

CHAPTER 9

TELESCOPIC SIGHTS

Ever since the gun was first developed back in the 12th Century, the shooting world has had its fair share of stories about the prowess of various marksmen.

Shooters, a bit like anglers, take great delight in telling people (usually other shooters) about how they once hit a target so far away and so small, and moving so fast, that it would seem that the feat was impossible.

Target shooters - and in particular smallbore target rifle shooters - tend to be a more modest bunch and are more likely to tell you about their mistakes rather than how brilliantly they've shot.

All that's about to change! This story concerns someone shooting at 50 metres when a fly decided to take an unhealthy interest in the targets while he was sighting in. It wandered about, occasionally disappearing when it went onto a black aiming mark, then reappearing somewhere else, totally oblivious to the 40 grains of lead bullet whistling past its head at over 600 miles per hour.

It seemed to have no inclination to depart and there was obviously no point in shouting at it, so the shooter decided to take a shot at it. With that, the fly was no longer visible, but it wasn't until the shooter walked down to collect his card that he could see parts of the fly sticking to the edge of the bullet hole.

How do you shoot a fly at 50 metres with one shot? With a telescopic sight, of course. However, this isn't the main reason for buying a telescopic sight and, in case you're wondering why shooters spend so much money on telescopic sights, the main reason is the considerable number of benefits which can be gained from using one.

Firstly, a telescopic sight can be used as an aid to training; it will tell you things about your shooting that you didn't know, or hadn't seen. You can actually see quite clearly if you have a tendency to snatch at the trigger, or tense your arm, or drift to one side or the other as you release your shot, and once you can identify a particular fault then you can concentrate on doing something about it.

Secondly, it's good fun. You can't use a telescopic sight for normal leagues or most open shoots, of course, but there are a number of 'any sights' competitions around where scopes may be used if wished.

If you speak to most people who shoot with a telescopic sight they will probably tell you that they do it because it's different and because, somehow, there's not the same amount of pressure as there is with normal league cards.

Of course, a competition card is still a competition card, but it's like a coarse angler going sea fishing, or a snooker player having a game of pool - it's the same sport but in another dimension, not too far removed from the main interest.

However, before going too deeply into the benefits of a telescopic sight, let's have a look at what they are and what features are needed to make the best use of one.

Firstly, as this is a target sport, there is a fairly rigid definition of what type of sights can be used, in order to make sure that no-one has an unfair advantage.

So, in normal competitions shot under NSRA rules, you'll find that you're allowed a lens of up to 1.5 times magnification in the back sight, and the rules changed in 2003 to permit a small amount of magnification in the foresight (currently 0.5x is the largest magnification available).

Most leagues, competitions, etc. in Great Britain are run under these rules (UIT rules are even more stringent when it comes to what type of sights you're allowed to use), but the NSRA does run an 'any sights' postal league, as well as individual competitions at the national meetings.

In addition, various regional organisations and open shoots often have leagues or competitions when telescopic sights may be used.

The terms 'any sights' means exactly what it says, so you can use your ordinary everyday sights, or you can clamp onto your rifle a great long tube containing optics good enough to enable you to shoot flies at 50 metres (N.B. this is *not* an official NSRA target!)

The normal magnification for a telescopic sight can range from 16x to 24x; there are bigger and there are smaller, but outside these limits you tend to run into other problems.



A typical receiver-mounted scope

Telescopic sights of the type normally used by smallbore target rifle shooters are more akin to the sort of sights used by the 'bench rest' riflemen, rather than the rabbit or deer shooters. That means they can be very powerful because smallbore shooters hold their rifles so steadily (!), whereas a vermin or game shooter is unlikely to use anything more powerful than 10x magnification, and a 'bench rest' shooter may go up to 36x or possibly even more.

The first thing you'll notice on looking through one of these high magnification scopes is how big the target is. If it magnifies 24 times, then it looks as though the target is only $1/24^{\text{th}}$ of the distance away, so at 50 metres it appears to be the size it would be if it was only approximately 2 metres away. Similarly, at 100 yards the target appears to be only 4 yards away, or thereabouts.

How could you possibly miss?

