



# NATIONAL RIFLE ASSOCIATION

# Probationary Training Manual

Updated and reprinted December 2024

Edition Three





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ASSOCIATION**

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## Revisions to Issue One

Date	Changes
March 2024	Minor spelling corrections, minor changes to text, graphics updates.
March 2024	Addition to Mod 3 Wind explanation
April 2024	Amendments to FAC application process
May 2024	Addition to PoM's - Breathing Control
May 2024	Addition of new Sections: Cannons, LPB & LBR.
May 2024	Range Officer Role added
June 2024	Addition of Recording and Reporting attendance
July 2024	Addition of the JustGo system reference material
July 2024	Removal of old training material references
July 2024	Edited new sign off process
August 2024	New SCC review
August 2024	How to use the JustGo system for booking firearms use
August 2024	NRA Shooting Club section added

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## Welcome

Welcome to Bisley. We hope that this is the start of many years of safe, successful, and happy shooting.

By joining the National Rifle Association you are becoming part of one of the world's oldest shooting organisations. Not only is the NRA the national governing body of target shooting sports in the UK, it is also the country's largest Home Office Approved Club.

One of the many privileges of full membership is that you will be able to shoot on our ranges without supervision. Depending on the type of shooting that you decide to do, you will be able to shoot at distances as short as 10 yards, or as great as 1200 yards. However, with privilege comes huge responsibility. Before we can grant membership, we must be absolutely certain that you are able to handle and use firearms to a high standard of safety. We will train you to the best of our ability although, ultimately, the responsibility is yours.

The number of incidents and accidents involving legally held firearms in the United Kingdom is incredibly low. Safety, however, is not something that can be taken for granted. It has to be worked at constantly. All shooters, even the most experienced, can fall victim to **complacency** unless they constantly monitor their behaviour and always follow the safety rules.

## Introduction to the NRA Probationary Course

To comply with current Home Office guidelines, probationary members must complete a course in the safe handling of firearms and shoot regularly under supervision before they can become full members of a Home Office Approved Club. The minimum time period for probationary membership at the NRA is three months.

The NRA probationary course not only involves training in the safe use and handling of various different types of firearm, but also in the legal aspects of firearms use and ownership. The course stresses the absolute necessity of maintaining a responsible attitude towards all aspects of firearms use, and does not shy away from describing what can happen if safe practices are not observed.

Students will be continuously assessed throughout the course and on the afternoon of day 4, will be required to pass a written exam (multiple choice) and an assessment in the handling and use of firearms. However, students will not be asked to undertake an assessment test until we are satisfied that they have gained sufficient confidence and skill. A probationer who fails an assessment must receive additional training before being re-tested.

### **NRA probationary training is not specific to any particular shooting discipline.**

Once full membership has been gained, further training is available to enable the new shooter to enter the world of competition shooting in whatever disciplines appeal to them (for more information, please see the Reference Section).

## About this Manual

This book does not pretend to be a stand-alone manual of all things to do with target shooting. It is an integral part of the NRA Probationary Course, and should be studied together with the NRA Handbook (the 'Bisley Bible') which will be issued at the start of Module 1. Most of the questions in the multiple-choice examination are derived from these two publications. It also functions as your personal record of training. Make sure that you remember to ask your instructor to sign off each section as you progress through the course.

Lastly...

If you see a **RED dashed line** down the side of a section (left), this indicates part of the Modular syllabus and you have to

read it first!

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# Record of Probationary Training

COURSE	DATE	INSTRUCTOR NAME AND SIGNATURE
Module 1		
Module 2		
Module 3		
Module 4		
Shooting Club	1 <sup>st</sup> Visit	
	2 <sup>nd</sup> Visit	
1 to 1's		
Comps		
Final Briefing Session		

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# Module 1

## Module 1 Overview

Module 1 of the Probationary Course is all about Safety, the basics of good handling skills and an introduction to the Principles of Marksmanship. You will be in the classroom for most of the morning and then it is all range work with the Instructor team.

### Firearms you will use

You will be using three firearms on this Module and they will be introduced to you in the classroom prior to getting on the range.

The first is a .22 LR Ruger 10/22 iron sighted semi-auto rifle.



The second is also in .22 LR and is a scoped Ruger bolt action rifle.



The third is the Marlin 1894C .357 Magnum lever action Rifle.



**For more detailed information about these firearms and others used throughout the course, please refer to the Firearms Reference Section at the back of this manual.**

## Bisley General Information

The Probationary Course is designed so that your tuition is constantly assessed and evaluated by the Instructor Team. They are there to help you through the course and always remember, there are **NO SILLY QUESTIONS** so please do not be reticent about asking. If you're thinking it, there's bound to be another student on the course who is thinking the same thing.

## The National Rifle Association

The **National Rifle Association (NRA)** is the National Governing Body (NGB) for full bore rifle and pistol shooting sports in the UK and is in fact also the largest Home Office Approved Club in the UK with numbers in excess of 10,000.

Registered as a United Kingdom charity, its objectives are to "***promote and encourage marksmanship throughout the King's dominions in the interest of defence and the permanence of the volunteer and auxiliary forces, naval, military and air.***"

The formal purposes of the charity are to promote the efficiency of the armed forces of the Crown, or the police, fire and rescue or ambulance services.

The National Shooting Centre at Bisley is a wholly-owned subsidiary of the association.

The NRA was founded in 1859, 12 years BEFORE its American namesake and was originally located on Wimbledon Common, running along Parkside.

In 1890, the NRA re-located to the current venue at Bisley and this is when Queen Victoria granted the NRA a royal charter of incorporation.

There are also a large number of affiliated clubs who also use the ranges at Bisley on a regular basis, and although they may not have been through the same Probationary Course as you are doing, the standards of training are just as high.

The NRA boasts a very well stocked Armoury so once you have completed your training with us and have been issued your Full Membership and Shooter Certification Card (SCC), you will be able to rent firearms and purchase ammunition for use on the ranges.

There are a large number of ranges located at Bisley, ranging from 25 to 1200 yards and you will be allowed unaccompanied, unsupervised use of them all.

## About the Course

The NRA Probationary Course was originally developed from a UK Police Firearms Course which used the FBI Training Course structure as its source. It is a tried and tested format using rapid progression in firearms usage that makes the Probationary Course a very successful one.

The course structure spans 6 days of training both in the classroom and on the ranges with regular passive assessments carried out on your growing knowledge to reinforce any shortfalls you may encounter.

The afternoon of the fourth day is an assessment day and the Instructors will be testing you on various handling, range protocols and safety factors. This is to ensure that when you first arrive as a shooter on a range, your fellow shooters feel assured that you are in all respects a competent and safe person with firearms.

Your Instructors will verbally test you at the end of each day to ensure the information taught so far has been absorbed and if necessary, will assist you to ensure you are ready to progress.

## About the Course (continued)

A word of caution though, if an Instructor doesn't feel you are ready to progress, they will first talk to you about repeating the particular day with the Lead Instructor/Chief Instructor or National Training Manager present for advice. Remember, it's not a "naughty step" it's so we are confident you can move forward comfortably and you don't get into the embarrassing situation of feeling lost in the next piece of training as it will have a cumulative effect.

Upon completion of the test and assessments on Day 4, you will be issued a restricted Shooters Certification Card (SCC) which will allow you to attend Bisley and hire firearms/purchase ammo to shoot but you must be accompanied by another person who holds a full SCC with the type of shooting you wish to do on their SCC.

Shooting Club Days are designed to prepare you for the next step which is "leaving the nest" so to speak and acquitting yourself safely on the ranges. You will be to all intents and purposes on your own but there will be a member of the Training Team on hand should you have any issues. You need to attend two separate Shooting Club days to get the signatures in your manual so don't forget to bring it on both occasions. You will need to independently hire a firearm from the NRA main Armoury but this process is detailed within this manual. You can also purchase ammunition from the Armoury at standard costs which are regularly maintained on the NRA website.

Upon successful completion of each Module and 2 visits with the Shooting Club, this book will be endorsed by the Instructor team so remember to bring it!

Each morning, you will be asked by the Lead Instructor for a verbal declaration. It covers:

- Any Ammunition?
- Anybody suffering from the effects of drink or drugs?

We require that you confirm with the Lead Instructor a negative in each case.

### Why?

#### Ammunition

There will be firearms in the classroom throughout the course and you will be instructed in their use, including handling skills, loading, unloading and making ready. You will be divided into small groups of up to 4 with an assigned Instructor. The firearms will all have been checked and examined by the Instructor first, which they will then ask you to verify.

Don't worry if you don't know what to look for as the Instructor will detail this inspection process for you during the demonstration.

There will NEVER be any ammunition in the training rooms though for one simple reason. It's **DANGEROUS!**

#### Drink/Drugs

You will agree that alcohol and firearms are literally a dangerous mix and we, as well as all other shooters, have a zero tolerance policy to it. In the future you might encounter someone who you suspect may be under the influence of either drink or drugs and you are duty bound to contact the Range Office as soon as you can so the duty staff member may then take action.

Illegal drugs have a similar effect too, and you should treat them in the same way.

#### But...



## About the Course (continued)

There are incidences when drink or drug use has been suspected in the past and the root cause has turned out to be a lack of taking the appropriate medication on the part of the person under suspicion.

An example would be a person with Type 1 Diabetes who has not had an Insulin shot and who subsequently exhibits all the hallmarks of being under the influence of something.

This example by no means affects all those with diabetes as there are many Insulin dependent people who do not exhibit these symptoms at all.

Hay fever sufferers require taking antihistamines to help alleviate their symptoms and sometimes it can make the sufferer appear drowsy.

Auto Brewery Syndrome is a classic issue as the sufferer smells of alcohol but has not been anywhere near drink of any kind.

Sometimes, a carefully chosen observation might be all that’s needed as a form of reminder.

In terms of distances you will shoot from throughout the course, here’s a breakdown of what you will be doing:

Day	Firearms used	Range (yards)
1	Ruger 10/22 .22 LR iron sighted rifle	25
	Marlin .357 Mag lever action rifle	25
	Ruger American .22 LR scoped bolt action rifle	25 & 50
2	Ruger American .22 LR scoped bolt action rifle	100
	Savage .308 scoped bolt action rifle	
3	AR15 5.56mm Straight-Pull rifle	300 (AM)
	Enfield .303 bolt action rifle	
	Savage .308 Vernier sight bolt action rifle	
	Savage .308 scoped bolt action rifle	600 (PM)
4	Savage .308 scoped bolt action rifle	1000 (AM)

As you can see, on Day 4 AM you will be shooting at 1000 yards. Many people will look at this distance and feel it is just a little too far for novice shooters. This statement couldn’t be further from the truth, as by Day 4 the abilities you will have learnt will ensure you are capable of successfully hitting the target with every shot. There is also an exceptionally high chance you will hit the centre of the target too. When you look at the 1000 yard target centre, it is only 14.4” across so when you hit it (what we call a “V-Bull”), congratulate yourself!

Being the culmination of your training at this distance, you will be able to assess the elevation you need to alter the sights. You will also be able to read and assess the wind and apply changes to the sights before settling the crosshairs on the target, firing, and 2 ½ seconds later, after travelling about 36 feet above the target at the highest point of its trajectory, record a hit on your target.

## About the Course (continued)

### Final Test

There's always a test...

The Probationary test is a 40 question multiple choice one. It is “**closed book**” meaning you should already be able to answer all the questions without help. The Instructors will talk you through this as you progress through the course but bear in mind there is a pass mark that has to be achieved. If for some reason you fail the test, the Lead Instructor or Chief Instructor will talk you through any remedial actions you are required to take in order to re-sit the test.

If you have dyslexia (or similar), please don't hide it but let an Instructor know and the team can take appropriate action to ensure you have a fighting chance with the test.

### A note on dyslexia, dyspraxia and dyscalculia

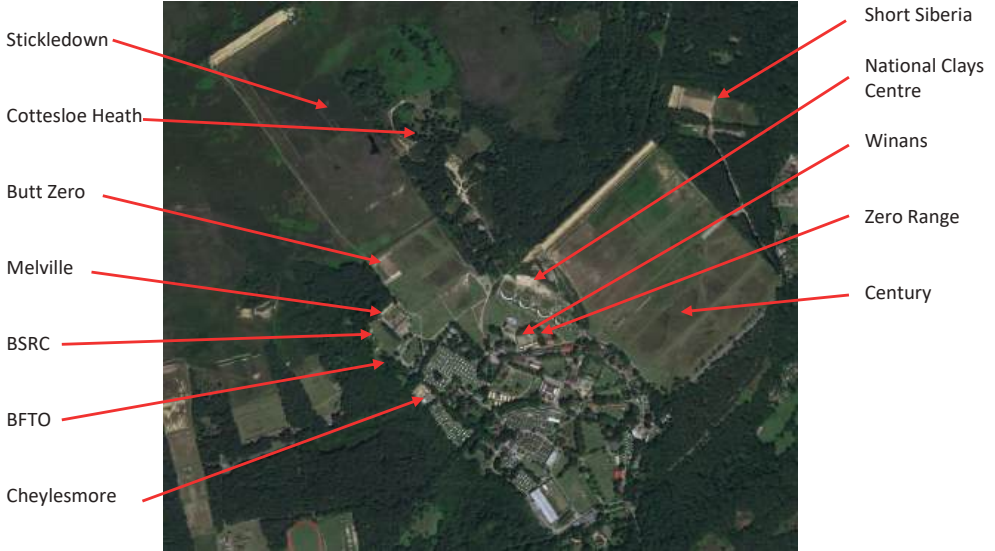
If you suffer from any of the above, **DON'T WORRY!** There's an exceptionally high chance that a good number of your fellow students have the condition too.

#### **AND...**

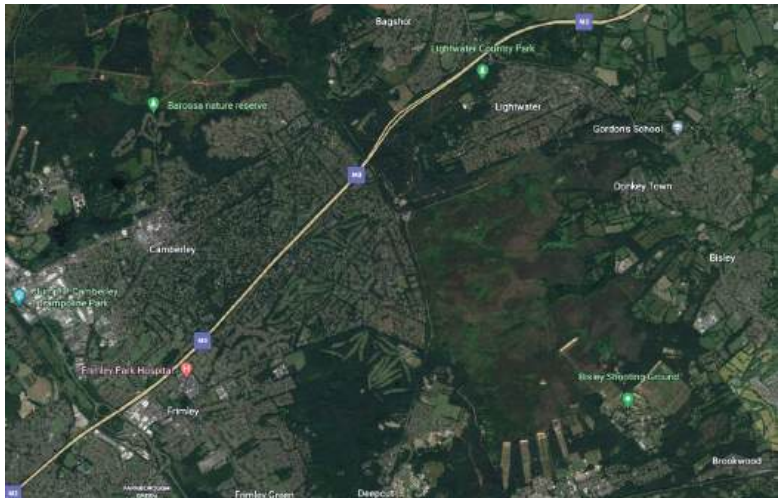
There are a number of Instructors you will meet on the course who have the same condition. Don't hide it but speak to an Instructor at a suitable moment so that the team are aware.

## Bisley Camp

The camp occupies approximately 3000 acres including the danger area.



This is a wider view of the camp location relative to the surrounding Surrey area. As you can see, we're not too far from habitation so it's important to always remember the **4 Safety Rules** that your Instructor will shortly be covering in the course



## Privileges and Responsibilities of NRA Membership

Once you pass the course including the 2 mandatory Shooting Club visits and final unrestricted SCC issue, you will be granted full membership of the National Rifle Association with the following membership features:

- Book ranges up to 1200 yards unsupervised and hire markers at Bisley
- You can hire firearms and purchase ammunition from the Armoury within the provisions of the Firearms Act. NB: Unless the ammunition sold is entered on your firearms certificate, it must be used on the day of purchase and must not be removed from Bisley
- All Full Members are entitled to register for the NRA Shooting Club (this will be automatically done for you upon completion of Day 4). Twice monthly shoots are planned covering all ranges and disciplines
- With this membership you will get comprehensive Insurance cover (see the NRA website for more up to date details)
- All Full Members are entitled to attend further training courses held at Bisley at discounted rates (this is also available to you upon completion of Day 4)
- You are entitled to compete in competitions held at Bisley, free of 'meeting membership' fees (this is also available to you upon completion of Day 4)
- The NRA Journal is published four times annually and is sent automatically to all members. It keeps you updated with news from Bisley and the shooting world

## Guest Days

If you have an acquaintance that wishes to also get into shooting, you can invite them to special days registered as "Guest Days". Your guest will have to submit what is known as a Declaration 21 which is a declaration from them that they are not a prohibited person in any way to be in contact with firearms. You can hire firearms from the NRA for this purpose if you do not possess firearms of your own.

What you cannot do though is invite a friend down to Bisley to "have a go". The last thing you want to do is get in trouble before you've even started your shooting career!

## Rules & Regulations

As you would imagine, shooting in the UK is very heavily regulated and as a result, we have to ensure that we are all abiding by those rules and regulations that govern the continued safety of our sport.

The Rules & Regulations are published by the National Shooting Centre which is responsible for the operation of all Bisley Ranges and governs the safe conduct of all shooting on those Ranges.

You will receive a pamphlet containing the latest Bisley Rules and Regulations upon your arrival on Day 1. They are also available from the following sources:

### Bisley Bible

This will have been handed to you as part of your Day 1 package. It contains all the rules and regulations relevant to Bisley at the front of the book. The main body is dedicated to the individual rules governing all the competitions shot at Bisley.

### NRA/NSC Website

Those same rules and regulations are also available for download on the NRA's website. They are in PDF format and are updated in some cases, several times a year. The address is:

<https://nationalshootingcentre.co.uk/range-regulations/>

### Range Office

They are also printed and pinned to the wall in the Bisley Range Office for you to look at.

It's a very good idea to acquaint yourself with the rules and regulations. There is nothing worse than starting your shooting career on a bad note. Many of them will probably not make much sense to begin with but as you progress through the course, they will become clear to you or will be explained.

Remember though, these rules & regulations also apply to everybody else (with the exception of HM Armed Forces & Government Agencies who have their own NSC approved procedures) on the ranges so if you see something being done that you feel uneasy about, report it to Range Control. It might be nothing, and there again...

## Attendance Recording

All Home Office Approved Clubs are required by law to record members shooting attendance –

The Firearms Amendment Act of 1988 – Section 15.

This information may be requested at any time by the relevant Firearms Licensing Authority to verify that a person is actually using firearms on a regular basis.

Failure by a club to properly maintain a log of its members shooting visits may affect its approval status

## NRA JustGo System

If you have joined the NRA, you will have received details of your login for the JustGo system. If not, your club will have some form of recording facility so speak to your Instructor and find out your club process.

## NRA Members

The JustGo system used by the NRA to record and maintain all the personal data for each member. It is an online resource which can be accessed by you to amend your personal details and record details of firearms owned or used by you. It also allows you to maintain a record of all your attendances at Bisley.

When training as a new shooter, the chances are pretty high that you won't in fact have a Firearm Certificate (FAC) so you can now log on to your JustGo account and record these times when you have used firearms at Bisley. The system is setup in such a way that firearms ownership is not a prerequisite of recording your shooting.

For example, let's say you are attending your first day of training. As you will have already found out, you will be using 3 types of firearm – a 22 Ruger semi auto, a Marlin 357 Mag and a Ruger bolt action. That's 3 entries right there.

First, you need to log on via the information sent to you by the NRA Membership Department.

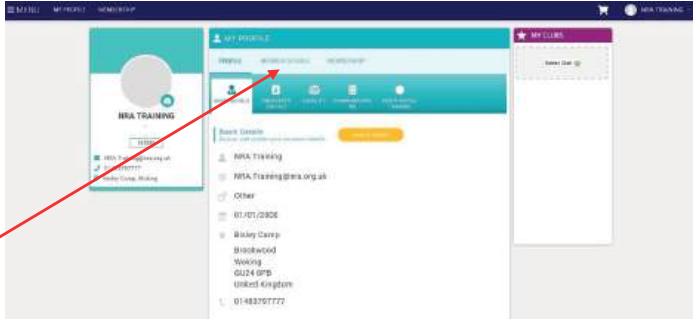
- If you have not received anything, yet, please get in touch with Membership by calling the NRA main number: 01483 797777 and selecting "Membership" from the list.

## NRA JustGo System

You can log in via the NRA website and will then see the following:

This is the main screen that has all your data at a glance. From here you can amend information like address, FAC status and emergency contacts, to name but a few.

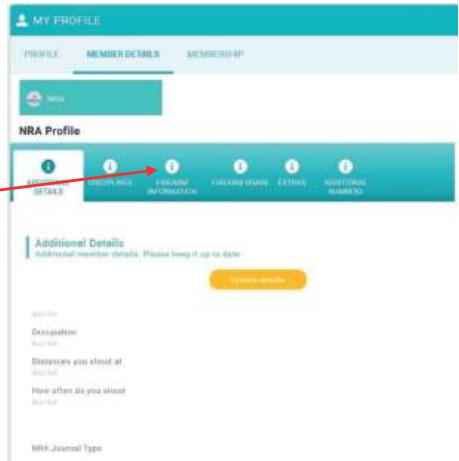
You can also add firearms by first clicking on the menu option MEMBER DETAILS, located at the top of the screen



Once you have clicked “MEMBER DETAILS”, you will see this next screen.

As you can see, there are a number of different sub menu options available to you. In order to record firearm usage you must first enter the firearm details.

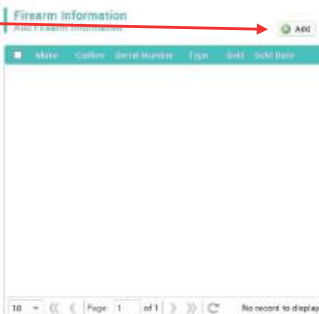
You accomplish this by selecting the “FIREARM INFORMATION” option



As you can see, there are no recorded firearms to pick from so you must now enter a list of firearms by manually adding them.



