the shot is fired too quickly the observed change on the flags may not reached the projectile flight path before the shots fired. The result of this is that you will have prematurely wound yourself out.

When the wind starts to change direction it pays to stop and wait for the wind to settle. If the shot is fired before the wind settles it is likely that the wind will have changed strength or direction while you have been on aim. If you are forced to shoot in changing conditions, due to time restraints, it is important to fire quickly but accurately to reduce the amount the wind changes before the shot is released.

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6.7 Affects of the surroundings

The surroundings can have strong and unexpected but predictable effects on the flight of the projectile. This is because they have an affect on the wind and how it pushes the projectile around.

6.7.1 Hills

Hills tend to change the direction of the wind. This may mean the wind may be sweeping around a hill at a different angle to the flags as the wind hitting the flags is not affected by the hill. A strong wind that changes direction from going across the face of a hill to up the hill may push the projectile high. Likewise a strong wind that changes direction from going across the face of a hill to down the hill may push the projectile low. Obviously the converse applies if the wind was going up or down a hill and then changes direction. In addition a steep hill can act as a wind break with the wind being directed completely over the path of the projectile. This means the wind has no affect on the projectile in this area and the apparent wind allowance required will be reduced.

6.7.2 Trees

Groups of trees have a similar affect on the wind as hills. The affects on elevation are far less than those of hills and can generally be ignored. However trees make an effective wind brake. When the wind is coming from the other side of the trees the effect of the wind will be greatly reduced. When the wind is moving toward the trees it will be stalled by them, have to go around or over them, thus reducing the effect of the wind.

6.7.3 Light

Changing light can also have an affect. With some shooters a change in the brightness can affect the sighting picture and hence the point of aim. This is more apparent when using a blade foresight. This affect is due to light refracting or bending around the sharp edge of the foresight. With a blade foresight a brighter light causes the projectile to go low. An old saying to remember this is lights up sights up, light down sights down.

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7. SIGHT ADJUSTMENTS

Having gained an insight into the effects of various elements on the flight of the projectile, this section deals with adjusting the sights to counteract these effects. The important thing to remember is to maintain the same sight picture for every shot. Do not try to aim off for what ever reason as you will negate the adjustments that have been made.

Being able to read the adjustments made on the sights is also important. Often on tricky days where many wind changes are required it is easy to loose count of what the sight setting is.

7.1 Peep rear sight

Rear peep sights generally come in 2, 3 or 4 clicks to a minute of allowance. Two clicks to a minute is a half minute sight as one click is a half a minute. Likewise a 3 click sight gives 1/3 of a minute per click and a 4 click sight ¼ of a minute per click.

A 4 click or ¼ minute sight is only recommended for 300m shooting. This is because in NRA shooting winds can change vastly requiring large changes in allowance. These changes can happen very quickly. A ¼ minute sight makes it difficult to keep track of the amount of allowance being made by counting the clicks. In 300m shooting however, small adjustments are required to centralise the group in a very tight scoring area.

Although exceptions exist, the aiming point of a right handed rear sight on a NRA rifle adjusts as follows:

- To allow for a stronger wind from the right or to move the desired bullet strike to the right, rotate the wind knob so the top of the knob moves toward the target (i.e. clockwise when viewed from the right of the rifle).
- To allow for a stronger wind from the left or to move the desired bullet strike to the left, rotate the wind knob so the top of the knob moves toward the shooter (i.e. anti-clockwise when viewed from the right of the rifle).
- To allow for a wind from the right which is decreasing in strength, rotate the wind knob so the top of the knob moves toward the shooter (i.e. anti-clockwise when viewed from the right of the rifle).
- To allow for a wind from the left that is decreasing in strength, rotate the wind knob so the top of the knob moves toward the target (i.e. clockwise when viewed from the right of the rifle).
- To raise the desired bullet strike (i.e. move the group up the target), rotate the elevation knob clockwise when viewed from above.
- To lower the desired bullet strike (i.e. move the group down the target), rotate the elevation knob anti-clockwise when viewed from above.

The reading of the sights wind vernier scale requires practice (see figure 7.1). When the long centre lines are aligned the sight is on zero wind allowance. Adjusting the sight one minute of allowance to the right will cause the two lines to the right of the long centre lines to align. Likewise adjusting the sight another minute to the right (two minutes of allowance) will cause the two lines two to the right of the long centre lines to align. This continues until five minutes of wind allowance is wound on. With five minutes of allowance, the long centre line that is moving relative to the rifle will align with the line

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one to the right of the other centre line. Winding another minute on lines the next two lines to the right up, so this is read as the centre line is one mark to the right (five minutes) plus one division (one minute) which is a total of six minutes. This continues until the sight is ten minutes to the right, with the long centre line being two lines to the right (two times five plus zero). This process repeats every five minutes of allowance.