For those of you who can see your pulse beat through your normal aperture sights, the bad news is that *that* will be magnified 24 times as well, so what you originally thought was just a tremor now becomes an earthquake. This affects some people to such an extent that they are afraid to pull the trigger, because the crosshairs are bouncing around so much.

Don't worry about it, it's purely psychological; your pulse beat hasn't changed just because you've fitted different sights to your rifle (although there is a slight difference in weight, which I'll come to later). What you see is what you always shoot with, so there's no need to panic, just get on with it.

Before getting into how to shoot with a scope, let's have a quick look at the different types which are available - not a great selection, unfortunately, as they're all manufactured overseas, and there isn't a particularly large market for them.

Firstly, one of the most famous of the telescopic sights used around the ranges for .22 rimfire is the *Redfield 3200*. Your first impression may be that it's a very long scope and, at 23½ inches, you're not mistaken, but if you're going to mount it half way down your barrel (where the mounting blocks are) then it's going to have to be fairly long.



The old Redfield 3200 scope: barrel-mounted

Of course, that's not the reason for the length of the scope, it's more to do with concentrating light paths from the target to your eye, especially as you don't need a large field of view with a target scope.

The *Redfield 3200* has its adjusting knobs mounted towards the back of the scope, otherwise it could be awkward to reach them, and they are $\frac{1}{4}$ minute click adjustments, i.e. approximately $\frac{1}{4}$ inch per click at 100 yards. That actually is a little on the coarse side, but with a scope it doesn't matter too much as it's so easy to aim off to compensate for any slight 'out of zero'.

The scope weighs quite a bit - approximately 1 kilo - which obviously has some effect on barrel vibrations, but certainly in most cases that's not a detrimental effect, (it may even be beneficial, but that's another story to be discussed later).

If the thought of all that weight bouncing up and down on your barrel bothers you, then *Redfield* thoughtfully also developed a shorter version, which is designed to be mounted on the rifle's receiver. They called this one the *6400* and it's very similar to its longer brother, as you can see in the photo.



The old Redfield 6400 scope: receiver mounted

These two scopes typify the basic differences between most types of scopes. Other 'long' ones which you might see around are *Unertl*, *Lyman* and some of the earlier *Tasco* models, which are all designed to be mounted on the barrel. The shorter ones, like the *6400*, *Leupold*, *Weaver* and newer *Tasco World Class* models are made to go onto the receiver.

It would be impossible to cover all the scopes that there are around but basically, having decided on the length, then the other specifications are similar and mostly down to personal preference, or what you can actually find. Many of the American scopes are no longer available new, but they do occasionally come up secondhand.

The number of clicks to the minute tends to be 4 or 8 - the latter being preferable if available, but it's not that important, and the crosshairs have to be very fine so that they don't mask the target.

Some scopes are available with crosshairs and a small black dot at their intersection, which some people find easier to use. It appears, on looking through the scope, as if the dot floats in the middle of the image, and because it's thicker than the crosshair, it's easier to see, so the eye naturally focuses on it.

It's only a very small dot - approximately $1/8^{\text{th}}$ minute in diameter - i.e. about half the diameter of a .22 bullet hole at 100 yards, so it doesn't mask the target.

The magnification of most of these scopes falls in the range 16x to 24x, which is not to say that other sizes can't be used, it's just that generally something between 16x and 24x seems to work best. The lower magnifications appear steadier, but the target is smaller, so it's down to personal preference once again.

Your scope must have some form of adjustment on the objective bell to allow for parallax variations, and in case you're wondering what *they* are.....

The lens in the front of your eye ball is flexible and, by muscular power, you can change its shape to allow your eye to focus on things close to you, or at any distance out to infinity.

Objects close to you, i.e. a matter of inches away, require considerable change in lens shape to focus on them, but as they get further from the eye, the change in shape necessary to bring them into focus is considerably reduced. However, the change necessary to focus on something 100 yards away and then something 100 miles away (infinity) is slight.

The problem with lenses in telescopes is that they aren't flexible and they rely on the automatic focussing of the human eye to compensate for any small out-of-focus element.

The higher the magnification of the scope, the further away its minimum focussing distance is, i.e. most of the high-powered telescopic sights we are

talking about can't focus to less than 20 yards. In fact some may not make the 25-yard range, but as we don't do much 25-yard scope shooting, that's not too important.