You do this by clicking on the “add” button to the right of the screen for each firearm you will use on the course.



### NRA JustGo System (continued)

A data entry box will pop up with the firearm information you need to key in.

**Make:** Type in Ruger, this will cover you for both the semi auto and the bolt actions

**Calibre:** In this case it's 22

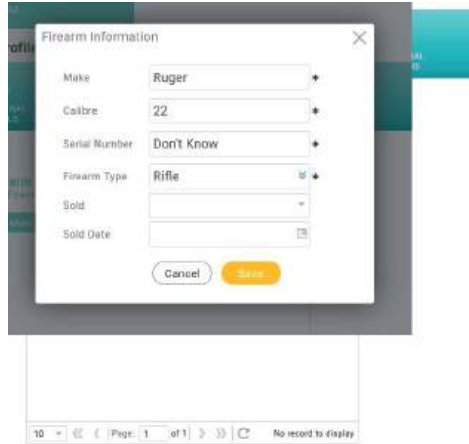
**Serial Number:** You will not know this information so enter "Unknown" in this box, as opposed to "Don't Know"

**Firearm Type:** This is a pull down and you want to select "Rifle" from the list

**Sold:** Leave blank

**Sold Date:** Also leave blank

When finished, click "Save"



Repeat for all the firearms you will be using throughout the Probationary Course.

The 5 generic firearms and calibres you will use on the course are:

Make	Calibre
Ruger	22
Marlin	357 Magnum
Savage	308 Win
AR15	5.56mm
Enfield	303

The Ruger entry can double for all 22LR shooting and the Savage entry can double for both iron and scope sighted rifles.

### NRA Profile



Once you have keyed in all the training firearms, you may record the times and dates you used them. To do this, select the "FIREARM USAGE" sub menu option from the "MEMBER DETAILS" menu. You can see it to the right of the "FIREARM INFORMATION" option above.

You can also follow this process to add any future used or owned firearms.



## NRA JustGo System (continued)

When you click on this menu option, you will see the data entry box pictured right.

The “Firearms Owned” data box is a pull down which contains all the firearms you previously entered. In our example, we are going to select “Ruger”

Once selected, the “Make”, “Calibre” & “Serial Number” boxes are automatically filled for you.

The “Date of Usage” box will revert to today’s date but you can edit if you are adding shots retrospectively.

“Where Shot” will default to “Bisley” so leave that as is.

The “Activity” box is a drop down and you need to select “Training” from the list

Once complete, click “Save” and your record will be recorded. If the date you entered is in the future, an error message will be displayed

As you can see, the process is relatively painless.

Once you gain an FAC, you should add newly purchased firearms to the system as soon as possible so you can record your continued shooting.

If you should encounter any issues regarding the JustGo system, please do not hesitate in contacting the Membership Department on 01483 797777.

### What does all this logging achieve?

The Firearms Enquiry Team in your county will always want to see clear evidence of your regular shooting. Without this evidence you run the risk of losing that firearm. It is also known as “use it or lose it”. This clear evidence, coupled with entries of ammunition purchases will satisfy the authorities that you are a legitimate shooter. Logging your attendances during training is perfectly valid and as mentioned previously, a legal requirement which will supplement your initial grant of a licence too.

The screenshot shows the 'Firearm Usage' form with the 'Firearms Owned' dropdown menu open. The menu lists the following options: Marlin (Calibre: 357 Mag) (S/N: Unknown), Enfield (Calibre: 303) (S/N: Unknown), AR (Calibre: 5.56mm) (S/N: Unknown), Savage (Calibre: 308) (S/N: Unknown), and Ruger (Calibre: 22) (S/N: Unknown). The 'Ruger' option is highlighted. Other fields on the form include 'Make', 'Calibre', 'Date of Usage', 'Where Shot', 'Activity', and 'Serial Number', each with an asterisk indicating a required field. There are 'Cancel' and 'Save' buttons at the bottom.

The screenshot shows the 'Firearm Usage' form with the 'Ruger' firearm selected. The 'Firearms Owned' dropdown now shows 'r (Calibre: 22) (S/N: Unknown)'. The other fields are filled: 'Make' is 'Ruger', 'Calibre' is '22', 'Date of Usage' is '01/01/2025', 'Where Shot' is 'Bisley', 'Activity' is 'Training', and 'Serial Number' is 'Unknown'. The 'Cancel' and 'Save' buttons are visible at the bottom.

## Section 2 – Safe Shooting System

This section is all about safety. Shooting in the UK is a sport just like any other and it is meant to be **fun**.

### But...

Due to the nature of the sport, we have to maintain our absolute maximum attention to safety and not let complacency creep in.

At the NRA, we abide by our Safe Shooting System and our 4 Safety Rules.

The Ministry of Defence requires all civilian organisations using military ranges to have an auditable system of training based on a specific risk assessment. In response, the NRA has developed a Safe Shooting System (SSS) which has been approved by the MoD, and was introduced in April 2008. Civilian shooters must also possess a current Shooter Certification Card (SCC) signed by their club chairman.

This system was implemented by the NRA in 2008 and based on the Army Safe System of Training. It is based on 4 elements below:

### Safe Person

A safe person is competent in the use of firearms and ammunition and demonstrates that capability at all times. The NRA Shooter Certification Card system is one example of an auditable record that the responsible officer of the club, normally the Chairman, has satisfied himself that, at the time of certification, the shooter has the ability to use firearms and ammunition safely. The NRA Probationary Course provides such training.

### Safe Equipment

The individual shooter is responsible for ensuring:

- that the chosen firearm is serviceable and properly maintained
- that the ammunition employed in combination with the firearm results in performance within muzzle velocity (MV) and muzzle energy (ME) restrictions for the range
- that the combination of firearm and ammunition is safe and suitable for the circumstances in which it is being used

### Safe Practice

Range Safety Officers (RSOs) and Range Conducting Officers (RCOs) are responsible for the safe running of ranges. Additional qualifications are required if pistols, moving targets, target shotguns, muzzle loading firearms, firearm/ammunition combinations developing a ME greater than 4500 Joules or event-specific courses of fire are being used. The NRA Rules of Shooting contain regulations detailing the conduct of shooting for each of its disciplines.

### Safe Place

A safe place is one in which the controls that are necessary to enable shooting to be conducted safely have been identified by a site specific risk assessment and implemented through Range Standing Orders (RSO). All ranges should have site specific Range Orders (RO) which must be complied with at all times. It is one of the responsibilities of the RCO/RSO to ensure compliance by shooters under his control. Ranges must be maintained regularly and subject to regular inspection.

Of these 4 elements, the most important and controlling factor is the **SAFE PERSON**.

The second set of safety rules are listed in the handout but we will list them again overleaf with an explanation. Your Instructors will also cover them in detail in the classroom.

## Section 2 – The 4 Safety Rules

Accompanying the NRA Safe Shooting System, we have 4 Safety Rules which, if you follow them, will endeavour to make your shooting now and in the future as safe as possible. Commit them to memory! They are:

1	<b>ALWAYS PROVE A FIREARM IS UNLOADED WHENEVER YOU PICK IT UP, OR HAND IT TO ANYONE, OR TAKE IT FROM ANYONE</b>	It is essential that the condition of a firearm (whether or not it is loaded) is known before being handled. <b>Always assume that a firearm is loaded until proved otherwise.</b> Unless the firearm is being fired on a range, it must never be loaded and must be seen to be unloaded and safe.
2	<b>ALWAYS POINT THE FIREARM AT YOUR TARGET</b>	<b>Directional control of a firearm is absolutely essential</b> , and the only direction acceptable is toward your target from the firing point designated. The design and construction of most outdoor ranges is such that <b>the ability of the range to contain bullets is determined by the fact that they must be fired in a specific direction from any particular firing point.</b> If they are fired at an angle of elevation or azimuth which exceeds these limits the bullet may well travel beyond the range boundary.
3	<b>NEVER PLACE YOUR FINGER ON THE TRIGGER UNTIL YOU ARE READY TO SHOOT</b>	This rule doesn't mean that the gun has to be carefully aimed at the target before the finger can be placed on the trigger, rather that the finger can be placed on the trigger when the firearm is in the shooting position pointing towards the target but before being carefully aimed.
4	<b>NEVER POINT A FIREARM AT ANYONE</b>	This means <b>NEVER</b> point a firearm at anybody as a result of horseplay, joking, lack of discipline or lack of thought. There are, of course, some perfectly legitimate exceptions, such as these: <ul style="list-style-type: none"> <li>• An instructor checking a student's eye alignment with the sights, under strictly controlled conditions</li> <li>• Visually checking the bore from the muzzle end for obstructions or condition, on firearms such as the Ruger 10/22, where it is not possible to look through the barrel from the receiver end</li> <li>• Using a pull-through to clean the barrel – the gun is pointing straight at your hand or head.</li> </ul>

They are known as “**The 4 Safety Rules**” and on Mod 1, your Instructors will go through them in more detail but as you can see, they're fairly self-evident.

One look at some of the horrors that abound on social media sites is clear evidence of shocking handling errors that would have been avoided if those persons had just abided by these 4 Safety Rules.

Abiding by the NRA Safe Shooting System and these 4 Safety rules should ensure your shooting career will be a long, safe and happy one.

## Section 2 – Muzzle Awareness

**Simply put, muzzle awareness is core to good firearms handling.** Poor muzzle awareness will always generate negative comments from other range users and if the situation appears to look threatening even by accident, it will almost certainly result in removal from the range and subsequent disciplinary action taken against the offender.

### What is muzzle awareness?

Muzzle awareness is always being aware of, and paying attention to, where the barrel is pointing when the firearm is either being handled or when it has been set aside. The end of the barrel (muzzle) should always be pointing in a **SAFE** direction, **ALWAYS**.

If a firearm is pointed at you, your natural reaction would be one of self-preservation and you will move out of the line the firearm is pointing. Nobody likes to be staring down the barrel of a firearm!

### Good Handling Skills

From the very start of the course, you will be instructed about muzzle awareness. If there is a malfunction with a firearm, for instance, we can become fixated with the area in question and take our eye off the overriding control factor which is where the firearm is pointing.

The 4 Safety Rules **ALL** relate to muzzle awareness, please refresh the rules in your mind again before moving on through the manual as we will refer to them throughout the course.

Imagine there is a taught, strong wire running down the barrel of the firearm you are handling and it is attached to the target you are firing at. It would be almost impossible to move the barrel direction away from the target. This would equate to superb muzzle awareness as the muzzle cannot point anywhere else but the target.

Unfortunately for all of us, we will be muzzle swept at some time in our shooting career. This is when somebody inadvertently points a firearm at us. Whatever the reason is, it equates to bad handling skills on the part of the person handling the firearm, and depending on the severity of the event, it will tell you a great deal about the person's level of expertise with firearms. This behaviour will almost certainly result in action being taken against the offender too, including dismissal from the NRA, its ranges and potentially notification and subsequent Police involvement.

The term "muzzle swept" basically means a person has accidentally or deliberately pointed a firearm at another person in the process of moving it from one position to another. If you are muzzle swept, a tactful word with the offender is usually all it needs to prevent further action, but if it happens again, please report it to the Range Office if at Bisley or if you are at another club, a word with whoever is running the range should suffice. What you don't want though is a return comment along the lines of "Oh, it's only old Joe, it probably isn't loaded...". A comment like that suggests the range is being thoroughly mismanaged and is in all likelihood a very unsafe place to be in.

Good handling skills are a bit like learning a new physical activity. You first have to walk your way through the whole process several times before muscle memory takes over and those handling skills become second nature.

When learning new handling skillsets, it's generally easier to break it down into bite sized portions.

For instance, when you are taken to the range, you will be asked by your Instructor to step up to the bench where the firearms are laid out. You will notice that the muzzles are all pointing towards the target – there's your introduction to muzzle awareness!

## Section 3 – Firearms:

### Introduction to firearms terminology

As you progress through each Module, you will be introduced to a list of shooting related terms. Some you may well have heard of before but some will be new to you. If during the course an Instructor uses a term you are not familiar with, ask for an explanation. There's nothing worse than nodding your head sagely when you have no comprehension of what's been talked about! Let's introduce a few firearms related terms for you that will come up during the first day:

22 LR, .357 Mag, .38 Spl	These are all the names of calibres of ammunition. Generally speaking, the number usually relates to the diameter of the bullet in either imperial or metric form.
Semi-Auto	Or semi-automatic is the description of how the action of the firearm operates. Semi-auto means that the firearm will fire every time you pull the trigger. The firearm will then eject the fired case, strip a fresh cartridge from the magazine and chamber it while re-cocking the hammer.
Lever Action	Unlike semi-auto, a lever action is entirely manual. To reload the firearm, you have to operate the lever all the way down to first eject the spent cartridge, then lift it back into position to chamber a fresh cartridge and re-cock the hammer. Once complete, you may fire again then repeat the process.
Bolt Action	The bolt has a handle and you lift the handle, draw the bolt to the rear. The spent cartridge is ejected. Push the bolt forward and it will strip a fresh cartridge from the magazine (if fitted) and chamber it. Lastly, you close the bolt by rotating the handle back to its closed position which locks the action, making the firearm ready to fire again.
Straight Pull	Similar to a bolt action firearm but instead, the bolt is assisted by a spring – usually housed within the receiver and/or butt stock. Pull the bolt to the rear as normal but instead of pushing it forward, let the spring complete the load sequence. Basically, pull the bolt back, the spent case will eject, then let it go. It will strip a fresh round from the magazine, chamber it and cock its mechanism, ready for you to fire again. If you ride the bolt forward, it will not fire.
Action or Receiver	Simply put, the <b>Action</b> is the firing assembly and usually contains the bolt, firing pin, hammer and trigger assembly. It is also referred to as the <b>Receiver</b> .
Barrel	The barrel stabilises the bullet and imparts a spin on the bullet to make it gyroscopically stable.
Muzzle	The end of the barrel that the bullet comes out of.
Chamber	This is located at the rear of the barrel and is where the cartridge is held in place
Butt or Butt stock	This is the part of the stock that locates in your shoulder. Make sure it is firmly in place but not overly hard. Your Instructor will tell you how & where it should be placed.
Forend	This is the front part of the firearm under the barrel and is where your other hand goes to support the firearm.
Trigger Guard	This is the protective loop around the trigger that prevents inadvertent touching of the trigger by clothing etc.
Trigger	This is the bit you pull in order to fire the rifle.
Bolt	The bolt usually contains the firing pin, extractor and ejector in some cases. Your Instructor will detail these items.
Bolt handle	On a bolt action rifle, the bolt handle is the curved piece of metal attached to the back of the bolt and is used to open (unlock) and close (lock) the action.
Guide rod	Similar to a bolt handle, the guide rod assembly is part of a semi auto system and unlike the bolt & handle on a bolt action rifle, it moves back and forward every time the firearm is discharged.
Magazine	A receptacle that contains a certain amount of ammunition.
Magazine release	This is a catch or lever that allows you to remove the magazine from the firearm
Safety Catch	Safety catches are often located close to the trigger and do exactly what you'd expect. Block the trigger from being pulled or get in the way of the hammer falling
Front & Rear Sight	Exactly as you'd imagine, open sights usually come in pairs. You align the rear sight with the front sight at the target.
Scope	A glass based optical system, usually with magnification
Reticle	The crosshairs inside the scope that you place on the target

## Section 3 – Firearms (continued):







### Normal Safety Procedures or NSPs

Before reading this section, refer to Safety Rule No 1. Which is:

**ALWAYS PROVE A FIREARM IS UNLOADED WHENEVER YOU PICK IT UP,  
OR HAND IT TO ANYONE, OR TAKE IT FROM ANYONE**

Normal Safety Procedures are a 3 fold checking process (after removing the magazine if fitted) that you want to repeat twice to absolutely, totally and utterly confirm to both yourself and others present that the firearm you are using **OR** are about to use is **SAFE!**

Let's break them down into the constituent parts using the Ruger 10/22 as an example. They apply equally if you're starting shooting as well as finishing.

1a	<b>REMOVE THE MAGAZINE...</b>		3	<b>INSPECT THE CHAMBER – CLEAR OF ANY CARTRIDGE?</b>	
1b	<b>...FROM THE MAGAZINE WELL</b>		4	<b>INSPECT THE MAGAZINE WELL – NOTHING PRESENT?</b>	
2	<b>LOCK BACK THE BOLT</b>		5	<b>INSPECT THE BOLT FACE – CLEAR OF ANY CARTRIDGE?</b>	
6	<b>Repeat steps 3,4 &amp; 5</b>				

Well done, you have completed those NSP's and vouched that the firearm is safe.

These checks apply to all styles of firearms you handle throughout your career and when carried out correctly will send a very clear message to other range users that you know what you're doing.

## Section 3 – Firearms (continued)

### Normal Safety Procedures or NSP’s

During the initial walk through, the Instructor will point out all the working parts and their methods of operation. They will explain how the mechanism operates and how to load and unload. They will also describe the NSP process which is also known as a “show clear”. The walk through will concentrate on the Ruger 10/22 .22LR semi-auto and the Marlin .357 Magnum Lever Action

### Your 1<sup>st</sup> Range Visit

This first range visit is purely to get used to firing real firearms (if you’ve not done so before) and you will not be asked to go through the NSP’s yet. That will come later. This session is not about who can drill the smallest group into a target but getting used to firearms and feeling comfortable.

Depending on conditions, you will be using the .22 LR from the Ruger and the .357 Marlin (see the next section on Ammunition).

At this stage, your Instructor will not be critical of how you shoot but obviously will stop you if there is a potentially dangerous situation brewing.

At this juncture, we will introduce a couple of what are known as range commands for you. There is a full section on Ranges as part of Day 3 though.

<b>STOP! STOP! STOP!</b>	A shouted command that means... <b>STOP!</b> If you hear it – <b>FREEZE</b> . The only thing the Instructor wants to see moving is your finger coming off the trigger – <b>DO NOTHING ELSE!</b>
<b>EYES &amp; EARS OR ADJUST YOUR MUFFS AND GLASSES</b>	Always ensure that prior to walking onto any range, you put your hearing protection on. On some ranges we also insist you wear protective eyewear. These items are issued to you as part of your Day 1 pack
<b>* MISFIRE</b>	A misfire is exactly as you would think, you pull the trigger and the firearm goes “click” instead of “BANG!” Misfires can occur with rimfire ammunition and the Instructor will tell you prior to your first range visit to just keep the firearm pointed downrange and they will sort out the issue for you
<b>LOAD</b>	Means insert a loaded magazine into the magazine well
<b>MAKE READY</b>	Point the firearm at the target and rack the action. The Instructor will do this for you at this stage but you will do it in the PM range session
<b>FIRE GO ON etc.</b>	Fire, couldn’t really mean anything else!
<b>UNLOAD</b>	Means do this in the following order: <ol style="list-style-type: none"> <li>1. Keep the firearm pointing at the target at all times!</li> <li>2. Remove the magazine</li> <li>3. Lock the bolt back</li> <li>4. Do your NSP’s (previous section)</li> <li>5. Show the firearm to the Instructor (remembering your muzzle awareness!)</li> </ol>
<b>BENCH FIREARM</b>	Exactly that, just lay the firearm down on the table with the muzzle pointing towards your target with the action open and facing upwards.

#### \* A quick note on Misfires

Modern ammunition tends not to suffer misfires as much as it did when quality control wasn’t as stringent 50 years ago but they still do happen and rimfire ammunition is susceptible because of the method employed during manufacture.

For a full description on the NRA Misfire Procedure, please refer to the relevant section in Day 2.

## Section 3 – Other Firearms used on the course

Here is a brief taster of the firearms you will be using throughout the 6 day course. For more in depth information on each firearm, please refer to the Section on Reference Material at the back of this Manual.

The Savage F12 is a single shot .308 calibre bolt action rifle equipped with a 5-25x50 telescopic sight.

You will be using this rifle on Day 2 at 100 yards, Day 3 at 600 yards and on Day 4 at 1000 yards.



This is the 5.56mm AR-15 straight pull rifle. You will also be using this firearm on Day 3.



This rifle is exactly the same as the Savage scoped rifle above except it is equipped with Vernier sights instead of a scope. You will be using this firearm on Day 3 at 300 yards



This is the Enfield .303 Bolt action Rifle. You will be using this firearm first on Day 3 at 300 yards





## Section 3 – Firearm Mechanics

### Rifling

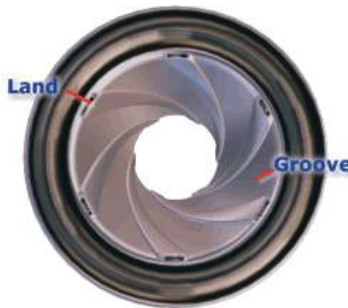
In order to successfully, consistently and accurately hit a target at longer ranges a firearm needs rifling, a smooth bore firearm like a shotgun does not have rifling as it would upset the guns ability to throw a shot pattern.

You need a barrel that has been machined with helical or spiral grooves running down the centre of the barrel from one end to the other. This is what is referred to as rifling.

#### Lands

These are the projecting parts of the barrel that engrave the bullet surface as it travels down the barrel, gaining speed as it does so.

The lands have to grip the bullet to impart the required spin rate so need to have relatively sharp edges



#### Grooves

As the name would suggest, grooves are machine cut into the barrel at equal distances within the barrel to ensure the lands have an adequate grip on the bullet in its travel down the bore

These spirals impart torque and spin on the bullet as it travels down the barrel. The amount of spin imparted is dictated by the tightness of those spirals in terms of complete revolutions per foot of barrel. This is known as the twist rate.

We will not get into the science of rifling here as it is a huge topic in its own right. Our advice would be to have a chat with an Instructor at an appropriate time during the course for more information.

A general rule of thumb with twist rate is the faster the twist, the heavier the bullet can be. An example would be a 5.56x45 AR15 with a twist rate of 1 in 7 that can effectively and accurately shoot a heavy for calibre bullet like an 85 grain bullet whereas a slower twist barrel in the same firearm, say 1 in 14, will only stabilise up to 50 or so grains in weight.