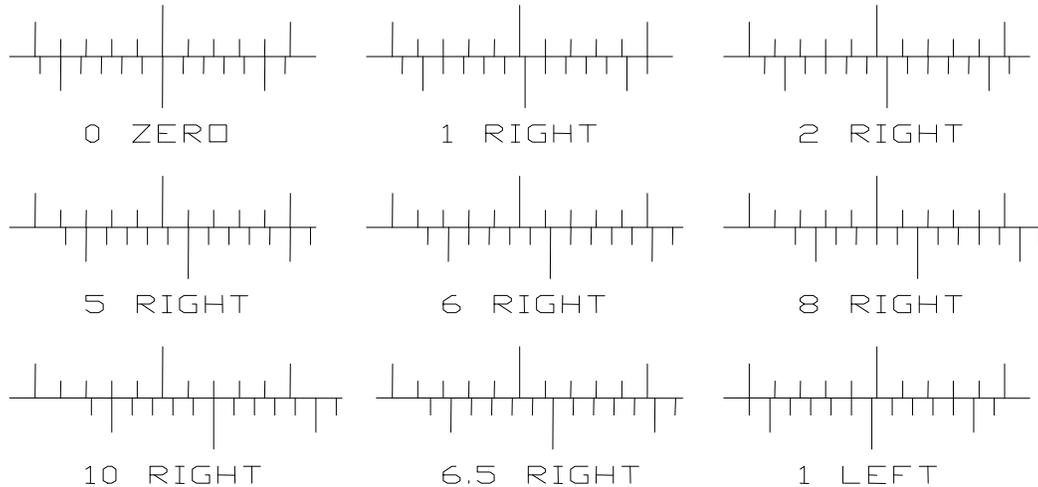


Figure 7.1

The process is the same when allowing left wind except that the centre line goes to the left and it is the first line to the left that lines up first.

7.2 Scope sight adjustment

Although there are exceptions, the aiming point of a scope sight is adjusted in the opposite manner to a rear peep sight (i.e. clockwise to go left and down).

An average target scope will have four clicks to a minute of allowance. Top grade scopes will have as many as eight clicks to a minute, which makes it difficult to keep track of the wind setting in strong or fast changing conditions.

Every minute graduation has a longer line and usually a number to indicate how many minutes from zero the knob has been turned. When the knob is turned backwards the graduations usually count backwards from a maximum value, so a little subtraction is required to determine the actual wind on the sight.

The greatest problem with scope elevation and wind setting is when the sight is set a whole revolution out. This usually results in a missed target and a confused shooter. This can only be combated by the shooter carefully zeroing the sight to the correct graduations before and after using the rifle.

Adjustment of the parallax is important on a scope. This adjustment makes the target and the cross-hairs come into focus together when the eye is focused on the target. If incorrectly adjusted the cross hairs may be out of focus and they may also move around on the target if the shooters' head is moved around.

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8. SUN

Several things should be considered when the sun comes out.

Firstly a good hat is important to keep the sun out of your eyes. This will also improve the sighting picture by reducing the light around the rear peep making it easier to see through.

Dehydration should be avoided. Initially even slight dehydration will reduce eye lubrication, concentration and energy to name just a few things. Drink plenty of fluids, even on average days. However avoid excess caffeine and sugar as these can make you hyper, stressed and tense. These all counteract relaxed and calm the best condition for ultimate performance. Alcohol should never be consumed while handling firearms.

Hot sunny days also contribute to heat waves (mirage) coming off the barrel. This is not where you want to see mirage as it disturbs the sighting picture. A mirage band can be used to reduce this effect. A mirage band is a black 50mm wide elastic or metallic strap running along the top of the barrel to divert the heat waves. The mirage band is only required in light winds and may flap in stronger winds.

9. RAIN

Rain generally has little effect on the flight of the projectile. Also the wind normally becomes lighter and more consistent when it rains.

Rain does however affect the sighting picture and may require the rear peep to be opened up to counter the loss of light.

If water gets under the action and into the bedding or on the ammunition, bad scores generally result. This is because the water reacts hydraulically to the recoiling motion of the action or cartridge. Higher pressures occur and the tuning of the rifle is upset. Good wet weather covers over the action of the rifle and ammunition are essential if it starts to rain. This can simply be a tea-towel draped over the rifle or even a specially made vinyl cover.

The greatest problem is the loss of concentration of the shooter. Get a good water cover, leggings and coat to make yourself as comfortable as possible. Then just grit your teeth and say, 'its only water,' forget about it, and get on with your shoot.

A good hat will aid in keeping water off the sight and glasses.

Most spotting scopes will need to be dried out to prevent them fogging up the next time they are used.

The rifle may also need to be disassembled and dried out to prevent rusting. Do not apply oil to the action where it comes in contact with the stock. This oil will act hydraulically on recoil and upset the natural vibrations of the rifle causing bad grouping. Additionally the oil may penetrate into the bedding of the stock making it almost impossible to remove and making a re-bedding job essential.

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10. IN SUMMARY

If any doubt exists about what is the best thing to do, **ASK!** You are not expected to know every thing and someone might even know a better way of doing it.

There are many aspects to learn, master, and try to control in NRA shooting. These can not all be learned over night. After twenty years you will still be learning new tricks and re-learning some you have forgotten. Give it time, be patient and remember the number one rule – relax, do not worry what other people think, **just enjoy the sport.**