Generally a scope without parallax adjustment doesn't always focus the image from the object lens exactly on the plane of the eyepiece lens, but it relies on the human eye to compensate.

With adjustment in the object lens, the image can be moved the small amount necessary to bring everything precisely into focus.



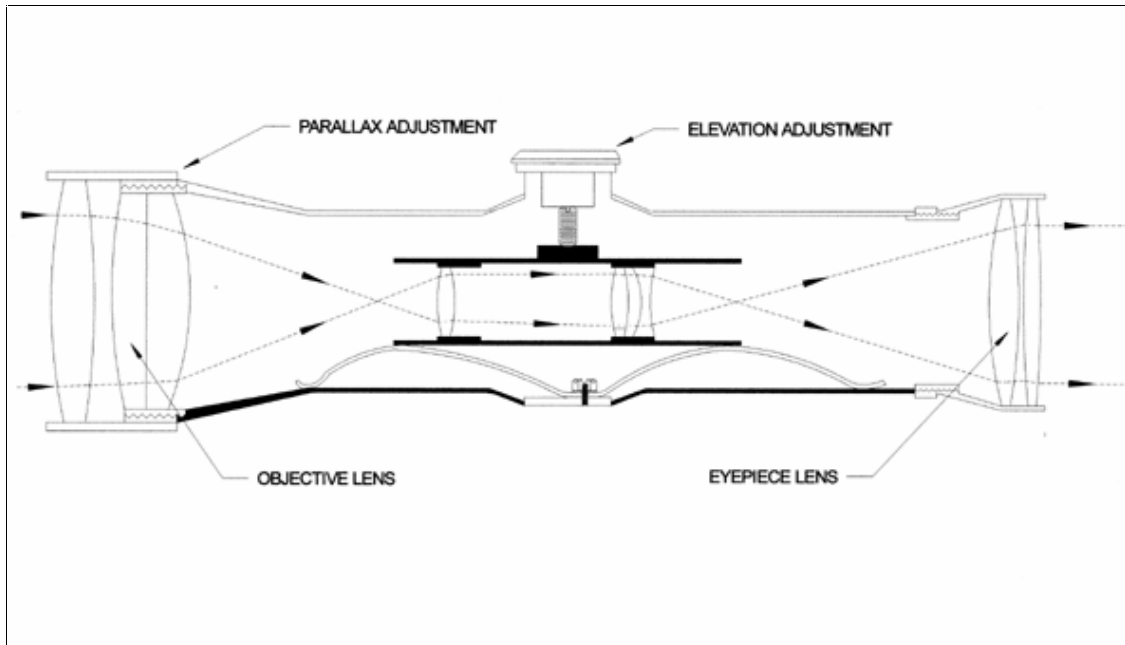
A variety of parallax adjustments

It is very critical that the crosshairs and the image of the target are on exactly the same plane within the scope, and the next part of this chapter deals with setting up the scope and shooting with it.

There's more to a telescopic sight than meets the eye!

If you've ever taken one apart - and this isn't to be undertaken lightly - you'll find that it isn't simply a matter of a bit of glass at the front end and a bit at the back, particularly in today's modern target scopes.

Looking at the sketch you'll see that there is indeed glass at the front and back, but this consists of groups of lenses, not all of which are the typical shape we associate with glass magnifying lenses.



The inside of a telescopic sight

The front objective group of lenses takes the light from the target, turns the image upside down, and focuses it on a group of lenses in the middle of the scope, which are housed in a moveable tube. These turn the images the right way up again before the light passes out through the eyepiece lens to the eye.

In high-powered target scopes the front objective lens needs to be adjustable to enable some very fine alterations to be made, to ensure that the crosshairs fixed inside the scope coincide exactly with the image, and are on the same plane. Scopes without that adjustment rely on the human eye compensating for anything which is slightly out of focus.

If the images of the target and the crosshairs are in different planes, a parallax error occurs, so that if you move your eye slightly, the crosshairs tend to move as well. (More of this later.)