One thing to remember down the line when you are looking at purchasing a firearm is to thoroughly assess what you want to achieve prior to purchase, and one consideration is the available twist rates for the calibre you are looking at.

Like all things mechanical, rifling does wear with each successive round being fired down the barrel and eventually the barrel will need to be replaced once the innate accuracy of the rifle has deteriorated beyond what is required of it. It is very difficult to answer the question of how many rounds it will take to render a barrel inaccurate though, as not all calibres degrade a barrel the same way.

Some calibres are well known as “barrel burners” because of their muzzle velocity. Generally speaking, the higher the velocity, the faster the wear will occur.

The grooves that are cut in the barrel need to have a relatively sharp profile in order to firmly control and hold the bullet as it starts its acceleration down the barrel. The acceleration goes from 0 to about 2800 feet per second with the 308 Winchester (which you will fire on Day 2) in approximately the first 18 inches of barrel, that’s approximately 1900 MPH!

A .22 LR standard velocity bullet will reach approximately 1100 FPS which is still an impressive 750 MPH

## Section 3 – Firearm Mechanics (continued)

### Rifling (continued)

Fired bullets will all have markings cut into their driving areas (the contact point of the bullet to the barrel). Here is an example:



This bullet has not been fired as there is clearly no witness mark around major diameter

This one has been fired as you can clearly see the rifling grooves have been transferred to it.

With advances in the development of rifled barrels, there are now a number of different styles of rifling:

#### Cut Rifling:

Cutting one groove at a time with a tool (*single point cut rifling*) or cutting all grooves in one pass with a special progressive broaching bit (*broached cut rifling*)

#### Button rifling:

A process where a machine presses all the grooves at once with a tool called a "button" that is pushed or pulled down the barrel.

#### Hammer Forged:

Forging the barrel over a mandrel containing a reverse image of the rifling with a giant hammer forging machine, often forging the chamber as well

#### Polygonal:

Formed similarly to hammer forged barrels, producing less pronounced "hills and valleys", so the barrel bore has a polygonal (usually hexagonal or octagonal) cross-sectional profile. Polygonal riflings with a larger number of edges have shallower corners, which provide a better gas seal in relatively large diameter bores.

## Section 3 – Firearm Mechanics (continued)

### Firearms and Ammunition Interactivity

Let's take a bolt action rifle as an example here



Looking from left to right, we see the bolt is in a forward position and has been locked down. Superimposed is a sectioned barrel with a round of ammunition. You can see that the base of the round is not in fact supported by the chamber of the barrel at all.



It is in fact supported by the bolt nose so we have a locking system comprising the barrel with its chamber supplying most of the support for the cartridge with the bolt taking up the job of supporting the rear of the cartridge.

## Section 3 – Firearm Mechanics (continued)

### Firearms and Ammunition Interactivity (continued)

Let's take a closer look at the interaction mentioned previously

This rear support of the base of the cartridge will prevent any movement when the system is fired. There is in fact a tiny amount of room between the bolt face and the cartridge which is called **headspace**. It is necessary for the cartridge to flex at the moment of firing in order to form a gas seal at the front.

You will also notice a set of lugs on the bolt face, these are designed to interconnect with the inside of the receiver (action) which has a machined mirror of the lugs to engage with.

This is how the action is locked prior to firing, ensuring you don't get a bolt in the face!



It's important to know the locking mechanism is robust enough to ensure the bolt continues to be locked during firing because in a full bore rifle like a .308, there is approximately 21 tons per square inch of pressure only a few inches away from your head.

**21 Tons per sq. inch = 47,040 PSI = 3243 BAR = Lots!**

That's a lot of pressure.

You will find variations on a theme with firearms and high pressure cartridges. They all employ the same style of lug system though with 2 or more.

By contrast, the average handgun chamber pressure is approximately 35,000 PSI and shotgun ammunition is considerably lower at an average of around 14,000 PSI.



14,000 PSI is still a fairly impressive 6 ¼ Tons per Sq. Inch though and will prove painful if your hand should be in the way. This double barrelled shotgun burst and was subsequently destroyed when a smaller diameter cartridge had found its way accidentally into the chamber, in front of a 12 bore cartridge which was subsequently loaded and fired.

## Section 3 – Firearm Mechanics (continued)

Whenever you handle a firearm for the first time, it is highly recommended that you conduct a visual inspection of the working parts and any accessories attached to make sure it's all secure.

Your checklist should start at the back and work your way forward. Obviously don't bother checking say a bipod if none is fitted.

1. Buttstock – Pad secure?
2. Pistol grip – cracks or splits?
3. Stock Screws – Secure & tight?
4. Bolt –
  - a. Face
    - i. Firing pin NOT sticking out?
    - ii. Extractor OK?
    - iii. Ejector present?
    - iv. Lugs not sheared off?
  - b. Handle not broken?
5. For SCOPE Sights
  - a. Rail secure?
  - b. Mounts & rings secure?
  - c. Scope attached & bedded securely?
  - d. Check Windage & Elevation settings (see Module 2)
6. For IRON Sights
  - a. Rear Sight system secure?
  - b. Check Aperture OK?
  - c. Check Windage & Elevation settings (see Module 3)
  - d. Check the Front Sight is securely attached to the barrel
7. Barrel Clear of any obstruction (remove the bolt first)?
8. Stock Forend
  - a. Bipod OK (if fitted)?
  - b. Sling Stud loose?
  - c. Other furniture attached properly?
9. Muzzle – Moderator/Brake secure & tight?

Although you may think this list rather long and in depth, the whole assessment will only take a minute.

### Section 3 – Firearm Mechanics (continued)

Let’s look at No. 4a, the bolt face using the following picture and identify any issues:



1. Firing Pin – it’s not sticking out ✓
2. Extractor – Yes, present ✓
3. Ejector – Oh, looks like a spring is missing (it should be protruding out of the bolt face) ✓
4. Lugs – Yes, all there. ✓

This machined out area of the bolt nose is called the bolt face recess

Before looking at a bolt with problems, let’s first just explain what the Firing Pin, Extractor & ejector do.

1. Firing Pin	Is a hardened pin that is propelled forward on firing which strikes the primer in the cartridge, setting it off. The distance the pin travels is very small so the spring needs to be incredibly strong. A light spring will always cause misfires and will need to be replaced by a gunsmith.
2. Extractor	The extractor is a small piece of hardened metal with a claw on the end. It is sprung (within the body of the bolt) and when pressed outwards, should offer lots of resistance. The extractor claw engages the rear of the cartridge so that when you operate the bolt to the rear, it will hook on and pull the cartridge out of the chamber
3. Ejector	The ejector works in conjunction with the extractor and is usually positioned directly opposite. It pushes on the back of the cartridge and also contains a spring behind it. When the extractor and ejector are working together, this pulling and pushing force makes sure the cartridge does not get stuck but is ejected firmly. This is known as “positive ejection”. If the ejector spring has broken (in the case of the photo above) the case will in all likelihood just spin around inside the action. It will not stop your shooting but just prove itself a nuisance. The ejector should be standing proud of the inside recess of the bolt face
4. Bolt face recess	This is where the base of the cartridge case is supported by the bolt as opposed to the chamber. The recess is machined to the tolerances laid down by the specification of the calibre and bolts are essentially not transferable between firearms

## Section 3 – Firearm Mechanics (continued)

So we now know what a bolt nose **SHOULD** look like (with the exception of the ejector), let's have a look at one that clearly has an issue:



Ignoring the fact that the lugs look like they've been nibbled on by something with very strong teeth, is there anything else that leaps out at you that's clearly **NOT** meant to be present?

If you said the firing pin, well done

By simply checking the bolt face for a stuck firing pin and identifying it, you will almost certainly have saved yourself a potentially dangerous accident.

If the bolt was rammed home on a live round with the firing pin protruding, there is a very real chance that the cartridge will be initiated **BEFORE** the bolt lugs have been rotated into their locked position as nobody on the planet is fast enough to lock the system faster than the cartridge takes to fire. The result is the bolt will be blown back into the shooter's hand with the aforementioned **21 Tons** of pressure and will in all likelihood, remove fingers etc.

Remember Newton's 3<sup>rd</sup> Law:

**For every action (force) in nature there is an equal and opposite reaction**

## Section 3 – Ammunition

Ammunition is a general term for anything that can be fired, scattered, dropped or detonated from any form of weapon system.

You will hear terms like round and cartridge too. For civilian shooting in the UK, we obviously do not deal with bombs, grenades or missiles so the term applies to what is called “small arms ammunition”.

### General

Here is a line-up of some of the calibres you will encounter throughout the course:



From left to right they are: 5.56mm – .308 Winchester – .38 Special – .22 LR

As you can see, some are straight walled and some are bottlenecked cartridges. Some have rims and some are rimless.

Here is a statistic that you should always remember when it comes to safely handling firearms. How far the bullet will travel if you accidentally fire it when the firearm is pointing approximately 30 degrees off the horizontal:

Calibre	Distance <b>IN MILES!</b>
.22 LR	Approx <b>1 MILE</b>
.38 / .357 mag	Approx <b>1 MILE</b>
5.56	Approx <b>2 ½ MILES</b>
.308/7.62	Approx <b>2 ½ MILES</b>

If you fire a .22 on the Winans range over the backstop at an angle off the target line, it **WILL** reach houses outside the danger area in Bisley town. Similarly, the danger area beyond the butts on Short Siberia Range is approximately 2 miles then it's Camberley...



## Section 3 – Ammunition (continued)

Below is a basic graphic of where a full bore rifle bullet will go if fired from approximately 30 degrees from the 100 yard firing point on Short Siberia.



Camberley (people)

Short Siberia Range

Always remember that a bullet fired from a firearm YOU are using is your responsibility till it comes to a complete stop in the **SAND BEHIND THE TARGET!**

## Section 3 – Ammunition (continued)

A round of ammunition typically is made of 4 components:

<p>① The Bullet</p>	<p>This is the projectile that comes out the barrel and impacts the target. Usually constructed of lead or a combination of lead, copper and polymers but construction is dictated by the intended use and velocity.</p>
<p>② The Case</p>	<p>This is the bit that holds all the components together and upon firing is the only bit left behind.</p>
<p>③ The Powder</p>	<p>Modern shooters powder (also known as smokeless powder) is a combination of nitrocellulose, nitro-glycerine and various other trace chemicals plus a coating of inhibitor to control and regulate the burn rate.</p>
<p>④ The Primer</p>	<p>This is the only explosive component of the package and contains a shock sensitive compound that when struck, will explode. Thus igniting the powder.</p>



Here is a pulled round with all four components. You will notice that the cartridge case actually has a fired or spent primer already seated within. This is purely for display purposes.

Although technically outside the scope of this Manual, many students do ask about the possibility of making ammunition from the fired cases and the answer is yes. A great many shooters reload their own ammunition. It is both rewarding, produces more accurate ammo than can be commercially made and is generally cheaper. The NRA runs a Basic Handloading Course which will help you through the process later in your shooting career.

### Section 3 – Ammunition (continued)

To fire a round of ammunition, the primer has to be struck by the firing pin. There are two forms of case incorporating a primer, they are either Rimfire (RF) or Centrefire (CF).

A CF cartridge is initiated by a separate primer cap which is press fitted into the base of the centre of the case.



An RF cartridge is initiated by being struck anywhere on the rim of the case.

You can see that the instant benefit of CF over RF is the primer is a separate entity on the CF case and can be pushed out and the case recycled, thus allowing the user to build a fresh round of ammunition whereas the RF case is essentially 1 shot and disposed of. It is extremely difficult to accidentally have a CF round of ammunition go off outside a firearm as a result of dropping, but on the other hand it is extremely easy (and unlucky) to accidentally initiate a RF round because the rim is effectively exposed.

#### Rimfire - 22 Long Rifle (LR)

This will be the first calibre you will be introduced to on Day 1. The .22 LR was originally introduced in 1887 by the J. Stevens Arms & Tool Company who developed it from a much older cartridge, the .22 BB Cap which dates back to 1845.

This is a .22 LR cartridge



The .22 LR case is the same diameter as the bullet (0.224”) and the bullet uses what is called a “heel” which is slightly narrower than cartridge diameter. It is pressed into the case and a crimp applied.

As you can see, this is the heel part of the bullet.



This is a cross section of how the RF round looks put together. You can see that the majority of the bullet is exposed whereas with a CF round (at the end of Section 3 - Ammunition) it is mostly enclosed and protected by the case. You can see from this image that the primer is spun into the case rim.



Primer Powder Case Bullet

## Section 3 – Ammunition (continued)

The .22 LR Rimfire (RF) is undoubtedly the most common calibre in the UK as it is relatively cheap to shoot as opposed to Centrefire (CF). It is also an extremely accurate calibre and more than capable of being fired at distances up to 100 yards. In fact, there are 22 competitions that shoot to 200 and 300 yards.

The .22 LR is also probably the most versatile calibre in terms of velocity spread and designed use with velocities ranging from 710 fps right up to 1800 fps depending on the manufacturer.

Lastly, the .22 LR has minimal recoil and the report is comfortable when using proper hearing protection. Don't be lulled though and be tempted to remove your hearing protection while others are shooting 22's because it **WILL** ultimately damage your hearing.

### Centrefire – Pistol Ammunition - .38 Special and .357 Magnum

These calibres will also be introduced to you as part of Day 1 training and the choice of which calibre will be dictated by current NRA Armoury supply. As you recall, centrefire ammunition is initiated by striking the primer in the centre of the base of the case.

You are probably wondering why two calibres are listed here. Basically, the bullet diameter is the same and both calibres will happily fit in the same gun as long as it is chambered in the longer round:



This is the **.38 Special (Spl)** round with a case length of 1.155". Originally designed by Smith & Wesson in 1898 and one of the most popular pistol rounds in history. Less powerful than the .357 Mag

This is the **.357 Magnum (Mag)** round with a case length of 1.29". It was ultimately designed by a number of different people in the 1930's to compensate for the lack of "knock down" power of the police issue .38 Spl. More powerful than the .38 Spl

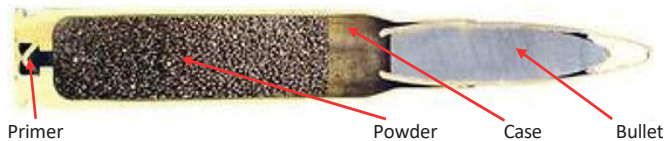
Both calibres use the same diameter (.357") bullet and are straight walled. As long as the chamber of the rifle is designated as ".357 Mag", you can fire both calibres. The .38 Spl name is based on the approximate diameter of the brass case as opposed to the bullet.

This commonality exists with a number of other calibres, for instance .44 Special and .44 Magnum where the only difference is the case length and as long as the firearm is chambered in the longer calibre, both will fit.

During the course, you will be exposed to a couple of other calibres with these similarities and your Instructor will explain them in due course.

### Centrefire – Rifle Ammunition

Full bore rifle ammunition design is basically much the same format as rimfire ammunition in that it consists of 4 component parts.



Pistol ammunition is constructed the same way as rifle ammunition.

## Section 4 – The Principles of Marksmanship

There are four Principles of Marksmanship and they are:

What	Definition	Explanation
Position & Hold	<b>“The shooting position and hold must be firm enough to support the rifle”</b>	a good relaxed grip of the firearm using the body’s natural support
Natural Alignment	<b>“The rifle must point naturally at the target without any undue physical effort”</b>	the rifle should naturally point at the target using the body’s bone structure and not held onto the target by applying undue physical force
Sight Picture	<b>“Sight alignment and sight picture must be correct”</b>	<b>For iron sights:</b> the foresight must be in the centre of rear sight aperture (more on Day 3). <b>For Scoped sights :</b> The sight picture should be clear and distinct (more on Day 2)
Shot release & follow through	<b>“The shot must be released and followed through without undue disturbance to the position”</b>	Remember: Controlled breathing & trigger pressure then observation of the new position of the firearm to confirm your <b>Position and Hold</b> & your <b>Natural Alignment</b> .

Next, we will go through them in detail.

As you progress through the course, the Instructor team will continuously refer to the Principles of Marksmanship.

They will also assess your technique and advise you accordingly.

## Section 4 – The Principles of Marksmanship

### Position & Hold

Remember: “The shooting position and hold must be firm enough to support the rifle”

Day 1 is all about shooting from a standing position with a firearm unsupported by any other aid (bench etc.) so it’s very important that you are as comfortable as possible. Straining to get comfortable with a firearm will distract even the strongest person, and because of this, their thoughts will be drawn away from concentrating on the job at hand – shooting accurately, and they will be fretting about the pain developing in their shoulders/back/arm/anywhere else.

The main thing to remember about using any firearm is:

**The firearm should always fit around you, not you around the firearm.**

Next, let’s look at the angle you are adopting in relation to the firearm and line of fire. Here you can see various angles as viewed from above:

	<ul style="list-style-type: none"> <li>✓ Good, comfortable position</li> <li>✓ Head midway up butt stock</li> <li>✓ Shoulders relaxed</li> <li>✓ Great sight picture</li> </ul>
	<ul style="list-style-type: none"> <li>✗ Bad, uncomfortable position</li> <li>✗ Head far back on butt stock</li> <li>✗ Shoulders &amp; driving hand tense</li> <li>✗ Terrible sight picture (especially with a scope)</li> </ul>
	<ul style="list-style-type: none"> <li>✗ Potential stress in lower back</li> <li>✗ Body support from behind greatly reduced</li> <li>✗ Butt stock re-located close to the bicep which when incorporated with a larger calibre with increased recoil will potentially hurt</li> </ul>

## Section 4 – The Principles of Marksmanship

### Position & Hold (continued)

There are 4 points of contact between the shooter in the unsupported position and the firearm. They are:



- 1. Shoulder** As an exercise, put your shooting arm out to the side at 90 degrees from your body and with your other hand in the shape of a blade, place it on your shoulder at the junction of your arm and move your shooting arm around in a small circle. You will feel a distinctive line between two muscle groups and it is here that you want to be placing the buttstock, **below** your collarbone! This contact point should be good and solid but not so hard that it fatigues you. It is known in the shooting world as a solid weld
- 2. Cheek** The next point of contact is your cheek which applies outward pressure from the inside of the buttstock, this pressure is compensated by contact point no 4, the firing hand
- 3. Driving hand** Your non-firing hand is employed in positively directing the firearm towards the target. The position of your hand in relation to the stock is purely personal preference but it has to be comfortable. Too far back and you can interfere with the cocking handle on semi auto rifles and too far forward will ultimately fatigue you
- 4. Firing hand** Your firing hand (the one that pulls the trigger) is now wrapped around the neck of the stock and should be applying just enough pressure towards you to compensate for your cheek pressure (# 2)

The position and hold you employ has to be **consistent**.

Adopting the correct, consistent position and hold is key to accurate shooting, irrespective of the shooting position you are in:

- Standing
- Sitting
- Kneeling
- Prone

You will very quickly learn muscle memory and automatically adopt the same hold as second nature but if you start to notice your group mean point of impact has shifted, this is an instant tell-tale for inconsistent position & hold of the firearm.

## Section 4 – The Principles of Marksmanship

### Position & Hold (continued)

In addition to the above, let's look at a couple of examples of positions adopted that can cause undue stress on your body. The ideal, personal position you need to adopt when shooting unsupported should be as comfortable as possible with an absolute minimum of stress to your body. This ensures you are 100% concentrating on shooting accurately and not thinking about that growing pain in your lower back as it will detract from what you want to accomplish. Accurate shooting!



“The Banana Position”

This is a fairly common position adopted by new shooters. We all have a tendency to adopt this position in an attempt to offset your balance against the rifle.

- As you can see from the side view, the back is bent backwards and the head is positioned at the back of the butt stock.
- From the front view, the subject's head is also bent over the stock in an attempt to compensate for the rearward head position.
- What we have is stress up the back from the hips all the way to the base of the head through the neck.
- Breathing is partially restricted due to the neck bend
- There is also a good chance of the onset of symptoms of vertigo due to the angled head position



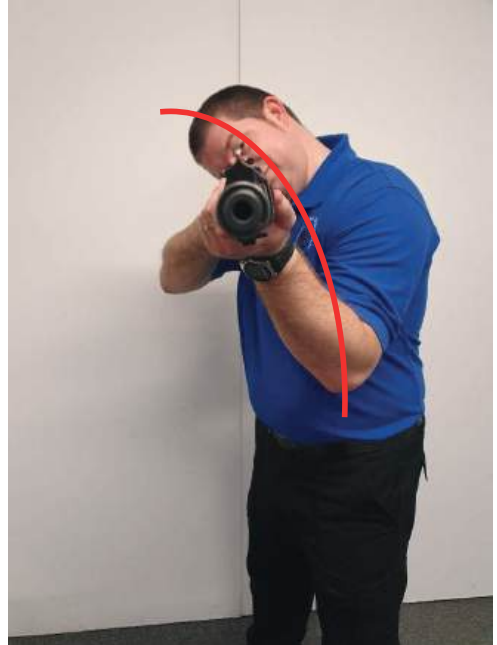


## Section 4 – The Principles of Marksmanship

### Position & Hold (continued)

Eye dominance is another factor when shooting. There is no hard and fast rule though as to which of your eyes is dominant.

This example is that of a right handed shooter with extreme left eye dominance:



#### Eye Dominance

As you can see, in order for the subject to get a decent sight picture, his head is literally wrapped over the butt stock. In terms of body stress, it's very similar to the first example. The subject is attempting to adopt a neutral Position & Hold on the buttstock but due to the eye dominance factor, the head is being forced backwards from the neck.

What does all this add up to?

- Increases stresses similar to the previous example
- Poor accuracy and a lack of positional consistency will ultimately be the result

## Section 4 – The Principles of Marksmanship

### Natural Alignment

Remember: “The rifle must point naturally at the target without any undue physical effort”



The subject above is perfectly comfortable and ready, only problem is the Natural Alignment to the target is off. Would the remedy be to bend the body across and move the rifle so it was back on aim?