The centre group of lenses is adjustable sideways and vertically to allow you elevation and windage movement. Most modern scopes are 'image moving' which means that when you wind up or down, you're actually moving this set of lenses, so that the crosshairs always remain fixed in the centre of the scope.

The eyepiece lens is also adjustable and usually has a locking ring at the front edge to ensure that it stays in place once you have 'tuned' it to suit your individual eyesight.

As you can see from the sketch, the light has lots of glass to travel through before it reaches your eye, and unfortunately this can lead to some of it being lost *en route*.

There will always be a reduction in light level as it passes from one medium to another, due to reflection at each surface, so manufacturers don't put any more lenses in their scopes than is absolutely necessary to do the job. They also go to enormous lengths to reduce the light loss as much as possible, by very carefully polishing the lenses and coating them with a non-reflective material.

Telescopic sights are also assembled under very strictly-controlled conditions to ensure that they remain fog-free in all temperatures. Scopes aren't intended to be taken apart by their owners, and I would recommend that you don't ever try unless you wish to destroy them forever.

Because they cannot be readily dismantled (which means that you can't get to the inside lenses to clean them) the manufacturers fill them with an inert gas (usually nitrogen) when they're assembled. The scope is then sealed so, no matter how much variation there is in the outside temperature, there's no moisture on the inside to condense on the lens where you can't get at it.

Most manufacturers test their scopes for gas leaks by the time-honoured method of chucking them in a bucket of water. The really top-class manufacturers actually create a vacuum above the water in a special tank, which encourages the nitrogen to try even harder to escape; no tell-tale bubbles in the water means that the scope won't leak gas out - or air in - and it also means, of course, that it's waterproof as well.

In some cases they even heat up the water, which causes the gas to expand and try even harder to escape; so, if you pay a lot of money for a scope, you really are getting your money's worth, and it's easy to see why expensive scopes are usually guaranteed for such a long time.

So, how do you set up a telescopic sight? It's not just a question of sticking it on the rifle and having a shoot - there are a number of things to get right before you can expect any sort of success.

The first and most important thing is how to mount it onto the rifle. If it's a long scope, it will need to be mounted onto the barrel; if it's a short one, it should go onto the receiver. It should *never* go half on the barrel and half on

the receiver as that will play havoc with the vibrations of a fully-floating target barrel.

The decision about exactly where it does go is dependent upon you and your position; what *is* critical is having the *correct* eye relief - here's one way of ensuring you get it right.

Get down on the firing point with your normal equipment, i.e. rifle with its iron sights in their normal place, and aim at a target. Now get someone to remove the sights without you moving your head any more than you can help, and substitute it with the scope, which your assistant should move backwards and forwards until you get the maximum amount of light through the eyepiece lens at the back.

This is the position in which your scope should be fixed, to ensure that you don't end up shooting with your head in a different position to normal.

The next problem is to find some mounts to fix the scope in the right place. If it's to be barrel-mounted, normal scope mounts attached to the mounting blocks on the barrel will suffice. If your barrel doesn't have such blocks, then it's a gunsmithing job to fix them, but it's well within the capabilities of a normal gunsmith, and your local gunshop should be able to help you there.

The receiver-mounted scopes are slightly more difficult to fix because their short length doesn't allow very much tolerance with backwards and forwards movement. Most target rifles, like the *Anschutz*, have a groove on the top of the receiver to accommodate their rearsights, and this same groove will accept most normal mounts.

If you don't have enough backwards or forwards movement with standard mounts, then look out for some offset ones. Having got your mounts onto the rifle, insert the scope, but before tightening down the clamping rings you'll need to twist the scope round to compensate for the cant you use.

Once again, lay in your normal shooting position with your levelling bubble in place, and ask your assistant to rotate the scope until the crosshairs are vertical; *now* you can tighten everything up. You may also have to make some adjustment to the cheekpiece on your stock if the scope is at a different height to your rearsight.

Putting the scope on and off the rifle is a simple matter of undoing the screws which clamp the mounts to the rifle and, if you make a small mark on the mounting blocks, you can ensure that the scope goes on in exactly the same place each time. You should then find that, as with your normal iron sights, there will be very little (if any) adjustment required to zero in, unless you're shooting at a different distance.

The next operation is to focus the eyepiece lens correctly. This can be done either on or off the rifle, and there are a couple of methods you can use.

The idea is to focus the lens on the crosshairs inside the scope; you may think that they *are* in focus, but it has to be done very precisely, and your eye is capable of making minute compensatory adjustments automatically, without you being aware of them.

Therefore, in order to be sure that you have the correct focus, look through the scope at something which is either totally out of focus, or something which is a long way away and has no form to which your eye will be attracted.

For example, you could use a plain white handkerchief draped over the front objective lens, or you could look at the sky, but whatever you use, your eye must not be capable of focussing on it. This way you'll know that when you look at the crosshairs, your eye isn't going to be distracted.

Now you have to make sure that you don't give your eye time to adjust its natural focus, so you must be quick.

At the first glance into the scope the crosshairs should be sharp and black; if they're not, your eye will re-focus within a second and the crosshairs will then *appear* to be in focus.

If you normally wear a shooting lens, you may continue to do so, or you may be able to adjust the scope to compensate for your eyesight, particularly if your only problem is lack of accommodation (see chapter 13 on eyesight).

Remember, though, if you suffer from a particular eye defect such as astigmatism, you may find that you see either the vertical or the horizontal crosshair more clearly than the other, in which case you should use your shooting lens as well.

If the crosshairs aren't sharp and in focus immediately, release the locking collar of the eyepiece lens and wind the lens in or out until they do become sharp at your first glance into the scope. Check this every so often during the season.

Don't think that because you set your scope up correctly 10 years ago, it will still be right now. Most people's eyes change over the years, so don't assume anything - your eyes will try to compensate for anything which is minutely out of focus, and that will make them tired, which will result in you struggling with your sight picture.

The next setting-up operation has to be done on the range, because you need some targets at 100 yards and 50 yards/metres. This adjustment will be made to the objective lens to remove any possibility of parallax error.

As mentioned earlier, the objective lens focuses the image inside the scope onto a group of lenses, which gives you the windage and elevation adjustments.

If the objective lens is not exactly in the right plane, that image could fall outside the lens and your eye would then accommodate that error, and re-focus accordingly. The problem then is that this doesn't coincide with your eye focussing on the crosshairs, and they go out of focus.

If you look at the target and it appears sharply in focus whereas the crosshairs don't, that's an indication that you need to adjust the objective lens. Most scopes have markings on the cases, but these are only a guide and aren't intended to be precise, so if you find that your scope reads '125 yards' when you're shooting at 100 yards, don't worry.

Remember to lock any locking rings securely; the main disasters can occur if you forget to lock the objective ring, or (even worse) forget to tighten the mounting clamps. It's better to check everything twice rather than shoot badly and then find that your scope falls off, just as you've finished.

To ensure that both the target and the crosshairs are in focus, they should both appear sharp and clear, but if you move your eye slightly to one side, each crosshair should stay exactly where it was; if one moves, then the image and crosshairs are not in the same plane and further adjustment is necessary, no matter how small.

If you've set the scope up properly as described, you'll *know* that the crosshairs are in focus even if they don't appear to be; generally the target will be in focus because your eye is drawn to the larger, more easily seen, object, rather than the fine crosshairs, and it's compensating for the error.

Now you have the scope all set up and clamped to your rifle and you're ready to rush down to the range and amaze yourself (and your friends) at your ability to shoot flies at 50 metres.

But just before you go, there is one other small job to do that may make life easier when you get on the range.

Set up the rifle on a table or similar, and remove the bolt or action so that you can see down the bore. Put the scope on and set the windage at about mid-range in its adjustment.

Now look down the inside of the barrel from behind the butt and line up the bore with something a long way away, but with a pronounced vertical edge (like the corner of a house somewhere down your road).

By alternating your eye between the bore and the scope you should be able to see that the crosshairs are aligned with the same object as the bore. This is called 'bore sighting' and is a quick and easy method of checking the alignment of the scope.

If the mounts are wildly out, for example, you should be able to see that, and possibly do something about it before you get down on the range.

If things line up OK, your first few shots will at least go on the target and it shouldn't be too much of a problem to zero in.