No, to do so would start imparting sideways stress to the shooter's body and rifle. It will very quickly start to detract from concentrating on the objective of accurate shooting.

The only option is to get up and relocate so the natural alignment is now correct.

There are a number of ways you can test your natural alignment in any position you are shooting in.

In the case of Day 1 standing unsupported, follow these easy steps to test yourself.

- With an empty firearm **and with your eyes closed**, adopt your most comfortable position and hold to where you think the target is
- Open your eyes and assess where you're pointing
- If you're dead in line with the target, congratulations!
- If not, don't be tempted to start bending your torso/hips to accommodate getting on target
- Shuffle your entire body until you are aligned

Now you have achieved the correct natural alignment to the target.

Natural alignment and position and hold are interrelated and one cannot work properly without the other.

Remember, the goal is good marksmanship skills.

## Section 4 – The Principles of Marksmanship

### Sight Picture

Remember: “**Sight alignment and sight picture must be correct**”

On day 1 you will be using open sighted firearms and although rudimentary, they are still accurate enough to shoot a small group. The sight picture for iron or open sights consists of lining up the rear sight with the foresight, on the target.

The Rear sight



The Foresight



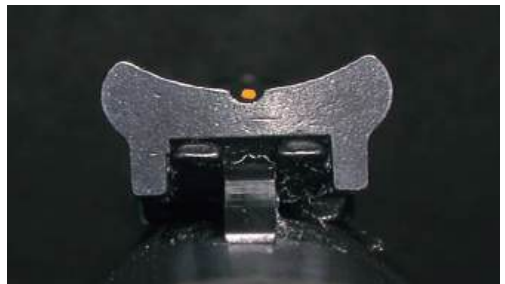
A Target



Put it all together and this is what you should see:  
(This sight picture is very similar to the sight picture of the Marlin lever action you will also use)



This is what the sight picture through the Marlin lever action looks like. As you can see, very similar to the Ruger in that you place the foresight bead in the bottom part of the rear sight. Remember consistency so always use the same sight picture.

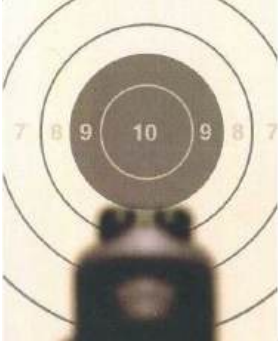


Always remember, **ALWAYS FOCUS ON THE FORESIGHT!**

## Section 4 – The Principles of Marksmanship

### Sight Picture (continued)

Here are three different focus points, the 1<sup>st</sup> picture (left) shows focus on the target, the 2<sup>nd</sup> focused on the rear sight and the 3<sup>rd</sup> is focused on the foresight.



#### Target

Incorrect : you cannot accurately place the foresight/rear sight combination accurately on the target because you can't see them clearly



#### Rear Sight

Incorrect : Your depth of perception is too short focusing on the rear sight so it's very easy to stray away from the target



#### Foresight

Correct : The foresight guides good accuracy, your focus is beyond the rear sight, helping the target to be clearer, and the sight picture, although slightly out of focus is much clearer when it comes to reading all three objects.

Remember: Your eyes can only focus on one object at a time!

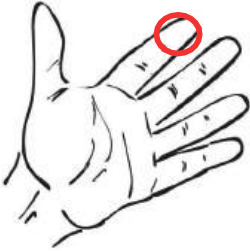
## Section 4 – The Principles of Marksmanship

### Shot release & follow through

Remember: “**The shot must be released and followed through without undue disturbance to the position**”

Shot release: A good, controlled trigger pull is absolutely essential to accurate shooting. Yanking away or flicking it will only ensure your grouping suffers.

The trigger pull should be a slow but measured increase in pressure directly backwards, not angled across the firearm. The contact patch of your finger should be the soft part of the tip of your finger on the trigger, just forward of the last joint.



When the firearm discharges, it should be a surprise.

One aspect of shooting that affects absolutely EVERYONE is **flinch**.

We all have a tiny, primeval voice in the back of our heads that is screaming “I don’t like this, it’ll hurt!” and the result is flinching. Flinching is when you react to an external stimulus and make a quick, nervous movement that is completely instinctive. By applying slow but steady trigger pressure, you can ultimately cheat flinch but you have to concentrate on that application of pressure or the flinch will return. Your Instructor will help you through Day 1.

All firearms develop recoil. Larger calibres substantially more than say the .22 LR but they all have an effect on the end position of the firearm in relation to the target.

Follow these simple steps,

1. Once the shot is fired, you must not shift your position, move your head, or allow the muzzle to drop until the sight picture is regained and held for a moment.
2. Do not anticipate the shot and move before or during the time the bullet is still in the barrel.
3. Remember what your sight picture looked like when the shot was fired. Was it good or were your sights pointed to one side or high or low? Remembering what your sight picture looked like when the shot was fired will tell you where the shot should have hit the target. It is vital to good shooting.

We advise that your follow through be held for a full 2 seconds after the shot is fired.

Those seconds also include:

- time required for recovery depends on the shooting position and the calibre of the firearm being used
- good recovery is the last stage of follow-through when it comes to evaluating both a shot and a shooter’s position
- reflexive recovery at the end of follow-through also prepares the shooter for the next shot

## Section 4 – The Principles of Marksmanship

### Shot release & follow through (continued)

#### Breathing Control

As you will imagine, breathing in and out while trying to maintain a sight picture is an almost impossible task to perform as your sights move up and down in rhythm to your breathing. To compensate, you are going to have to pause your breath cycle to fire the shot.

Where you pause is personal preference as some like to fire on a complete exhale, some pause either a third or half way on an exhale and others like to hold a full lung.

Let’s look at some of the benefits and downfalls of each:

	Benefits	Pitfalls
Empty	Shooting on empty lungs has the main benefit of <b>consistency</b> as your body will have a greater contact patch to the floor when shooting prone	We all need oxygen so you will suffer from oxygen deficit which will lead to an unsteady hold if you dwell on the trigger too long before firing You should fire within 15 seconds dependent on your individual physique before your vision is impaired.
Full	Your dwell time on aim can be increased by maintaining a lungful of air	Your contact patch with the floor is greatly reduced. It is possible to take too long in the aim as a result and subsequently ruin the shot
Midway	Gradual reduction in lung capacity can aid in the establishment of a good sight picture. Many will slowly exhale till the reach an ideal position then go and complete the trigger pull	Reduced lung capacity reduces your ability to hold a sight picture. It is extremely hard to consistently match your lung capacity for each subsequent shot

The natural respiratory pause lasts usually just seconds during the normal breathing cycle and it is vitally important to only hold as long as you feel **comfortable**. There is no point holding your breath till your eyes bulge, your diaphragm spasms and your heart rate soars as that will firstly ruin your shot and more than likely cause you to pass out... not good!

We like to see the shot fired within 15 to 20 seconds of the bolt being locked closed with the firearm ready to fire. Any more and it is perfectly acceptable to refill your lungs and operate the bolt handle up to disengage the lugs, preventing the firearm discharging. Closing your eyes for a few seconds to “reset” is perfectly acceptable.

Here is a step by step example of an example shooter taking a shot:

- Breathes normally and gathers the target in the sights
- Slows breathing down and observes sights settle onto the target
- Commence applying trigger pressure
- Respiratory “pause” when the shot is fired
- Complete Shot release and follow through

## Section 4 – The Principles of Marksmanship

### Shot release & follow through (continued)

So, you've adopted the perfect position and hold, your natural alignment to the target is the stuff of legends and you have the perfect sight picture via the perfect breath hold. You fire the shot and immediately jump off the firearm to see your prowess through a spotting scope only to discover you missed... so what happened?

You moved off the rifle too soon and interrupted the shot.

Remember those 2 seconds? - Always pause after the shot release to assess the rifle's final position after it comes to rest.

What else can follow through analysis tell you about your shooting?

Ask your Instructor to watch and monitor your shot process throughout the follow through segment.

- They will watch for any small movements of your body during or directly after the shot is fired to ascertain whether your Position & Hold/Natural Alignment combination is not constructed properly. Typically seen by strong arming the firearm back into place rather than letting a correct Position & Hold do the job
- They will also look out for any movement in the rifle due to your relaxation after the shot is released. This movement in the firearm usually indicates you are using muscles to strong arm the firearm into place, increasing stresses and strain on your body. This is a clear indicator of incorrect Position & Hold
- They will also look for a correct eye position

## Conclusion to Day 1

Have a look through the list below and refresh yourself prior to your Day visit

- **Can you remember the NRA Safe Shooting System**
- **Do you remember the 4 Safety Rules?**
- **Remember the importance of the effects of drink and drugs on shooting**
- **Guest days**
- **NRA Rules and Regulations**
- **Muzzle awareness**
- **Range Commands**
- **Centrefire & rimfire**
- **Pressure**
- **Principles of Marksmanship**



# Module 2

## Module 2 – Section 1: Overview

Module 2 of the Probationary Course is all about extending the range you’ve been shooting at to 100 yards.

The day will start in the classroom where the basic concept of sighting systems will be explained. You will be shown how to boresight, assess your group and then adjust your sights accordingly before carrying out the practice on the range.

The range session on this Module will involve first shooting the scoped 22 LR rifle you last used on Day 1 and there will be a number of exercises your Instructors will take you through.

In the afternoon, you will then be introduced to the 7.62mm calibre scoped rifle.

### Firearms you will use

You will be using two firearms on this Module and they will be introduced to you in the classroom prior to getting on the range.

<p>The first is a .22 LR scoped bolt action rifle.</p> <p>This Ruger bolt action you will remember from Module 1.</p>	
<p>The 3<sup>rd</sup> is a 7.62mm scoped bolt action rifle.</p>	

For more detailed information about these three firearms, please refer to the Firearms Reference Section in this manual.

## Section 1 – Sighting Systems General

Why do you need sights? – to hit the target!

The most basic sight is probably the bead sight on the front of a shotgun.

Without sights, there is little chance of hitting a target accurately at very short range and absolutely no chance of hitting a target further away.

Sights generally are broken down into three categories:

- Iron or open sights
- Scope
- Reflex and Red Dot

Irrespective of what sighting system you have fitted to your firearm(s), there are a number of steps you'll need to do in order to make use of them effectively.

The collective name for this whole process is referred to as “zeroing” and you will hear it mentioned throughout the course.

Zeroing consists of the following subsets:

- Boresighting
- Theory of the Group
- Point of Aim
- Mean Point of Impact

Let's have a look through this process.

## What is Boresighting?

Simply put, boresighting means looking down the bore of a firearm at a recognised target then bringing your eye up to the sighting system WITHOUT touching the firearm, then manipulating the sighting system adjustment until it's pointing in the same place as the bore.

## When do I need to boresight?

You should boresight a firearm whenever you change the sighting components, are setting up a firearm/sighting system combination for the first time or have removed or moved your sighting system around.

## Why do I need Boresight?

Accurate boresighting is a very effective method of ensuring that a subsequent cold bore, close range shot (say up to 100 yards) is 99% guaranteed to hit the target face, therefore safely hit the butts behind.

That all means SAFETY, SAFETY and SAFETY.

It also means you're not spending loads of money needlessly on throwing ammunition down range without a clue as to where it's going.

Simple? Yes and no.

## Can't I buy a gadget to Boresight?

Simple answer, absolutely.

But you are in possession of a very accurate piece of equipment already... the old Mk 1 eyeball.

You can go out and buy a boresighting tool. They come in all shapes, costs and sizes. Some are a lot better than others. Most involve inserting a rod of some sort into the muzzle or attaching something to the end of the muzzle. All good until that fateful day when you forget to remove the item and go ahead and fire.

Nett result is an expensive error that could end up destroying your firearm and costing ££££ Like anything, there are pros and cons with gadgets.

Pros	Cons
<ul style="list-style-type: none"> <li>• Quick and easy method to boresight anywhere</li> <li>• Gadget can be kept in your kit bag</li> </ul>	<ul style="list-style-type: none"> <li>• Lasers can be seen at closer ranges and you could attract unwanted attention</li> <li>• Accuracy issue with the gadget concentricity to the bore</li> <li>• Forgetting to take it out &amp; firing... oops.</li> <li>• Battery goes flat at the WRONG time</li> <li>• Laser only good at very short range and pretty much hopeless on a sunny day. You will NOT see the laser dot on a target at 100 yards...</li> </ul>

## Some boresighting gadgets

Here are some examples of boresighting setups:

This style is inserted into the bore at the muzzle and the idea is, you switch it on and a laser projects onto a target and you simply adjust your sights until they are on the laser. In theory, it's a good idea except for a number of issues, the stem of the system has to be ABSOLUTELY 100% straight or the inaccuracy of the laser is huge, even at short ranges AND, forget to take it out, fire a shot and your gun barrel **WILL** be destroyed



This gadget is inserted into the chamber of the firearm and the act of closing the bolt switches it on, projecting a laser beam down the barrel towards whatever it is you are boresighting on. Generally better design than the 1<sup>st</sup> item and no real danger of destroying your prized possession as it's in the chamber. But, like all gadgets, it's battery powered so will always run out just when you need it most.



This design is known as a collimator and works by inserting a rod down the barrel (blockage!) and looking through the scope at a grid within the collimator to adjust your sights. However you need some point of reference first which means buying another format of bore sighting gadget prior to using something like this.



## Boresighting Fundamentals

Before we start, let's take a look at some of the fundamentals first.

When looking down the bore, you should see something like this:

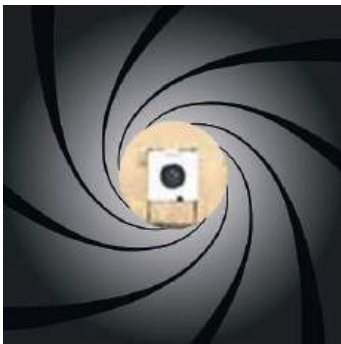
The spiral effect you see is the rifling which imparts spin on the bullet and thus stabilisation which equals accuracy.  
 Make sure the object you decide to use is unique or clearly identifiable.  
 For instance, if you choose to boresight on a target which is exactly the same as all the other targets down range, there is a possibility that your bore is pointing at one target and the sights are pointing at another. The nett result is your elevation will be sound but you'll be peppering somebody else's target (see below).



Remember **Safety Rule #2** – “Always aim at your target”



Here's a typical bank of targets at the NRA range complex at Bisley as an example. You'll probably notice that they're all exactly the same.  
 If you look at the next picture, you will see why it's **vitaly** important to **identify** your chosen target when you boresight



Which target is this boresight picture looking at?

It could be Target 55 or it could be 43.

Let's look at it step by step.

## OK, how do I Boresight?

Before starting a boresighting exercise, there are two points you need to answer “yes” to:

1. Can you **EASILY** remove the bolt to see down the bore?
2. If not (like a Ruger 10/22), follow “**I can’t see down the barrel**” detailed next.
3. Can you locate somewhere with enough distance to make the exercise effective? Any distance greater than 50 yards but less than 120 yards is ideal.

Let’s boil down boresighting into the necessary steps:

1. Find a **unique reference point** to boresight onto. This is going to be a target if you are on a range, or some easily identifiable thing. For this example, we are going to refer the reference point as a target
2. Now **remove the bolt** from the firearm so you have a clear view down the bore from back to front
3. You now need to **securely anchor the firearm** so it is as stable as possible and doesn’t move around. Use sandbags, coats, pillows or anything that effectively locates and stops the firearm from wiggling about
4. It’s a good idea to **wind down the magnification** a certain amount because it will help with your matching the chosen target through the bore with the image you’ll see in the scope. There is nothing worse than picking a target amongst a bunch of other targets to boresight on, then pick the wrong one through the scope. You will be shooting somebody else’s target, thinking it’s your own.
5. You’ve now got the firearm ready to actually boresight. To do this, **look through the bore at your chosen target**
6. and move the firearm about until the target is located centrally in the bore
7. Do not touch the firearm at this point and **raise your eye up to the scope** to see where it’s pointing in relation to the bore.
8. As carefully as possible, **adjust the elevation and windage turrets** so the crosshairs are also pointing at your chosen target.
9. Now it’s time to check the bore again as there is a high chance the firearm may have moved. If it has, re-centre the target in the bore.
10. Repeat steps 7 & 8 until both the crosshair of the scope and the centre line of the bore are pointing at the same thing.

Once complete, your firearm will be effectively rough zeroed for approximately 100 yards.

## So what are the benefits of boresighting?

**Cost:** 7.62/308 ammo is expensive. If it takes you 15 rounds to zero your rifle, that’s a lot of money. By using your Mk1 eyeball instead, you’ve saved yourself a goodly amount.

**Satisfaction:** It’s another core skill that will give you more range time.

Congratulations, you’ve successfully boresighted your firearm.

So, that’s all well and good for a firearm that is easy to boresight. What happens when there is no way you can look down the barrel without effectively taking your firearm to small bits.

## I can't see down the barrel

There are times when it's an almost impossible task to effectively boresight. A classic example is the Ruger 10/22® that is used on NRA Training courses. Many private owners have gone to great lengths to try and solve this problem and one of the most common is drilling a hole in the back of the receiver to make a "peep hole". This hole can also be used for cleaning purposes with a rod but the act of drilling a hole in the receiver will:

- Invalidate your warranty
- Put the firearm "out of proof" as you have modified a pressure bearing part of the firearm which means you cannot sell it on until you submit your firearm for re-proof. **That's costly.**

Your only alternative is to zero your firearm at a close range. Usually 25 yards as the bullets will be captured by the butt stop and you can see the strike and change accordingly. This will work even if your sights are seriously off.

Once you have close range zeroed your firearm, you can progressively increase the distance and make changes, but this does all depend on whether you have access to other ranges to accomplish this. Fortunately, there are a number of ballistic apps available which will give you extremely accurate elevation data, but it's all dependant on what you enter first.

To summarise...

The only way to effectively set your sights on such a firearm is to start at a close range like 25 yards and either

- establish a zero @ 25 yards then increase distance

or

- establish a zero then use additional data (ballistic coefficient & muzzle velocity) to apply in a ballistic app which is covered in the **Reference Material** section "**Introduction to Ballistics Applications**" at back of this manual



Module 2	Section 1 – Sight Systems – Theory of the Group
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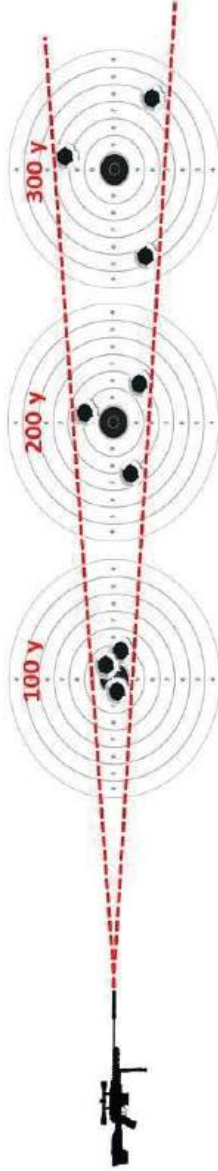
## What does “Theory of the Group” mean?

Put simply, a group is the collective pattern of shots recorded on a target.

The theory of the group is defined thus: as the range increases, the size of the group increases in direct proportion.

All modern firearms will shoot accurately but some are better than others. There are a myriad of different reasons why and they are beyond the scope of this Training Manual. Suffice it to say that as a **general** rule, the bigger the price ticket, the better the firearm will group but remember that’s a **general** rule. It is entirely possible that the price tag could be high but the quality could be low, thus affecting accuracy.

The example below is a firearm that under optimal conditions can shoot a 1” group at 100 yards:



As you can see, as you stretch the distance out past 100 yards, the group is going to get bigger. This is normal. If your firearm can shoot a 1” group at 1000 yards, you are either the luckiest person on the planet and WILL have queues of shooters from all over the planet, all desperate to give you their life savings for it, or you’re using a laser gun from a science fiction movie.....

You will notice, we say “**optimal conditions**”, that means:

- that the firearm is locked into some form of device that prevents it from being moved
- there is NO wind blowing anywhere
- the firearm is mechanically sound (see **Reference Material** section on **Cleaning & Maintenance**)

## Outside contributing factors

As discussed on the previous page, we touched on using something to lock the firearm straight towards the target. That obviously cancels out the primary contributing factor surrounding potential errors in a group, namely the shooter...

Shooting accurately does require the firer to be “in the zone” so to speak. As an example, you could be out on an uncovered range, assessing your firearm and the weather decides to take a turn for the worse like it does here in the UK.

The rain is coming down in sheets and you didn’t pack your wet weather gear. Water is running down your back, you’re lying in an ever deepening puddle of water and are thoroughly miserable. It’s a fair bet that your ability to ignore that lot and still attempt to shoot accurately has more than likely gone out the window.

## Firer Error

Remember the Principles of Marksmanship you were taught in Module 1? Go back to that section and reacquaint yourself with them as 99% of firer errors can be attributed to an issue with them.

## Equipment Malfunctions

Imagine jumping into your car and driving off only to find the back wheel overtaking you because you forgot to check it. The same applies to firearms and you should always perform a quick check and assessment of the following:

- **Scope** – Is it firmly attached to the firearm?
  - A loose scope will render your firearm hopelessly inaccurate and you will chase errors when zeroing
  - The scope can become detached and in all likelihood it will hit you in the face - **painful**
  - The scope could fall on a hard surface and potentially break – **costly**
- **Bipod** – If fitted, is it also firmly attached?
  - The firearm will fall off the bipod and you could damage/scratch your expensive purchase!
  - Loose bipods make it much harder to control as the firearm will wobble all over the place
- **Stock** – Check the screws (if fitted) & make sure it’s firmly attached
  - Loose screws will cause the metalwork of the firearm to move about during firing
  - The stock will become detached and WILL hit you in the face during recoil – **very painful**
- **Sound Moderator/Muzzle Brake** – Is it also firmly attached?
  - A loose sound moderator/brake will adversely affect accuracy
  - A sound moderator/brake that is very loose will almost certainly be damaged by bullet strike
  - A sound moderator/brake that becomes detached will fly down the range a good 70+ yards

## Light

Light conditions can also affect accuracy. Too dark and it becomes difficult to accurately place your sight system clearly in the centre of a target. Light coming in at your chosen position can also reflect back at you or directly into your eyes, causing errors to adversely affect your accuracy.