If things are not OK and you find that the bore is lined up with one house and the scope is with the one next door, further investigations will be necessary. Of course, there are adjustments on the scope, but they're intended to move a shot a matter of inches, not house-to-house distances.

The first things to suspect are the mounts. Have you got them both on the same way round? That sounds obvious, but it's amazing how many people can make such a simple mistake; they should also be a matching pair - don't ever use odd ones.

The next thing to try is turning the mounts around the other way - take them off the scope and clamp them on the other way round, i.e. so that the base clamping screws are on the other side.

If that doesn't work then, despite earlier comments, you'll have to try turning just one mount round. By this time you should be getting a feel for which way you need the scope to go to line up with the bore.

If none of the above works, then you're going to have to take a file to the dovetail on the underside of the mount, which is usually made of aluminium and therefore is relatively easy to modify. File out one side of the mount so that it moves over when clamped to the rifle.

If none of the above works, i.e. you still can't line up the scope on the same house as the bore, *now* is the time to visit a gunsmith and ask for help; either buy a new set of mounts or ask him to fix the existing ones.

If he can't sort the problem out, you may have ended up with a bent scope, and that's not a joke, but it does happen.

Now you're ready to start shooting, so choose your favourite ammo, pick a fairly still day and go out there and kill flies.

The first thing you'll notice when you get down on the mat is that your rifle is a lot heavier; you may need to make some small adjustment to your sling to help with the extra weight, but only do that if absolutely necessary, because it's much better to leave everything exactly as it is if you can.

Set up a card at 50 metres/yards. Whether you use your spotting scope as well is very much a personal preference - it's not necessary as you should be able to spot the shots accurately through your telescopic sight, but some people like to use their spotting scope to blank out their non-shooting eye.

A quick word here about shooting lenses: if you use a shooting lens you may need to continue to do so, but it's also possible that you can focus the scope without it, in which case the choice is yours.

Of course, if you have an eyesight error such as astigmatism then you'll still need to use your lens; if you don't normally use a lens and you find that one crosshair is much thicker or clearer than the other when you look through the scope, go and see an optician as you may be suffering from astigmatism.

Now you're laying on the mat with your rifle sitting comfortably in your shoulder all ready to start shooting; you open your eyes, look through the scope and - horror of horrors - the crosshairs are bouncing about all over the place.

Don't panic, this is quite normal; what you're seeing is the effect of your pulse beat magnified by the power of the scope. This pulse beat is always there when you shoot, but normally you can't see it, so what you now have to do is to accept it and shoot with it.

When you actually analyse how much the crosshairs move, it really isn't that much. With a 24x scope you should be able to hold it such that all the crosshairs do is just bounce around inside the bull. With smaller-power scopes everything will appear steadier and you may be able to hold to an apparently smaller deviation.

Zero in the scope by the method you usually use with your aperture sights, remembering that your scope may have coarser clicks, such as $\frac{1}{4}$ minute. After zeroing in at 50 metres and noting exactly where the parallax ring is, try the same thing at 100 yards.

Re-focus the parallax ring so that both the target and the crosshairs are sharply in focus and note the position of the ring so that you can return to it at any time. Now wind up. If your scope has $\frac{1}{4}$ -minute clicks, it will be about 20, if you have $\frac{1}{8}$ minute then obviously it will be about 40.

Now zero in. If you find that you don't have enough adjustment to reach 100 yards, don't worry, this isn't unusual and is caused by the fact that you've mounted the scope exactly parallel to the bore of the rifle.

If you've been reading the earlier chapters, you'll know that your rearsight is always mounted further above the bore than your foresight. This is because we always shoot with our barrels pointing upwards, as a .22 bullet starts to fall to earth immediately it exits the barrel under the influence of gravity; it wouldn't reach 100 yards from the prone position if the barrel was horizontal, because the bullet drops about 14 inches at 100 yards.

So what you have to do is elevate the rear of the tube by packing something underneath the scope where it fits into the cradle of the mount. To start with try a thickness of about 1mm - that will make a difference of about 10mm at 100 yards, so you can see that you don't need very much at all.

Now you can get down to business and find out what you can about your shooting.

Using a scope highlights bad trigger technique. You could find, for example, when you're concentrating on your trigger release, that the crosshairs start bouncing off into the nine ring (particularly in the 3 to 5 o'clock range) and then return to the bull once you've let the trigger go.

This can indicate that you're gripping the rifle too hard and squeezing with the rest of your fingers and palm of your hand, which in turn is putting pressure onto the rifle and forcing it off to one side.

Luckily with your scope you can actually see this happening. As an experiment, try taking your trigger hand off the rifle completely and squeeze the trigger with the minimum amount of contact; i.e. with your forefinger on the trigger and your thumb directly behind on the stock, gently squeeze the two together.

You may not like that as a technique, but it will show through the scope if you're influencing your shots with your shooting hand.

You may find that exerting more pressure with the shooting hand means that the crosshairs stay steadier in the bull; at least now you can see the effect.

It could be that you have a tendency to tense up your arm underneath the rifle, with a resultant rising of the shots on the target; that should also show up in the scope.

Or perhaps you tense your shoulder on the butt, or press down too much with your cheek; whatever you do, you can see some of these things happening with

your own eyes through the scope, as the crosshairs gently bounce their way out into the '8' ring, until you let go.

Try creating these errors on purpose to see what the effect is. It may not be very much but, on the other hand, it could explain some of those mysterious 'nines' which suddenly appear when everything seemed to be going all right.

You may find that you actually get two distinct groups, even when you're shooting very well; particularly at 100 yards you may find that you have 5 shots on one side of the carton and 5 on the other, or any combination.

This could be related to the shot release being on the top or the bottom of your pulse or heartbeat.

You know that your heart's a pump, which is pumping a liquid through your arteries and veins. This creates two distinct phases of the heart - the *diastolic* (when the chamber of the heart fills with blood) and the *systolic* (when it contracts and pumps the blood out into the arteries).

Really top-class shooters who shoot incredibly small groups have the ability to release the trigger on the same phase of their heart each time. Unfortunately they don't know how they do it and they can't do it at will - it's just something which comes naturally with experience and good trigger technique.

However, that technique can be learnt and practised with a scope sight.

This isn't to suggest that you should be trying to pull your trigger on a particular pulse beat just because you can see it. It's more that you lay there and bring your trigger to such a fine sense of balance that it seems to go off by some sort of natural release, without you consciously being aware of it until the shot has gone,

If your scores are *dramatically* better with a scope sight then it may be worth investigating why.

It could be because you can see much better, in which case it may be worth having your eyes checked. It may be because the rifle is heavier, so you could try adding some weights when shooting with your normal sights, but be careful where you put them because weights in the wrong place can have a disastrous effect on your shooting.

It's possible that your head is more upright because the scope is higher than your iron sights, in which case you could try some sight-raising blocks under your normal sights, or it may simply be that you're more relaxed about shooting 'any sights' competitions.

All of these things can be investigated, and the scope may help you discover something about your shooting that you didn't know.

Some scope shooters have got into the habit of adjusting their scope so that they can put the cross hairs onto another part of the target (such as the numbers) rather than the bull.