## Wind

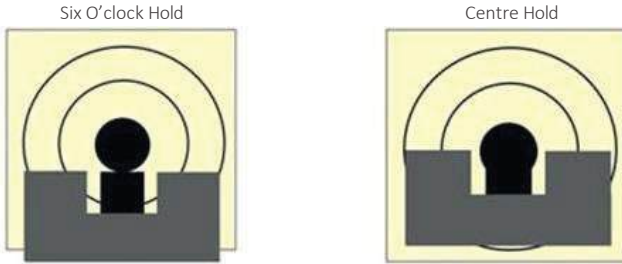
You will learn all about how to compensate for wind during Day 3 of this training Programme, suffice it to say that wind is a major contributing factor in longer range accuracy. As an example, a 20 MPH wind coming in from 90 degrees (right or left, doesn't matter) at 1000 yards **WILL** blow a 7.62 bullet about 20 feet in the opposite direction. Yes, that is not a typo – 20 FEET!

## Other Conditions

- **Adverse weather conditions** - like light shining on a distant target can also give you problems with contrast. Snow can obscure a target, rain then sun will cause mirage
- **Cheap glass!** – a cheap scope will be constructed with cheap, poorly polished lenses. This creates a light scattering effect when the angle of the light is coming in from a low angle. The result is that it looks like you are looking into a bottle of milk. Good luck seeing through that!

## What does Point of Aim mean?

It's exactly what you would expect, it is where your sights are aligned on the target. This could be directly zeroed for the centre of the target or just below it. Here's an example with iron sights:



When you are conducting a zero process, the point of aim is the basis of your calculations for adjustment later. It is extremely important NOT to change your point of aim when building a group on a target.

Why?

- Altering your point of aim will create multiples of groups and you will chase errors when zeroing
- It'll cost you more money in ammo!

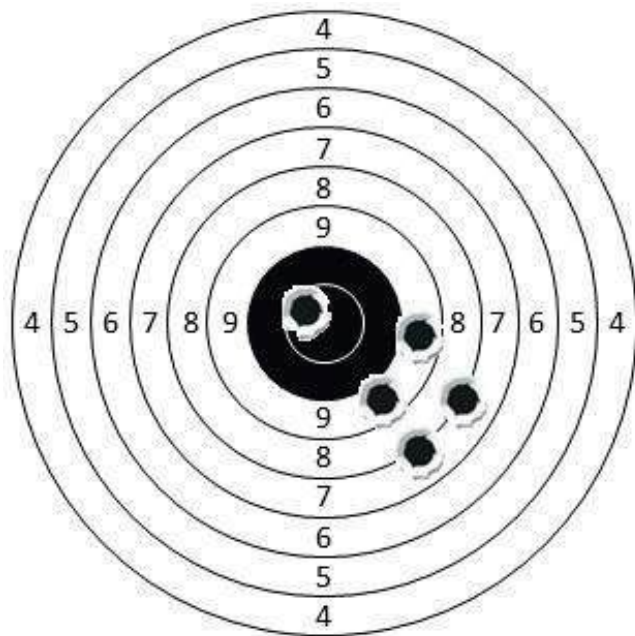
When creating a group, always fire at least three rounds. If there are any obvious flyers (see Appendix), continue to fire but **MAINTAIN THE SAME POINT OF AIM!**

If you have a flyer, fire another round or two and this will give you a clear picture of how your firearm is grouping.

## Mean Point of Impact (MPI)?

This is the centre of the group you have just fired. It is not an exact science but the human eye is pretty good at assessing a cluster of holes and guessing where the centre of that group might be.

Let's take a group of shots fired at a target by a shooter:



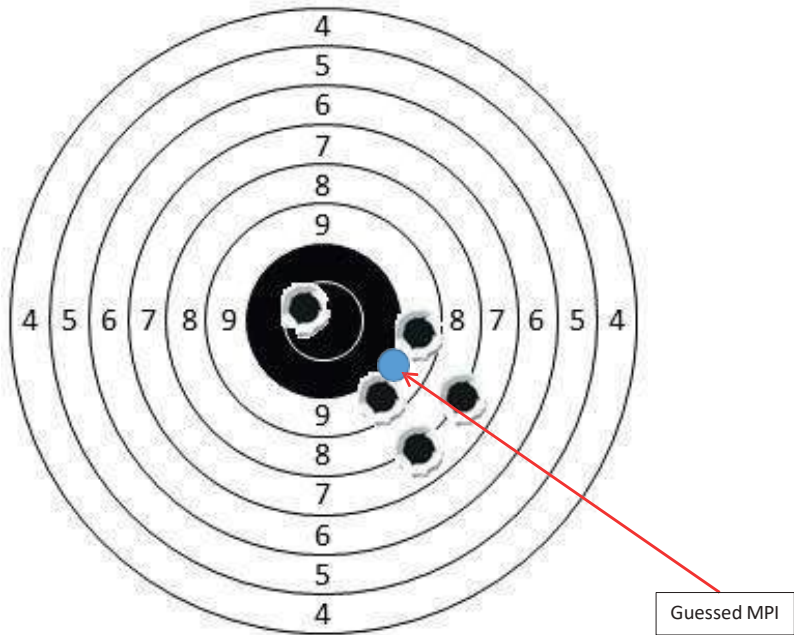
Let's assess the target.

First off, we clearly have five shots showing on the target.

With that in mind, have a look at the target and carry out your own assessment. Where do you think the MPI is based on these holes?

## Establish the MPI

Was your assessment of the target about the same place?



So, the first assessment places the MPI where the blue dot is placed.

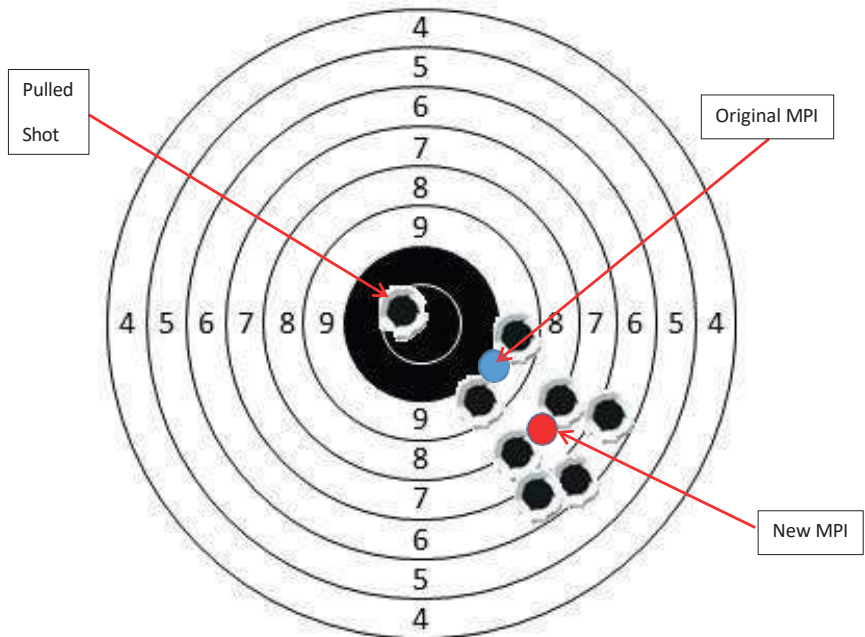
Our shooter now thinks the strike on the left in the centre of the target could have been a pulled shot so they are going to disregard that one for now and shoot a few more rounds to re-assess the MPI.

## Establish the MPI (continued)

Our shooter fires another three shots and you can see below the MPI has clearly shifted from its original position.

Our shooter has re-assessed the target and thinks they may have pulled the one on the left which was the first shot they fired in the initial string..

As you can now see, the MPI has subtly moved below and right of the original assessment.



You can see now that it is very important to fire AT LEAST 3 shots to carry out an assessment of your group. Our shooter's first shot was in the centre, so if they had used that single shot as a basis for changing the sights, the subsequent grouping would have been low and right.

When you carry out this process yourself, you need to make a mental note of any pulled or otherwise bad shots. These can then be ignored when making an assessment of your group before adjusting your sights.

Remember the rule when doing this exercise - **MAINTAIN THE SAME POINT OF AIM!**

Next, we'll look at Section 2 which is how to adjust those sights

## Iron Sighted Systems General

The system usually relies on two components, the foresight and the rear sight. In order to be effective, the sights are arranged down the centre axis of the bore from the back to the front of the firearm. Iron sights can be either fixed, meaning they have no adjustability or some form of adjustability for elevation and/or windage.

The distance between the sights is known as the Sight Radius so the longer the distance, the angular error and resulting inaccuracy is lessened.

You will encounter many different styles of open sight, from a very basic V notch affair right up to a Vernier sight with very fine adjustability.

Here are some examples:

<p>Basic pistol square notch “partridge” sight, no adjustment</p>	<p>Buckhorn style rear sight setup with orange coloured front bead</p>	<p>MBus style front &amp; rear “ghost ring” sights. Both are adjustable</p>	<p>Vernier Rear Sight. Fine adjustability for elevation &amp; windage</p>
			

Iron sights (with the exception of shotguns, which only have a front “bead” sight) come in pairs, front & rear. The idea being you match them up to the target (see section on Sighting Systems).

Some front sights are adjustable too, mainly for elevation. The idea being that if you need to apply a lot of elevation to a firearm to shoot at extreme distances (1000 yards & beyond), applying that elevation to the rear sight will almost certainly upset your Position & Hold (see section on Principles of Marksmanship) on the stock. By applying large changes to the front, you can fine tune the rear and your position on the stock will not be upset.

Because there can be two forms of adjustment, it is extremely easy to apply change in the wrong direction. Always remember the rear sight is adjusted in the SAME direction as you want to go. The front sight is always adjusted in the opposite direction. All will be made clear by referencing the section on Sighting Systems.



## Focus

Always remember the golden rule with iron sight systems – **ALWAYS FOCUS ON THE FORESIGHT!**

During the course, you will be using three distinctly different styles of iron sight from the basic “Buckhorn” style to the intricate Vernier setup.

Let’s start with the basic elements of using iron sights.

Remember, the Principles of Marksmanship are key to accurate shooting so if those elements are not in place first, poor shooting will almost always be the result. Refer to the section on Principles of Marksmanship if required.

## Different Sight Pictures

The definition of Sight Picture is:

With the exception of the Vernier sight system, you can adopt whatever hold & sight picture you like on the target but always remember that consistency is the name of the game here and altering your aim part way through a shoot will produce a different group.

Two of the most common iron sight pictures adopted are the Six O’clock and Centre Hold.

**Six O’clock Hold**



**Centre Hold or point of aim**



Whichever hold you decide to take on a target, always remember that magic word in accurate shooting – consistency.

Keep using the same hold throughout the string you’re firing or you will end up with a shotgun pattern.

Both holds have their own Pro’s and Con’s:

Hold	Pro’s	Con’s
<b>6 O’Clock</b>	<ul style="list-style-type: none"> <li>• Clear target identification</li> <li>• Precision</li> </ul>	<ul style="list-style-type: none"> <li>• Need to adjust sights for different shaped targets</li> </ul>
<b>Centre</b>	<ul style="list-style-type: none"> <li>• “one size fits all” sight picture, irrespective of target style</li> </ul>	<ul style="list-style-type: none"> <li>• Certain targets can be obscured by the foresight (picture above for instance)</li> </ul>

## Iron Sight Adjustment

As discussed previously, iron sights come in all sizes and formats of adjustability.

### Fixed

A fixed set of iron sights are about as basic as you can get. The term “fixed” means the sights are non-adjustable so the only way to accurately use them would be to aim off. Here is an example from a black powder handgun:

The firearm



Foresight



Rear sight



As you can see, the sights are about as rudimentary as you can get.

### Adjustability

There are various levels of adjustability with iron sight systems.

### Rear Sight

This is a rear sight from the Marlin 1894 rifle:



If you look closely at the image, you will see what looks like a miniature step ladder at the base of the sight.

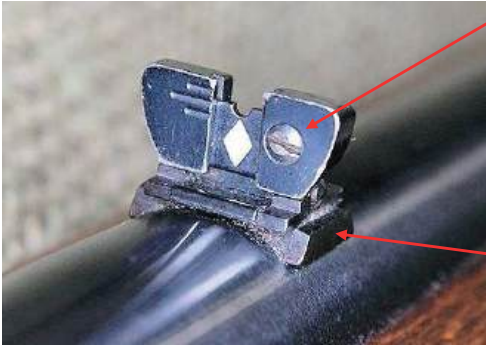
This ladder can be moved in and out, under the sight element. Pushing it forward, reducing the height of the rear sight, will lower the sight element thus moving your group down the target. Moving the ladder back will raise the group on your target.

So, if you establish a centre hold (see Module 2 - Section 1) point of aim on your target and the group is below, raise the rear sight until the shots come up and meet your aiming mark.

## Adjustability (continued)

Adjustment for windage on a sight like this has a little less “finesse” and involves a hammer and punch to physically move the entire rear sight left and right by tapping on the “V” notch forward of the rear sight assembly. There is no degree of accuracy with this form of adjustment at all but a word of caution, if you carry out this operation, go at it gently as it is very easy to give the sight a whack and send it flying off the rifle to land in a secret hiding place that you’ll never find...

Here is a picture of the standard rear sight from a Ruger 10/22 rifle:



As you can see, the difference between this style of sight and the Marlin is a certain amount of accuracy in elevation adjustment via a small screw. You simply loosen the screw a little and lift or push down on the sight element.

Windage adjustability is exactly the same as the Marlin with a hammer and punch. You can clearly see the “V” notch in this photo.

## Accompanying Foresights



As you would expect on general purpose firearms like this, the foresight will be fixed only. This example is from the Ruger and is known as a “Bead” foresight.

You can probably see that there is a similar method of attachment of this foresight to the body of the barrel but it is not designed for adjustability like the rear sight.

## Military Sight Systems

These sight systems generally are graduated in distance rather than angular measurement (see the next section on MoA).

### Rear sight TOP VIEW

The elevation adjustment on this style of sight involves pinching the knurled adjuster and moving it forward or backwards for large adjustments.



### Rear sight SIDE VIEW

The knurled wheel on the right is for fine adjustment once the rear sight has been adjusted for rough elevation (see left)



The “ears” either side of the sight are there for protection.

Here you can see the adjustment has been applied to the sight to INCREASE elevation:

### Rear sight SIDE VIEW



### Rear sight TOP VIEW



## Accompanying Foresights



You can see what appear to be “rabbit ears” either side of the foresight itself.

These are simply the foresight blade protectors. If the rear sight is lost on a battle rifle, there is still a certain amount of effectiveness that can be attained by using the foresight only but it certainly won't be accurate.

If the foresight however is lost, there is little to no effective accuracy.

NOTE: Don't be tempted to use one of the ears as a surrogate foresight, they'll throw your shots wildly left/right of the target AND because they are higher than the foresight, WILL throw your shots much lower than you wanted.

Module 2	Section 2 – How to adjust sights– Vernier
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## Vernier Sights

Target Rifles are equipped with aperture sights. They are designed for maximum precision and are highly accurate even at 1000 yards. The rear aperture consists of a disk up to 1 inch in diameter with a small adjustable hole in the middle. It is through this hole which the Foresight ring and aiming mark are aligned.

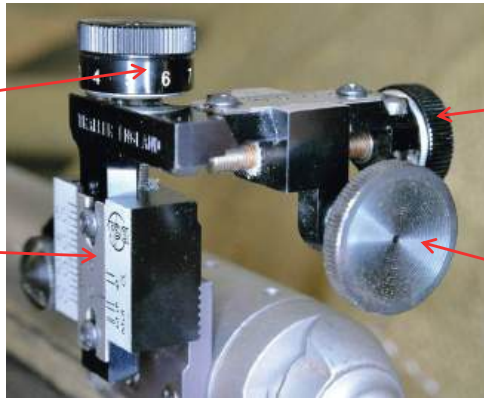
This sight system is a very sophisticated design. They are graduated in Minutes of Angle measurement (see the next section on MoA).

They are adjustable for both elevation and windage. For a detailed explanation of this sight system, refer to the section in Module 3.

In this picture, you can see the following:

Elevation Adjustment

Zero Screws

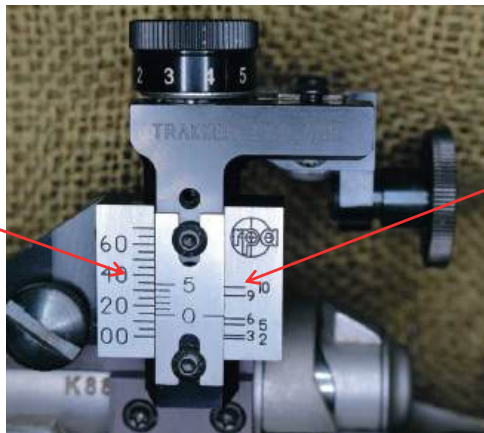


Windage Adjustment

Rear Aperture

Here we can see a side on view of the Vernier Sight system:

The Vernier Scale



To the right of the scale, you will see the numbers rising from "2" to "10". These are approximate ranges engraved on the scale for the shooter's use but if the zero screws are "slipped", the range scale will no longer be useable

Module 2	Section 2 – How to adjust sights– Vernier
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## Vernier Sights (continued)

The foresight may be a simple ring incorporating a fitting for an adjustable iris of different sight elements. If the sight is located within a tube, it is referred to as a “tunnel foresight”. The axis of the tunnel aligns with the axis of the bore. Within the tunnel, a foresight 'element' is fitted which is usually in the form of a metal ring, or transparent plastic disc with a hole drilled through its centre. The elements are designed to be swapped, depending on the range being shot. They can only be fitted in one orientation and some have horizontal reference bars to aid the shooter in horizontal stabilisation of the rifle if the range terrain undulates. Below are two forms of insert.



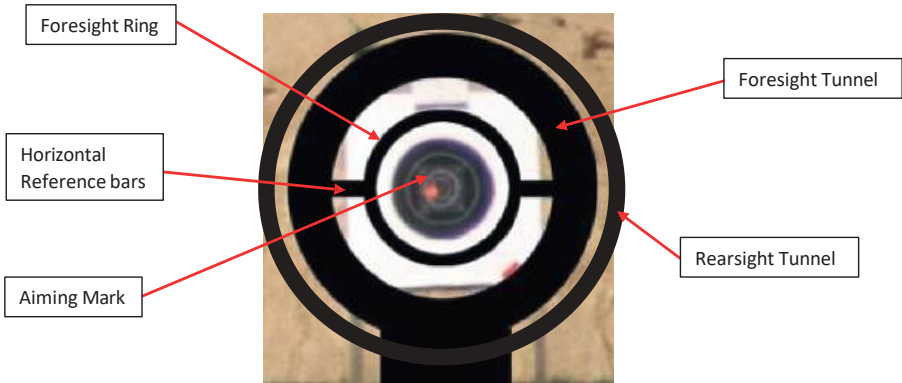
### Lining up the Target:

The basic concept of how to use them is based on concentric rings. As long as you have plenty of white around each circle, the eye and the brain will automatically centre them.

- Make sure your eye is centred in the rear sight.
- Line up the foresight on the target.
- Make sure you are on the correct target number.
- Check the sights are level.
- Check all three again until they are all right.

Remember, focus on the **FORESIGHT**.

The image below shows a typical foresight/rearsight combination aligned on the aiming mark.



## In Summary

With iron sights, the rule is:

To raise the point of impact or increase the elevation – **RAISE** THE REAR SIGHT

To accomplish the same if the foresight is adjustable – **LOWER** THE FORESIGHT



A rear sight without any elevation applied

The rear sight has had elevation applied and you can see that the barrel is substantially elevated, meaning the shot will go higher. This is the basis for accurate shooting at longer distances

## Refresher Section - IRON

Have a read through these test questions. Anything that doesn't make sense, just refresh yourself by looking through the relevant section again

1. The foresight on a firearm is located	a) At the front on the barrel b) At the rear c) Attached to the stock
2. Always focus on the foresight	a) TRUE b) FALSE
3. To adjust elevation UP on the foresight, you elevate it	a) TRUE b) FALSE
4. Is it good practice to alter your aim point when shooting prior to adjusting your sights if the sights are off	a) Yes, to establish a true point of aim b) No, you've just introduced inconsistency to your group
5. The Six O'clock hold will always be consistent when shooting different shaped targets without re-zeroing	a) TRUE b) FALSE

Answers:				
1	2	3	4	5
a	a	b	b	b

How did you do?

Feel free to read this section again but don't forget that the subject matter will be discussed in the classroom and on the range too.

## Scope Sighted Systems General

Scopes do not share the same setup as Iron Sighted systems as it’s all internal within the mechanism. We will not be covering the internal workings of scopes in this manual as they’re far too complicated.

A telescopic sight or scope for short is an optical sighting device based on the overall principles of how a telescope works but with the addition of a reference point within. This is called the reticle (see below).

Scopes are mounted to a firearm along its centre line to achieve accuracy. For more information on mounting scopes, please see the “How to fit a Scope Sight” section in the reference area of this manual.