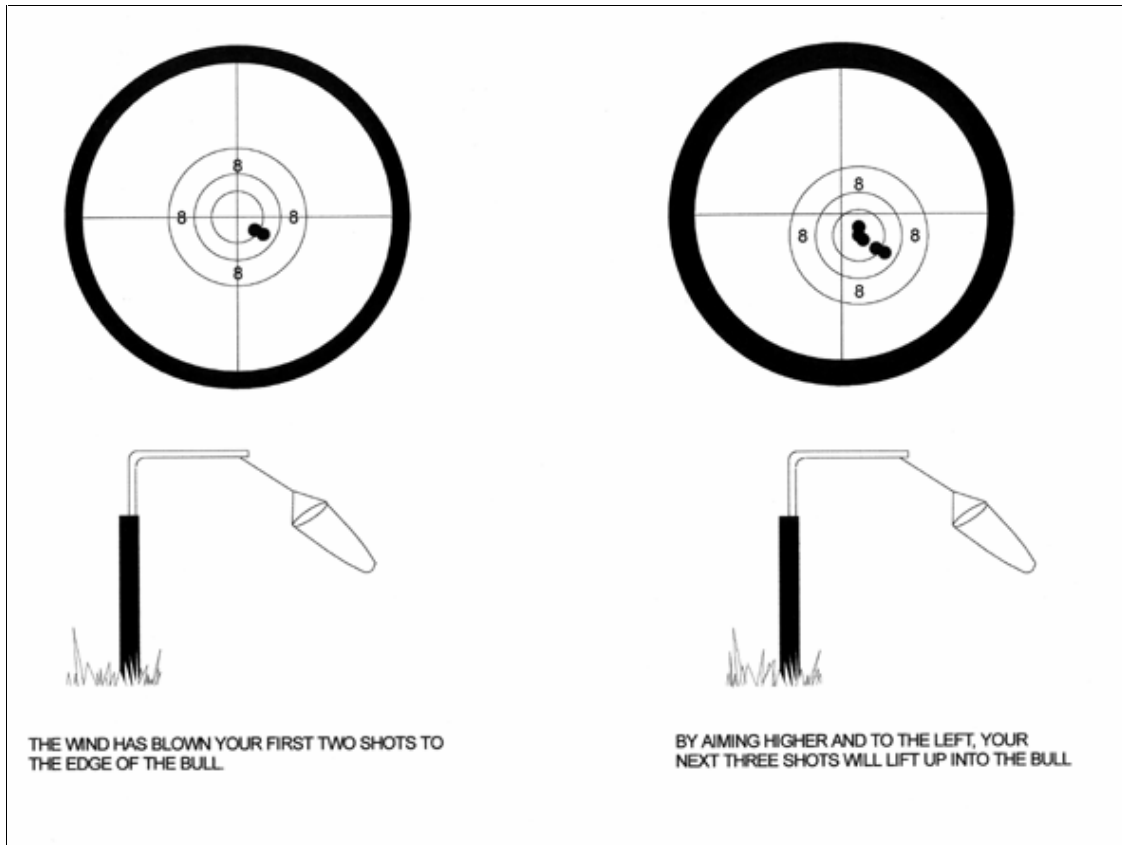
If you try that and you prefer that system, by all means go ahead and use it, but there *are* disadvantages.

The theory is that, if you're shooting at the bull and your groups starts to form off centre there will be a tendency for your eye - and consequently the cross hairs - to follow those shots and spread the group away from the bull.

Actually what happens is, when the group starts to form off centre, you automatically tend to aim towards the area where there aren't any shot holes because that's where you'd like the shots to go. So there's a sort of automatic self-cancelling effect that leads you back into the bull.

Secondly, it's much more difficult to measure the amount of aiming off required when your number is out in the wilds of the 6 or 7 ring, instead of having the width of the bull as a reference point.

If, for example, you've taken a central aim and your first shot is hanging on the edge of the bull a 4 o'clock when the wind is blowing left to right, then assuming the wind is the same when you're ready to take the next shot, all you have to do is put the crosshairs on the edge of the bull at 10 o'clock to ensure a carton bull.



Aiming off with a telescopic sight

Quite often scope shooting is about creeping about on the target, just easing the crosshairs across a little bit more and watching the group form just a little nearer the bull all the time.

It takes a brave man with a great deal of experience to be able to read the wind well enough to put the crosshairs in the 7 or 8 ring and confidently expect a bull, but it can be done and it does only take practice.

Lots of shooters in this country are using the wrong ammunition in their rifles. How to establish what is the right ammunition for your weapon will be the subject of a later chapter, but while on the subject of telescopic sights you will find that scope shooting is the best way of analysing which is the best ammo for your rifle.

All you need is a still day and a few batches of ammo, and you can soon sort out which shoots best through your barrel.

When using your scope for ammunition testing, use the back of a target, or a plain piece of paper so that you don't get tempted to shoot for anything else other than the smallest group.

You can make a reference point to give you something to aim at, but try using the first shot hole and aim at that - it doesn't matter where the rest go, as it's the group that you're after.

Fire a 10-shot group (or a 20, whichever you prefer) and then wind the sight 20 or so clicks one way or the other and use the same bullet hole as the aiming point. That way you can get several groups on the back of a 100-yard card. Don't select your ammunition on just one 10 shot group - it takes more than that to analyse the best.