Scopes can have a myriad of options available, here is a list of some of the more common elements:

<b>Element</b>	<b>Description</b>
<b>Fixed Magnification</b>	Scope does not have any other magnification available other than what’s been set at the factory
<b>Variable Magnification</b>	Mag power starts at 1x which is basically the power of your eye and can go up as far as 50x or even more.
<b>Reticle</b>	These are the reference points mentioned earlier. They can be a simple crosshair right up to some of the most complicated Ballistic Drop Reticles known to the human kind
<b>Angular Measurement</b>	Scope adjustment is generally divided into two types, MoA or Mils. They can also have all sorts of subtensions. In the case of an MoA scope, ¼ or ½ click to name a couple
<b>Objective Size</b>	The objective is the front lens on a scope and is measured in mm. Generally speaking, the bigger the objective, the more light is received but there are many other factors like glass quality, so you could have the biggest objective on the planet but the image looks like you are looking through a milk bottle. Another consideration is the larger the objective, the higher the mounts need to be to clear the barrel.
<b>Focal Plane</b>	1 <sup>st</sup> Focal plane means that as you increase mag, the reticle increases in size too. 2 <sup>nd</sup> Focal plane means that the reticle stays the same, irrespective of magnification selected. For a detailed description, please see the article in this section
<b>Eye Relief</b>	This is the distance between the eyepiece of the scope and the eye where the optimal image from the scope can be seen – this topic is covered in greater detail below

To adjust a scope for elevation & windage, you first have to identify the correct controls. To do this effectively, always consult the owner’s manual as not all manufacturers adhere to the same naming conventions or positions of the control surfaces on their products.

Generally speaking though, elevation is dialled in by turning a turret usually located on the top of the scope and windage is usually off the right side.

Because the adjustment is all internal, you will not see any discernible shift in the crosshairs.



## Scope Sighted Systems General (continued)

### 1<sup>st</sup> & 2<sup>nd</sup> Focal Plane

Scopes come in 2 formats, 1<sup>st</sup> & 2<sup>nd</sup> focal plane.

A 1<sup>st</sup> focal plane scope reticle grows or diminishes in size when the magnification setting is adjusted whereas a 2<sup>nd</sup> focal plane scope reticle stays the same size, irrespective of the magnification setting.

1 <sup>st</sup> Focal Plane	
Benefits	Pitfalls
Markings represent the same measurement throughout the magnification range	Higher Price bracket
Saves on additional maths when working out ranging to target	Much smaller reticle at low mag
Better suited to long range shooting with a fine reticle	Target can be obscured at high mag

2 <sup>nd</sup> Focal Plane	
Benefits	Pitfalls
Lower Price bracket	Beware very cheap scopes. Remember the old adage – “Buy cheap, buy twice”
Reticle the same size throughout the magnification range	Markings DO NOT represent the same measurement throughout the magnification range
Target <b>will not</b> be obscured at high mag	Additional maths IS REQUIRED when working out ranging to target
Better suited for shorter ranges and hunting	You need to check & confirm the magnification setting for true MoA or MilRad settings

### Why is a 1<sup>st</sup> focal plane scope more expensive than a 2<sup>nd</sup> focal plane?

Basically, it’s the position of the physical reticle within the scope itself. 1<sup>st</sup> focal plane rets are positioned forward of the saddle (main control surface) whereas a 2<sup>nd</sup> focal plane scope is positioned to the rear, near the ocular. Making it closer to the shooters eye.

## Understanding the Scopes Control Surface

### – Naming the parts

Let's look at the basic controls of a scope and then an in depth description of what each item does. Below is the Vortex

Viper PST 5-25x50 1<sup>st</sup> focal plane scope



### In Summary...

**Ocular Lens & Focus ring:** This is the lens you look through. When you look through a scope, the reticle should be in sharp focus. At this stage, it doesn't really matter what you're looking at. If the reticle is not crisp, it will compound parallax issues.

**Mag Adjustment Ring:** This ring adjusts the magnification of a scope. Higher magnification is akin to zooming in on a target. 1x power is the same zoom setting as the human eye.

**Elevation Turret:** This dial is used to increase or decrease elevation. They can be either exposed in the case of a target system or capped in the case of a hunting system. Depending on the system and the manufacturer, they may also have stadia printed in order to easily reference how much elevation has been applied.

**Windage Turret:** This dial is used to apply left or right changes to the reticle in the same way as the elevation turret. The windage turret will usually be marked with reference points left and right of centre to aid you in making changes. This turret will also be calibrated the same way as the elevation turret with the same angular measurement system.

**Barrel:** This is also known as the tube and dictates what size rings you need to acquire. They are generally either 30mm or 1" (25.4mm) although there are others at 34mm diameter and some even bigger but the cost of these scopes is generally much higher.

## Understanding the Scopes Control Surface

### – Naming the parts (continued)

**Saddle:** This part of the scope is almost always set in the middle of the barrel of the scope and houses all the mechanisms that make the scope work

**Objective Lens:** This lens at the far end of the scope gathers the available light and transmits it down the scope where it eventually gets to your eye as an image. The objective is always displayed as part of the scope description along with the magnification

And lastly...

**Parallax and focus turret:** Let's cover the focus part first, this turret is usually either located to the left side of the saddle or in the case of an "AO" scope, at the end of the scope next to the objective lens and stands for **A**adjustable **O**bjective. Use this turret to focus onto the target.

### Which brings us to...

**Parallax:** The technical description is the apparent movement of the reticle, relative to the target caused by the inconsistent positioning of the eye.

Eh?

Or when the target and reticle are on different planes within the scope, resulting in the reticle wandering around the target depending on the position of the eye in relation to the centre line of the scope.

### Nope, still don't get it...

Put another way, if you look through a scope at a target and move your head slightly from side to side, two things will happen if parallax is not set. A shadow will encroach from one or other side and the reticle will appear to move in the direction you moved your head.

Incorrect parallax accounts for a great deal of misconstrued bad shooting. You could be doing everything right but if the parallax isn't set correctly, your groups will wander and increase in size.

### How do I sort it?

By adjusting the focus turret to ensure that the sight picture is as clear and in focus as you can make it.

An old trick is to dial up the magnification on a target to high mag. If the target starts to go out of focus, adjust the focus ring accordingly until the target snaps back into focus. Then dial back the magnification to where you want to be or are comfortable with, repeat the head wiggle test and you will find the movement of the reticle has gone.

Congratulations, you've just adjusted out parallax. Now there's no excuse for missing!

You now have a basic understanding of what the various controls do, let's look at how you use them.

## – Naming the parts (continued)

### Ocular Lens & Focus ring

The Ocular lens is the lens you look through. It transmits the reticle information to you and it is the first thing you should adjust for focus before you do anything else. If the ocular is out of focus, the information will not be in focus. It doesn't matter if the target looks clear because you will have introduced parallax errors before you even start shooting. Remember, it's all about accuracy

### Magnification Adjustment ring

This control is usually somewhere near the Ocular but it all depends on individual manufacturers. The ring will always be labelled from a small number to a large one (min to max mag). As mentioned previously, if the magnification starts at 1 x power, this is the equivalent of the same power as the human eye and each successive increase is just that. For instance, 10 x power is 10 x the power of the eye and so on.

Magnification is a great thing, you have a clearer image of the target which is the most obvious bonus for accurate shot placement. For every positive, there's always a negative though. With extremely high mag, you will encounter black out. This is when the image is totally obscured, you literally cannot see a thing and would suspect the lens cap is still on.

This is caused by a drastic reduction in exit pupil.

- **Exit Pupil** - A human in their mid to late teens with 20/20 vision has an exit pupil of about 7mm. This is the width of the beam of light leaving the eyepiece that the eye can then process. Any more and it is simply ignored. This gets gradually smaller the older we get. The higher the magnification, the smaller the transmitted information or exit pupil becomes. If you take a scope with an objective lens (see below) of 56mm and you divide this number by 7 (ideal exit pupil), you get the optimal magnification of:

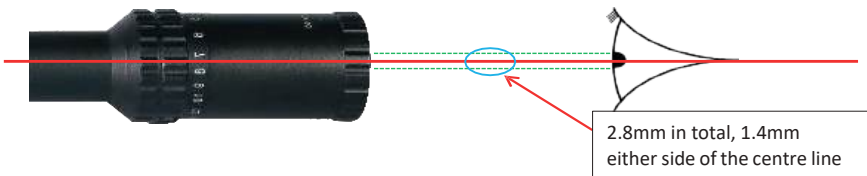
$$56 / 7 = 8$$

So 8 x magnification would be the best setup but we want to see more of the target.

Increase the magnification to 20 x power and reverse engineer the formula:

$$56 / 20 = 2.8$$

That's 2.8mm of available light being transmitted back to your eye which means your position & hold **MUST** be absolutely in the centre line of the scope or you will not see anything. If you take that centre line, the 2.8mm of available light is halved which means you've only got 1.4mm of wiggle room to correctly position your eye.



- **Heart rate** – The higher the magnification, the more pronounced your heart rate is transmitted through the firearm meaning you will see reticle “bounce” which will be in time with your heart. The only way to negate this is to wind down the magnification to a setting where your heart rate is not observed.

## Elevation & Windage Adjustment

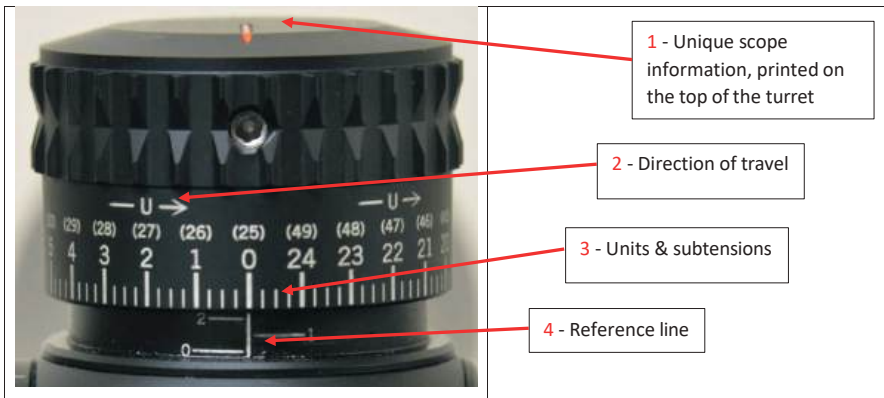
To adjust a scope for elevation & windage, you first have to identify the correct controls. Your scope might be slightly different to the scope referenced earlier so to do this effectively, always consult the owner's manual as not all manufacturers adhere to the same naming conventions or positions of the control surfaces on their products.

Generally speaking though, elevation is dialled in by turning a turret usually located on the top of the scope and windage is usually off the right side.

Because the adjustment is all internal, you will not see any discernible shift in the crosshairs but you will note the turret can move up/down or left/right but again, this all depends on the manufacturer.

Let's look at Elevation first

### Elevation Turret



As you can see, there are a number of different bits of information presented to you here, let's break them down.

**1 – Info:** Usually, the manufacturer will stamp on the cap the relevant info about the elevation & windage. This will usually look like: “1 click=  $\frac{1}{4}$  “ @ 100y” or “1 click = 1cm @ 100m”.

This means that one audible “click” from the turret will move the reticle  $\frac{1}{4}$ ” (MoA) or 1 cm (Mil) up or down at 100 yards/metres distance.

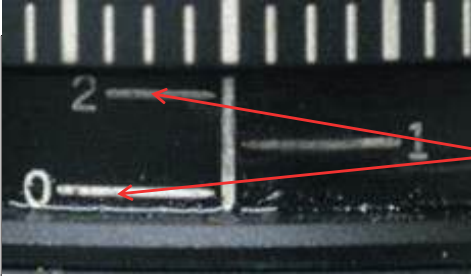
In this instance, the manufacturer has included a quick reference line to indicate the Zero mark

**2 – Direction of travel:** It's exactly what you probably thought. An arrow with a “U” in the middle pointing in the UP direction means.... UP. So if you fire a shot and your bullet strikes low, you need to go UP. Pretty simple?! The trick is to ALWAYS check this information when getting behind a scope rifle because it always catches out the unwary.

**3 – Units & subtensions:** The scope pictured is measured in  $\frac{1}{4}$ 's per unit so each click would represent in this case,  $\frac{1}{4}$  “ per click as it's an MoA scope.

## Elevation & Windage Adjustment (continued)

**4 – Reference or Datum Line:** This line not only gives you a datum point but also gives you an idea of how much elevation has been already applied. If you look closely below, you will see what looks like a tree:



These lines hanging off the sides of the Datum line are reference points to indicate how many FULL revolutions have already been applied to the elevation turret. The “0” line is the absolute bottom of the available adjustment, the “1” means 1 full revolution and the “2” means 2 full revolutions have already been applied.

## Barrel

It is very important to know the diameter of the barrel of scope as that dictates the size of rings needed to mount the scope to a firearm. Most scopes sold in the UK are either 25mm (1”) or 30mm in diameter. There are however other sizes. 34mm is becoming more popular but still remains more expensive compared to the first two.

## Saddle

The saddle is where most of the adjustment controls will be located on a scope

## Objective Lens

This lens gathers the light and passes it down the length of the scope. They are always measured in mm and will be listed as part of the general description

## Putting it all together

So, we now know that there are two focus steps within the scope in the following order:

- Ocular Focus – 1<sup>st</sup>, bring the reticle into sharp focus, irrespective of what you are looking at through the scope
- Parallax/main focus to target –
  - Dial up magnification to a high setting
  - Aim at the target
  - Adjust the focus ring until the target snaps into sharp focus
  - Dial down your magnification and assess the parallax by wiggling your head
  - Congratulations, that's all there is to adjusting out parallax.

Now you will need to apply elevation and windage and you do that by turning the turrets described in C & D. In order to accurately apply elevation, you first need to know how much to add – seems reasonable?

Knowing how much elevation to add will be covered in the next part of this section – MoA but for this example, let's assume you need to add 36 ½ MoA to your scope in order to successfully hit a target 1000 yards away from your zero position of 100 yards.



This is your scope elevation turret.

Please refer to the previous section under “C” & “D” so you are re-familiarised with what each piece of information means.

Your scope is zeroed for 100 yards and you have previously set the Zero Stop feature at “0” so you can easily reset your scope back to 0 so you always know your initial settings. Make sense so far?

You intend shooting at 1000 yards and the elevation for that distance with your rifle is 36 ½ MoA as mentioned previously.

You have two options, either:

- Aim off by shooting above the target, guessing
- = NOT GOOD!
- Adjust the elevation by rotating the turret by the correct amount

As you can see from the picture on the right, the turret has been turned up by 36 ½ MoA.

What? – You say... read on!



Module 2	Section 2 – How to adjust sights – Scope
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## Putting it all together (continued)

Let's just have another look at the elevation turret so you can familiarise yourself with it again.



1<sup>st</sup> – Always ascertain which direction is UP.

In this case, it's clearly Anti-Clockwise

2<sup>nd</sup> – Figure out how many sub-tensions there are per complete unit.

In this case they are 4 or ¼ increments

3<sup>rd</sup> – Look at the turret and work out how many units there are per complete rotation of the turret

1<sup>st</sup> – The “U” and an arrow pointing in a direction is all you need to figure this one out. You will be surprised to hear that it is not uncommon for shooters to accidentally go the wrong way. Please be also aware that not all manufacturers adhere to UP = Anticlockwise. Some are the other way round so always assess.

2<sup>nd</sup> The example scope turret above is divided into ¼ increments. These increments are sometimes referred to as “clicks”.

3<sup>rd</sup> and lastly, check how many whole units there are in a full 360 degree turn of the turret. As you can see from the photo, we have “0” round to “24” in an anticlockwise direction but don't forget the increments from “24” to the “0” point. That's another unit so this example scope has **25 whole units** for that full rotation.

Our brains mostly don't like dealing with large numbers so let's look at the value we need to apply to the scope in order to hit the target at 1000 yards which in this example is 36 ½.

This scope is what is known as a “¼ click”, i.e. 4 clicks per whole unit. Simple maths dictates that in order to get 36 ½ units applied, we'd need to apply  $36 \frac{1}{2} \times 4$  or 146 clicks to set up the scope. 146 clicks will take you forever to apply and there is an absolute certainty that you'll get interrupted by something as you count – 105, 106, 107, 10... “Do you fancy a cup of coffee” and guess what, you've forgotten where you are.

Try not to think in individual clicks but apply the change based on whole units and whole rotations.

In the example we know:

- There are 4 clicks per unit (MoA)
- There are 25 units per full rotation of the turret

So, to apply 36 ½ units or MoA, we'd apply 1 full rotation = 25 units plus 11 individual whole units plus 2 clicks = 36 ½

Simple, and it didn't take you hours of fiddling about with the turret.

**Less time fiddling = more time shooting.**



## Eye Relief

All scopes need a certain amount of distance between the shooter's eye and the eyepiece. If you press your eye up against the ocular and fire, you **WILL** get what is commonly known as a "scope kiss". That is when the ocular hits you just above your eye, usually breaking the skin and causing you some pain and discomfort.

Most scopes will have a measured distance of between 2 ¼ & 3 ½ inches to gain the correct eye relief.

You can always tell if your eye relief is not correct by the view you can see through the ocular.

If you are too close or too far away, the outside of the sight picture will be very blurred:



The easiest method of measuring the correct eye relief is to put your hand between your eye and the ocular. The average hand is approximately 3 inches across and will be the perfect measurement tool.



## How do I set the Eye Relief on my firearm?

When setting up the scope (more details on this topic in the Reference Section), you have to decide what position you are going to adopt for the vast majority of your shooting as that will be the ultimate determinant of the relative position you place your scope on the rail. In general terms, if you intend using the scope mainly standing like in a hunting situation, your scope will be located further forward than if you mainly shot from the prone position.

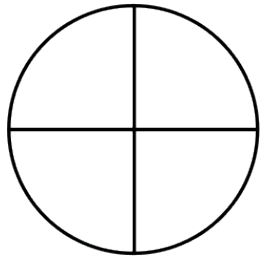
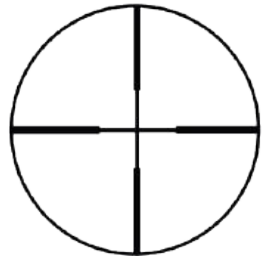
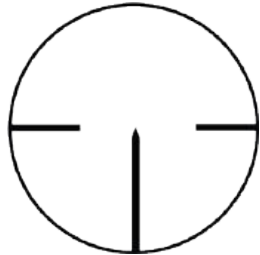
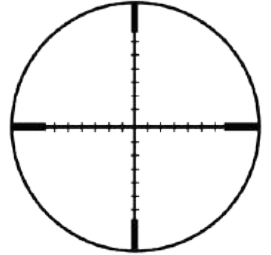
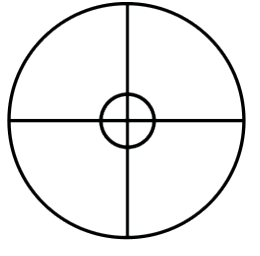
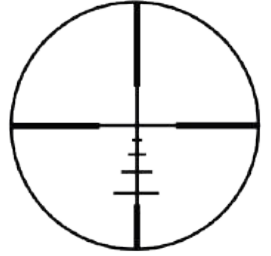
## Reticles

Simply put, it's the "X" mark in the centre of the sight picture or the pattern of lines or markings built into the scope to provide the user with measurement references.

Reticles or Rets as they are also known as are many and varied. There is literally a reticle style for any and all forms of scoped shooting from long range precision to hunting at night.

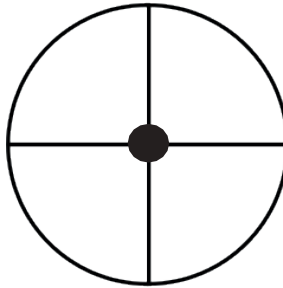
When looking at reticles, it is important to understand that different manufacturers may call similar styles by different names which is a bit confusing so don't take the description on the box as gospel, always look through the scope first.

Here are some examples:

<p><b>Crosshair or Fine Crosshair.</b> Minimum of additional information. Generally used by precision long range shooters</p>		<p><b>Duplex.</b> Faster target acquisition than the crosshair design but still no additional information for the shooter in terms of measurement reference</p>	
<p><b>German.</b> This is a basic hunting reticle for fast target acquisition.</p>		<p><b>Mildot.</b> Probably the most widely used of retes even though the design was primarily for military ranging to target based on a given set of parameters. Measurement facility via the dots.</p>	
<p><b>Circle.</b> Another fast target acquisition system. You may well find this optical system on shotguns too</p>		<p><b>Range finding or BDC.</b> BDC = Ballistic Drop Compensator. This design is more a "one size fits all" approach with the lower lines representing the predicted drop of certain bullets at distance</p>	

## Reticles (continued)

The examples overleaf are the tip of the iceberg when it comes to design of different rets.



Take a design like the Fine Crosshair then place a dot in the centre. This ret is known as a “Target Dot”.

It's great for offhand style, fast target acquisition shooting but due to the size of the dot, a considerable part of the centre of the target will be covered. That makes accurate shooting more about guesswork than pinpoint accuracy.

The choice of reticle you go for will depend entirely on what you intend to use it for. A Fine Crosshair ret is ideal for precision shooting at a high contrast target like a standard Bisley style bullseye but it will be lost on a complex background target like a DP2:



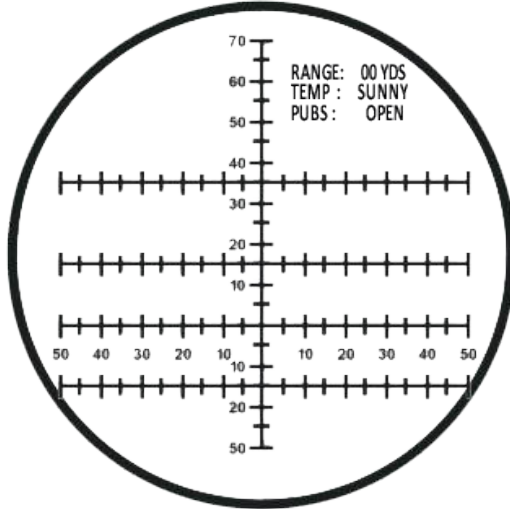
As you can see on the left, it's pretty hard to distinguish the crosshair against this style of target. This is compounded when you have to lift the scope to your eye in a speed shoot competition. You will be severely limiting your competitiveness as a result.

By contrast, the illuminated Mildot reticle on the right is much more visible.



## Reticles (continued)

The previous examples are one side of the scale but imagine a reticle so jammed with information that you literally cannot get a good sight picture because of the amount of extraneous data being presented to you:



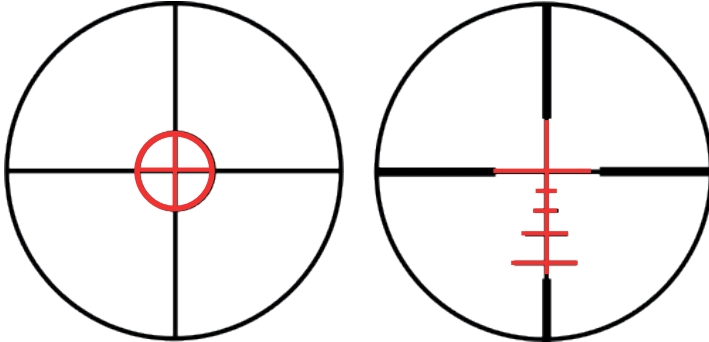
You can clearly see that there is too much information being displayed above that is going to hinder a decent sight picture. Sometimes, less is more.

## Illuminated Reticles

This system basically has a dial mechanism that is adjusted for brightness by the user. There is a minute diode internally that is projected onto the reticle, illuminating it. An example can be seen on the previous page. Most illuminated systems use the colour red but there are a few that also use green in addition. As with all things electronic, what needs switching on also needs to be switched off! One of the biggest problems with these systems is forgetting to turn them off and the next time they are used, there is an almost certainty that you don't have a spare battery. There are however certain systems that operate via "shake awake" parameters. This system will shut itself off if it detects no movement after a certain amount of time.

## Illuminated Reticles (continued)

Illumination can be applied to any or all parts of the reticle, the examples below represent just two of the myriad of different styles available to today's shooter.



## Other Factors

There is an increasing number of both high and low end electronic scope systems now appearing on the market that include useful features like range finding and programmed ballistic drop data that effectively alter the elevation based on the data you have programmed in. These systems are beyond the range of this manual however, and best advice would be to have a go with one before committing to the expense.

## Red Dot Systems

What is a Red Dot sight? Simply put, it is a light emitting diode projected onto a collimating mirror that creates a virtual “dot” that stays in alignment with the firearm it is mounted on, irrespective (to a certain degree) of the position of the shooter’s eye. As you will recall from earlier in this Module, parallax is one of the main components of shooter error when using optical based sighting systems and Red Dot systems are no different. This is why you will see a myriad of cheap red dot systems on the market. Our best advice is to avoid them as parallax will be a big concern. The easiest way to assess a Red Dot system is to hold it up to your eye and move your head from side to side a small amount, if the dot moves around the target, the system is not parallax free and should best be handed back.

Red dot sights are considered what is known as “fast target acquisition” systems. They do take a certain amount of getting used to as the shooter’s head has to be in a very specific location in order to actually see the dot. This skill can only be learnt by repeated use and muscle memory.

Red Dot sights generally come in two different configurations, the older closed tube design which resembles a telescopic sight and the newer reflex setup.

Tube Style	Reflex
	

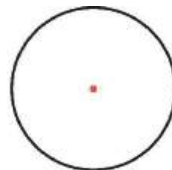
The mechanics of both systems are very similar in that a light emitting diode is projected onto a curved piece of glass that aligns with the shooter’s eye. It is important to note that effective use of red dot systems requires the shooter keep both eyes open.

These sights are designed for general purpose use with pistols, shotguns and some rifles. They have a larger dot which is dependent on the manufacturer, model and cost. The projected dot is usually measured in MoA or MilRads, ranging from 2 MoA (0.6 mrad) and 5 MoA (1.6 mrad).

Sights designed for longer range shooting will have a smaller dot, measuring between 2 to 3 MoA (0.6 to 0.8 mrad).

In its purest format, the red dot reticle is exactly as you would expect:

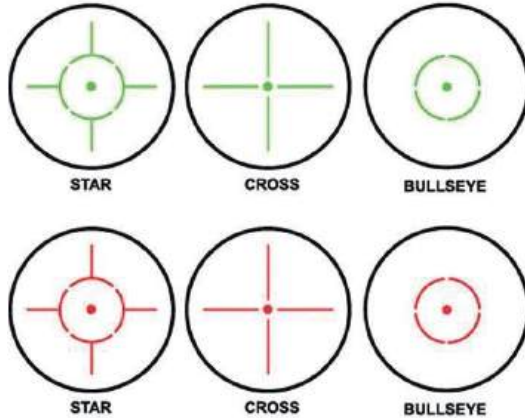
This is the sight picture you will see through a standard Red Dot sighting system.



## Red Dot Systems

### Other Reticles

This market is awash with all sorts of variants with regards to what type of reticle to pick from:



In terms of the description of the reticle style, it is basically down to the manufacturer and their naming conventions. As you can see from the image above, the term “red dot” is potentially misleading as some manufacturers offer the diode in both red and green (above).

A good sight will have the ability for the brightness to be adjusted. This is essential if it is to be used in bright sunlight, if the red is to be coupled with an infra-red add-on sight system for shooting at night or in exceptionally low light levels, it needs to have the ability to adjust down, beyond the level the human eye can register but enough to be visible through the add-on. This is however, outside the scope of this manual.

### Benefits and Pitfalls

There are a number of competitions involving fast target acquisition and these sights are perfect for them. Remember though that if you have a 6 MoA dot sight fitted to a full bore rifle and you are shooting at 1000 yards, that dot is going to obscure at least 60 inches of target, or 5 feet, or nearly half the target board!

Another benefit of these sights is the position and distance from the shooter’s eye is not critical, making them especially attractive in hunting where recoil is generally greater due to the reduced weight.

## MoA?

MoA simply stands for Minute of Angle.

All sighting systems use some form of angular measurement in order to be adjusted to accurately place bullets on target at different distances.

There are two types of angular measurement, Minutes of Angle and Mils. Note: we cover Mils later in the manual in the Reference Section. At Bisley, most longer ranges (greater than 50 m/yds.) are measured in **YARDS**.

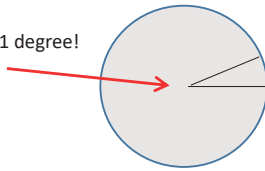
By some fluke of nature, the Minute of Angle angular measurement system maps almost perfectly with yards.

First, let's look at exactly what a MoA is.

Take a circle and take out 1 degree which is  $1/360^{\text{th}}$  of that circle:

The angle pictured is clearly **NOT** 1 degree!

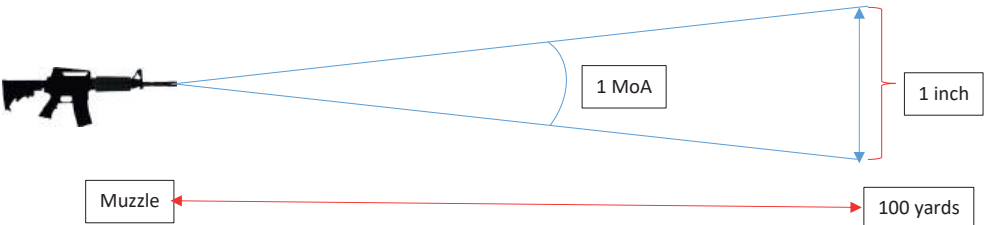
But is simply to give you an idea



Now, take that 1 degree and divide it by  $60 = 1/60^{\text{th}}$  of a degree which is **1 Minute of Angle**.

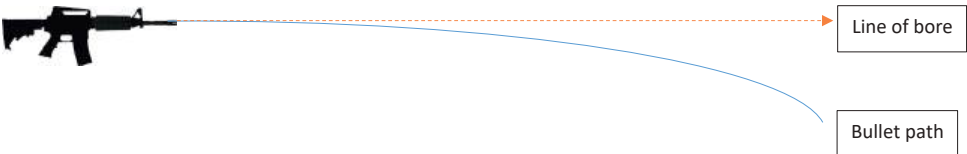
1 Minute of Angle is a very small angle we think you'll agree.

So, take that angle and stretch the legs out to 100 yards. The distance between the legs of the angle are about 1". In fact, they are exactly 1.047" but let's face it, 47 thousandths of an inch equates to the thickness of about 8-10 sheets of paper which is neither here nor there in shooting terms.



This is the basis for applying elevation to sights in order to hit targets at longer distances as bullets are all affected by one thing that is constant on this planet. **Gravity**.

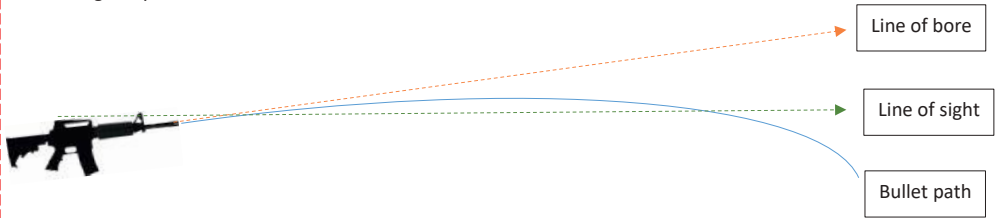
When you fire a bullet at a target, its highest point will always be the line of the bore and as it exits the bore, it will start dropping back down to earth.





## MoA (continued)

To accurately hit a target at a distance, you have to raise the muzzle in order to change the path of the bullet to overcome gravity:



You can see that now you have two options to hit a target at distance:

- Either: Guess and spray bullets all over the place, thus becoming a danger to everybody in the locality and in all likelihood being thrown off the range
- Or:
- Apply an amount of elevation to your sight system to accurately hit the target

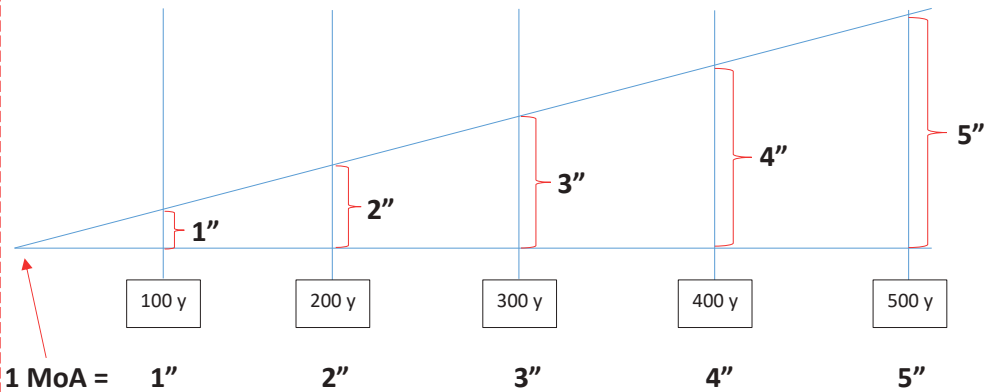
There are basically three different types of sighting systems

- Iron (open sights)
- Scope
- Red Dot

All systems adhere to the same principles when it comes to adjustment but there are some subtle differences.

For a full description on sighting systems, please refer to the relevant section in this manual.

Now that we're happy 1 MoA is roughly an inch at 100 yards, let's look at extending the legs out further.



## MoA (continued)

As you can see, the further the range, the further apart the legs of the angle become but the size of the angle stays the same, in other words, if you come up 5 MoA at **100 yards** – it’s 5”. That same 5 MoA at **500 yards** increases to 25”.

One of the biggest errors by shooters is to get fixated on the relationship of the minute to the inch at 100 yards which is 1 to 1. This error can either cost you a miss at closer ranges or potentially be hazardous at longer ranges.

An example:

You are shooting at a distance of 500 yards. Your rifle is zeroed for 100 yards and you know how much elevation to apply in order to successfully hit the target at 500. You go ahead and apply that elevation.

You fire a shot and the marker tells you that you are 3 feet below the target.

OK, you say. I’m still on the target board so I’ll go ahead and add some elevation. But how much?

- 3 feet = 36 inches – *so far so good*

How many minutes is 36” at 500 yards?

- 36 MoA... surely? – *Oops... you’ve just fallen into the 1 to 1 @ 100 fixation hole.*

At **100 yards**, 1 MoA is indeed 1 inch **BUT**... that same 1 MoA at 500 yards is **5”**

Consult the chart on the previous page.

If you applied 36 MoA to your sights, you’d have effectively elevated them by 36 x 5 or 180 inches which is **15 feet**.

There is a very **REAL** danger you are accidentally throwing bullets clean over the backstop and that is extremely dangerous!

An easy method is to look at the following formula with this data:

Distance	500 yards
Amount of adjustment in inches	36 inches
MoA Value	1 MoA = 5” @ 500 yards



=

—————

= **7.2 or 7 ¼ MoA**

**36**

**5**

MoA value at this range

As you can see, a simple equation.

The top of the formula is the distance in inches your shot is off.

The bottom of the formula is the minute value for that distance, also in inches.

## MoA at ranges Greater THAN 100 yards

We are all affected by one common physical law. **GRAVITY**

In order to successfully and repeatedly hit a target at a longer distance, the muzzle of the firearm HAS to be elevated a certain amount. By using an angular measurement system (MoA), we can very accurately adjust a sighting system but first we need to know how much.

The elevation table below has been formulated based on a number of factors:

- Muzzle Velocity

And

- Ballistic Coefficient (see Reference Section)

<b>ELEVATION TABLE for GGG 155gr Bisley Ammo</b>									
<b>UP FROM</b>	<b>TO</b>								
	<b>200</b>	<b>300</b>	<b>400</b>	<b>500</b>	<b>600</b>	<b>700</b>	<b>800</b>	<b>900</b>	<b>1000</b>
<b>100</b>	1.25	3.75	6.5	9.5	13	17	21.5	26.5	32
<b>200</b>		2.25	5	8	11.5	15.5	19.75	24.75	30.5
<b>300</b>			2.75	5.75	9.25	13	17.5	22.5	28.25
<b>400</b>				3	6.5	10.5	14.75	19.75	25.5
<b>500</b>					3.5	7.5	11.75	16.75	22.5
<b>600</b>						4	8.25	13.25	19
<b>700</b>							4.5	9.5	15
<b>800</b>								5	10.75
<b>900</b>									5.75

This table is relatively easy to use.

For instance, you are zeroed at 100 yards and wish to shoot at 600 yards. Pick up your start distance on the left (100) and follow the row along till you intersect the “600” column. There is a number in it. This is the MoA value you need to apply to your sights in order to guarantee a successful first round hit somewhere on the target (remember safety!)

What value did you find? - If it was “13” - well done, if not try again.

When using tables such as these, it is very important to check and verify your readings as applying the wrong settings to sights at longer ranges could very easily send a bullet over the top of the butts and that means you have no idea where it went.

**REMEMBER – The bullets you fire are all your responsibility until they come to a stop,**

**in the butts behind your target!**

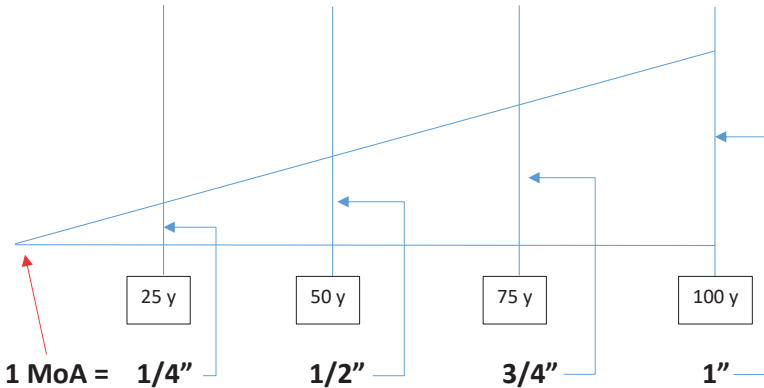
## MoA at ranges LESS THAN 100 yards (continued)

We have already seen that 1 MoA is roughly equal to 1" at 100 yards and you should be fairly comfortable with the fact that as you increase the distance to the target, the distance between the legs of the angle increases proportionately.

But...

### What about distances less than 100 yards?

Let's use the same angle picture used previously but in this case, substitute the longer ranges for those less than 100 yards.



It's the same angle, just closer. This fact is one of the biggest stumbling blocks when it comes to sight adjustment sub 100 yards. Everybody gets a fixation on the **1" @ 100 yard = 1MoA** rule and there is a real potential to use this rule at say 25 yards.

If you fire a shot at 25 yards and the bullet strike is 6" below the target, going to default mode and applying **1" @ 100 yard = 1MoA** and base that formula at 25 yards, you will only elevate your sights by 1/4 the amount you wanted because you are at 1/4 the distance (see above)

Ammunition costs money and you could find yourself blasting away and slowly creeping up the target at a snail's pace when a simple re-assessment of the range will dictate what the MoA value truly is.

So, you're at 25 yards and that bullet you just fired is still 6" below where you want it to be. Remember the relationship of the MoA at 100 yards? Well, let's take that and use it in a little calculation to establish the inch value at closer ranges.

Range you're shooting at	=	inch value for Minute of Angle	So the range you're shooting at is 25 yards so we place that in the equation  The resultant answer comes to 1/4 which is what 1 MoA is at 25 yards	=	1/4"
25 yards			25 yards		100 yards

So the denominator (the number below the line) in this case is **4** as we are at 1/4 the distance (100 yards) and the MoA value is 1/4 too. That denominator becomes our **distance factor**, explained on the next page.

## MoA at ranges LESS THAN 100 yards (continued)

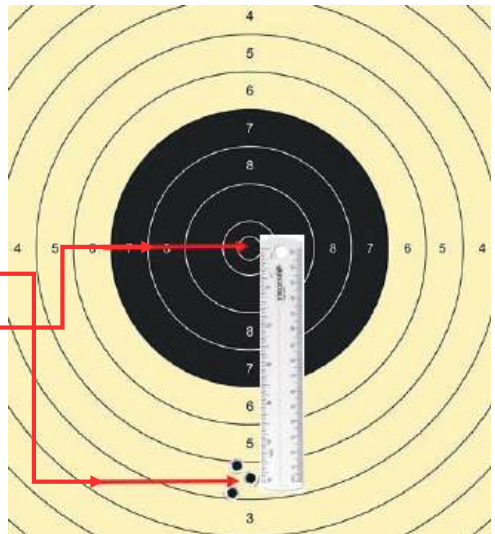
What you don't want to do is fire a shot, click your scope and fire again repeatedly:



All this will accomplish is unzipping the target and wasting ammunition unnecessarily.

What you want to do is:

- fire a shot group
- measure from the bullet hole to where you want to be
- read the inch value and multiply by the **distance factor** (25 y = 4, 50 y = 2 etc.), explained on the previous page.
- apply the changes
- voila!



Once you get the hang of it, it's simple maths but you WILL save yourself a fortune in ammunition!

## The Rail

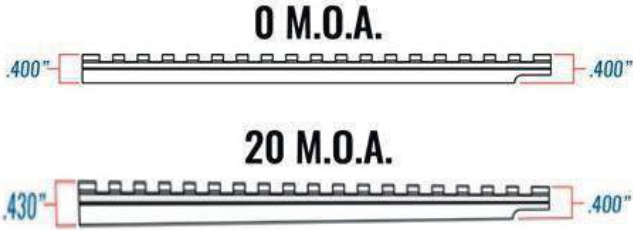
Let's invent a scenario based around a shooter who wishes to shoot out at 1000 yards.

Got a rifle capable of getting out there?	✓
Bought an expensive scope?	✓
Bought the correct size rings and mount to fit it?	✓
Checked the elevation needed to get to 1000 yards = <b>40 MoA</b>	✓
Just checked my scope to see if I've actually <b>GOT</b> that elevation...	Oh...

Scopes are designed so that the elevation setting for around 100 yards is usually set in the middle of the elevation range. This is because scopes are round in appearance and the mid-point on the elevation scale is the widest part or diameter of the scope, utilising the maximum amount of windage at closer ranges. The minimum and maximum are never at the exact top or bottom because there would be no windage available.

A scope with 60 MoA of elevation has effectively only got only about 30 MoA available. Our hapless shooter has probably invested a tidy sum in their equipment and will not get past 600-800 yards as they need 40 MoA and the scope will run out at 30 MoA.

There is a solution and that is an investment in a rail with a number of MoA built in. They look like a shallow ski slope and will compensate for the additional elevation needed. Here's an example of a 0 MoA rail and a 20 MoA rail.



As you can see, there is a small taper leading from the rear to the front:



A 20 MoA rail will claw back 20 MoA from the scope, meaning you have to adjust DOWN 20 MoA and reset your zero so if the scope purchased originally had 60 MoA of adjustment and the zero at 100 yards gobbled up 30 MoA leaving 30 to play with, the addition of that 20 MoA rail claws back that lost 20 MoA, leaving the shooter with 30 + 20 or 50 MoA. Just enough to get them out to 1000 yards with a comfort factor of + 10 MoA.

## Summary

This section has covered the basics of the Minute of Angle. For a description of the other methods of angular measurement used in shooting sports – The Mil, please refer to the Reference Section at the end of this manual

## Refresher Section - MoA

Have a read through these test questions. Anything that doesn't make sense, just refresh yourself by looking through the relevant section again

1. A Minute of Angle is $1/60^{\text{th}}$ of a degree	a) TRUE b) FALSE
2. At 50 yards, 1 MoA is $\frac{1}{2}$ "	a) TRUE b) FALSE
3. In order to hit a target at greater distance, you must:	a) Apply elevation b) Increase magnification
4. If you adjust your scope by 2 MoA at 1000 yards, the bullet will impact approximately 20" from where your last shot went	a) TRUE b) FALSE
5. Gravity will not have a big impact on a bullet fired from over 600 yards away	a) TRUE b) FALSE

Answers:

1	2	3	4	5
a	a	a	a	b

How did you do?

Feel free to read this section again but don't forget that the subject matter will be discussed in the classroom and on the range too.

## Wind – Basic Assessment

As you would expect, the wind does play a significant role in the ability of a shooter to successfully and accurately hit a target consistently at distance.

It is also something that you cannot get away from when shooting on any outdoor range.

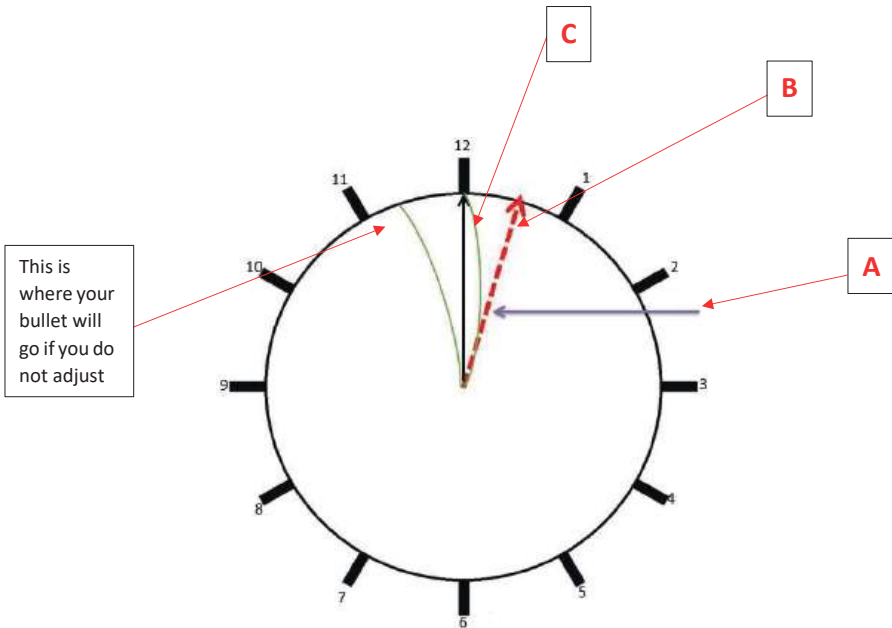
### What effect does wind have?

It will push any projectile in its direction of travel. Depending on the mass and speed of the projectile, it will be affected to a greater or lesser degree. Distance also plays a part. A heavy bullet fired from a 7.62/308 rifle at 100 yards is not going to be adversely affected by a side wind, however a light bullet from say a 22LR will be pushed off course.

### How to deal with wind

- **A** - Establish where it's coming from
- **B** - Adjust the sights INTO the wind by the appropriate amount
- **C** - Fire, assess and adjust further if necessary

At this stage of the course, we are establishing the fact of wind. For a more in depth look at accurate wind assessment, please refer to Module 3 – Wind





## Wind – Basic Assessment (continued)

As mentioned on the last page, wind will have an effect on bullet travel but that effect is by no means similar to all types and styles of bullet. The deciding factors are:

- Bullet Mass
- Bullet Speed
- The bullet's Ballistic Coefficient

For details on Ballistic Coefficients (BC's), please refer to Module 3, Section 1 – The Wind and the glossary.

Let's look at the first two though.

### Bullet Mass

The heavier an object travelling through the air is, the less likely it is going to be adversely affected by wind. In this area, we don't mean volume though. Take for example a motorcycle being hit by a cross-wind and a tractor being hit by the same cross-wind. The motor bike will always be blown further off course than the tractor even though it occupies less volume.

### Bullet Speed

The speed of the projectile also plays a major factor in any effects of a wind. The faster the bullet is going, the quicker it will get through the wind but that wind will still have an effect.

If we look at the two calibres you are shooting as part of this module, you will almost certainly experience wind deflection at 100 yards with the 22 LR rifle but unless you are in a hurricane, there will be no discernible effect on the 7.62/308 Cal bullet at all.

Let's look at the picture on the previous page. You are in the centre of the circle (clock face) firing towards 12 O'clock. Introduce a wind from the right (the purple line) and your bullet is going to be blown off course by a certain amount in a curve.

In order to compensate for the wind, you need to aim INTO the wind and your bullet will still be curved in its flight but it will hit what you were shooting at.

This part of the manual is purely an introduction to wind so you are aware of the overall effects. We will cover how to deal with the effects of wind in much greater detail in Module 3.

## Misfire Drill

A misfire is simply a click when you were expecting a



There are 3 types of misfire:

Issue	Cause
1. No round in the chamber	You've closed the bolt on an empty chamber, there's nothing to go bang because there's nothing in there. OR... During moving the bolt back and subsequently forward, the bolt has overridden the next round in the magazine, known as a "short stroke"
2. Primer faulty	It happens. A primer is a simple ignition source to make the round go off and they do sometimes fail. It's more common with rimfire ammunition due to the nature of how they're manufactured
3. Firearm Failure	The firearm has suffered some form of potential catastrophic failure within its mechanism and is effectively stuck in a limbo-land of "trigger pulled but round not fired"

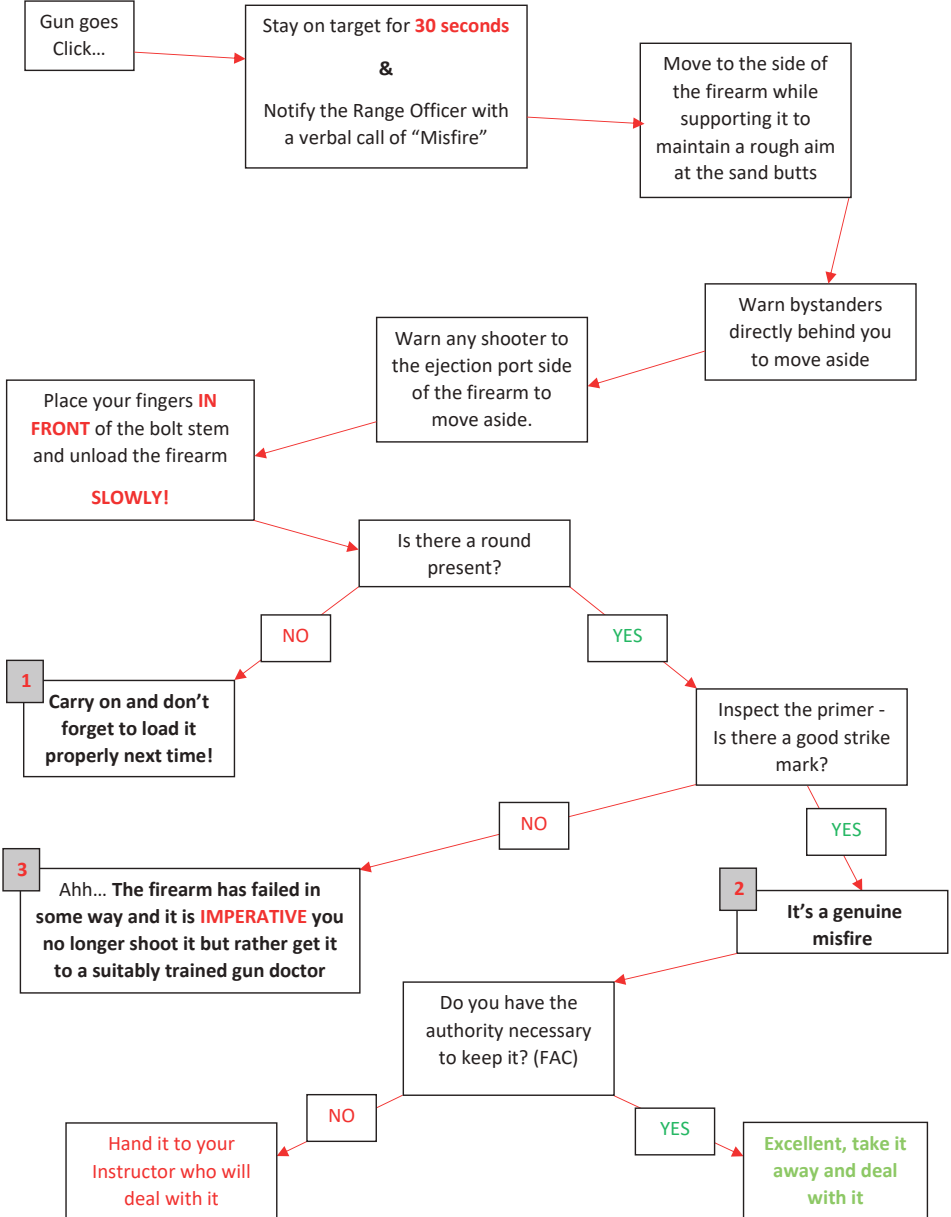
When carrying out the misfire procedure, the firearm needs to be supported and the muzzle pointing safely towards the sand butts and target.

Of these three forms of misfire, the third is by far the most hazardous because the firearm now has to be unloaded to find out the cause. That is why it is absolutely imperative that the firearm be supported and pointing towards the target and sand butts when the drill is carried out.

On the next page, we will go through the necessary steps when dealing with a misfire. The process might look daunting but is in fact a relatively simple step-by-step assessment process that will be shown to you on the range.

## Misfire Drill (Continued)

Here is the sequence for dealing with a misfire:



## Misfire Drill (Continued)

Let's now go through the sequence and detail why each part of the sequence is so important

**30 Second hold:** A round of ammunition is a self-contained vessel containing the propellant and the source of ignition (primer). We give the struck round 30 seconds to ensure that the round does not go off when it is ejected, potentially causing you and others close range injury from fragments.

**Move yourself away from the line of bolt travel and clear behind:** The only thing holding a bolt securely in an action when it is unlocked is a small piece of metal. This blade of metal will be easily sheared off when a bolt comes flying back if the round should fire. Remember Newton's 3<sup>rd</sup> Law which states that for every action (force) in nature there is an equal and opposite reaction. The action of a round of ammunition is no different. You experience Newton's 3<sup>rd</sup> law every time you pull the trigger in the form of recoil. That motion of the bolt travelling back through the action is sufficient to remove parts of your or anybody else's body if it's in the way. It's not going to come out the back of a firearm at 2850 feet per second as its mass is considerably more than a 155 grain bullet in a 308 Winchester but it is certainly enough to seriously hurt either you or an innocent bystander standing behind you.

Similarly, warning people to your ejection port side is important because they will most likely be hit by fragments if the round goes off upon unlocking the action.

**Fingers IN FRONT of the BOLT HANDLE:** When you are unlocking the action and the worst case scenario happens – the round is fired. The force mentioned above will almost certainly be enough to break or remove any fingers BEHIND the bolt handle so always operate the bolt with your fingers in front of the handle!

**If nothing is present:** This phenomenon is called a “short stroke” when the bolt has not been pulled back far enough and doesn't clear the base of a cartridge in the magazine or the shooter has simply forgotten to load.

**Primer inspection:** Always inspect the primer at the base of the case to ensure that there is some form of indent on the primer.



This picture of a fired 308 case shows a good strike mark on the centre of the primer



The strike mark on this primer is very small. This indicates a “light strike” and is a tell tale sign that there is a growing issue with the firearm's firing mechanism. The usual suspect being a weakened firing pin spring but it could be something completely different.

If there is no marking on the primer at all, there is very strong evidence that the firearm has an as yet unidentified problem and it is **STRONGLY** advised that the firearm not be used any more until a suitably qualified person inspects the firing system and ascertains the issue before having the system repaired.

**Legal Authority:** Is exactly what you would expect. Do you have a Firearms Certificate (FAC) **AND** does it have the calibre of ammunition you are using appended to it? If the answer to either question is “NO!”, then **ALWAYS** hand the misfired round to the legal owner or give it to the Range Office Armoury personnel for safe disposal – **DON'T TAKE IT HOME!** – That is a firearms offence which carries life changing penalties.

## Misfire Drill (Continued)

### A witness mark present on the primer

This is not technically regarded as a misfire, but if using a straight pull rifle, if asked to make safe and carry out the unload and show clear procedure, subsequent examination of the ejected rounds primer will most likely show the smallest of marks on the centre of the primer. This is known as a witness mark and is in no way to be confused with a bona fide misfire.

The witness mark is generated when the bolt is being propelled forward into battery by the buffer spring and the floating firing pin pops out of the bolt face under inertia to leave the mark. The inertial power is not enough to set off the chambered round.

### Mistaken Misfires

It is possible for a fellow shooter to mistake a dry fire operation for a misfire and there is the possibility that someone may observe and call a misfire to your attention when it is purely you testing the trigger pressure with an otherwise unloaded firearm.

Another issue with a fellow shooter mistakenly calling your attention to a misfire can happen when you are using very low velocity ammunition in conjunction with a sound moderator (see Reference Section). Typically, the combination would be with a .22 LR subsonic round and effective sound moderator, when the generated firing sound is effectively reduced to almost nothing.

In both instances, a quiet, reassuring word to the neighbouring shooter is all that is needed.

## Conclusion to Day 2

Have a look through the list below and refresh yourself prior to your Day 2 visit

- **Can you remember the NRA Safe Shooting System?**
- **Do you remember the 4 Safety Rules?**
- **Do you remember the Principles of Marksmanship?**
- **Muzzle awareness**
- **Are you happy with how to Boresight?**
- **You know the basics of different iron sighted systems**
- **You are fairly comfortable with the control surfaces of a scope sight**
- **You have a basic idea of the Minute of Angle and what it means**
- **You have a basic understanding of how the MoA and elevation work together**
- **You understand that wind has an effect on bullet path over longer distances**
- **The Misfire Procedure makes sense**

# Module 3

Module 3	Overview
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## Module 3 – Overview

Module 3 of the Probationary Course is all about extending the range you’ve been shooting at to 300 yards and 600 yards in the PM.

The day will start in the classroom like before, where you will be shown how to read the wind, use the score card and how to use the Zero Range & its unique target card

The range session on this Module starts at 300 yards in the morning, followed by a pm session at 600 yards.

### Firearms you will use

You will be using two firearms on this Module and they will be introduced to you in the classroom prior to getting on the range.

<p>300 yards AM:</p> <p>The first is the .223/5.56mm scoped AR15 rifle at 300 yards</p> <p>This is a straight pull, a variant of the bolt action system that you Instructor will show you how to use</p>	
<p>300 yards AM:</p> <p>The 2<sup>nd</sup> is the Enfield bolt action rifle in 303 British</p>	
<p>300 yards AM:</p> <p>The 3<sup>rd</sup> is a 7.62mm Savage bolt action rifle fitted with Vernier sights</p>	
<p>600 yards PM:</p> <p>The last at 600 yards the same as the above but fitted with a scope</p>	

For more detailed information about these four firearms, please refer to the Firearms Reference Section in this manual. The instructors will also explain their working parts to you on the morning of Module 3



## Wind

Please refresh your memory by reading the previous section on wind before proceeding into this section.

### Wind – Detail

As you recall, wind will blow a bullet off its intended flight path. Different calibres react differently and the deciding factors are velocity, mass and something called the **Ballistic Coefficient**.

### What's a Ballistic Coefficient (BC)?

The simple definition of ballistic coefficient is the measurement of a bullet's abilities to overcome air resistance mid-flight. Generally speaking, the higher the number, the lower the drag of the bullet and the better it will effectively cut through the air.

The BC value is between the range of 0.0 (akin to a baby throwing a breeze block) and 1.0 (a laser beam). We usually refer to the older G1 B.C. form factor as there is more information readily available for all bullet types and styles.

You can simulate an example of BC by simply sticking your hand out of a car window at speed. With your palm facing the wind, that would emulate a low BC as your hand is forced backwards by the increased air resistance. Turning your hand sideways to simulate a blade considerably reduces the resistance, increasing your hands BC.

### Wind assessment sequence

In order to successfully hit a target at a long distance, you have to do one of two things:

1. **Aim off** - As the name would suggest, you plot where your shot falls and aim an appropriate distance **into** the wind
2. **Adjust for the wind** - Assess the shot and calculate how much adjustment you need to apply to the sighting system in order to hit the target

On the course, we will teach you both, how to correctly assess the wind and apply the appropriate amount of correction in order to hit the target and how to assess and effectively aim off.

Here's a list of the info you need to assess PRIOR to making any changes to your sights.

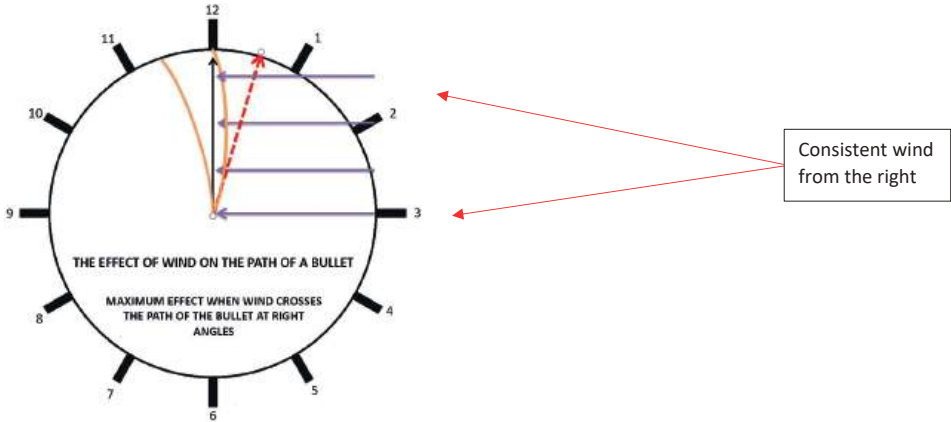
1. **Which side and angle is it coming from?**  
Assessing the direction and angle it's coming at you on the firing point is easy, pick up a couple of blades of grass if need be and throw them in the air.
2. **How hard is it blowing?**  
The speed of the wind can be guessed by simply looking at the range flags you will see at regular intervals on the range floor.
3. **Is it at consistent speed all the way down range to the target?**  
As per the above, looking at all the flags as they approach your position will determine any patterns in the wind

It is for this reason that there are flags on all ranges over 100 yards.



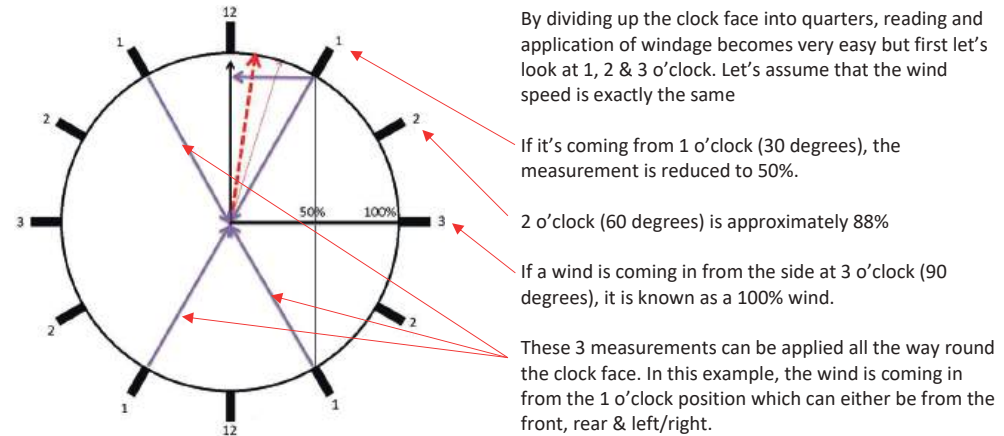
## Wind (continued)

We will now take another look at the wind graphic used in the last section of Day 2 with some additions:



As you recall, in order to compensate for wind, the shot must be fired into the wind by a certain amount in order to successfully hit the target.

You can now see that we have added numbers to the circle in the form of a clock. Having to assess all 12 segments of the clock to assess the wind direction and angle can get confusing so we simply break it down to a quarter of the clock face or 3 segments – 1 o'clock, 2 o'clock & 3 o'clock. We then apply them to the other quarters of the clock face:



What about a wind coming from 12 or 6 o'clock? – It will have virtually NO effect on your bullet, the wind would have to be blowing at a speed that would in all likelihood lift you off your feet and take you with it.

## Wind (continued)

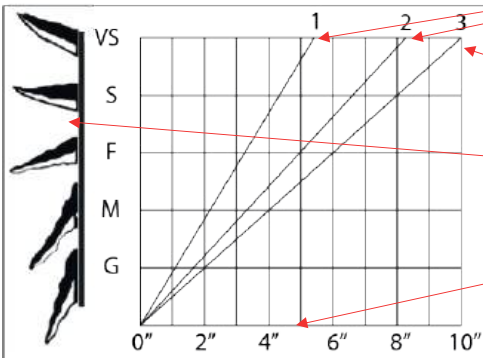
What about 6 o'clock? – There may be a minor lift potentially but this would be down to the topography of the ground in all likelihood.

Using the picture on the last page, you can see that the effect on a bullet is exactly the same if the wind was coming in from 1 o'clock or 5 o'clock. It is also exactly the same as if the bullet was coming from the other direction at 11 o'clock or 7 o'clock.

Remember the question previously - Which side and angle is it coming from?

Once you know what direction (left or right) and the rough angle (1, 2 or 3 o'clock), you can very easily use the wind reading picture on your score card to determine how much wind you need to apply AND, crucially... in which direction.

For your information, the score card is covered in the next presentation but here is the wind graph that is included with the score card. This example is a wind assessment graph for 600 yards.



As you can see, we have three lines on this graph, labelled 1, 2 & 3. If you are thinking that they represent 1 o'clock, 2 o'clock & 3 o'clock – you'd be absolutely correct!

The "y" axis is the wind speed, measured by you looking at a flag down range and matching it as near as possible to the appropriate flag picture.

The "x" axis represents the MoA value required to adjust your sights in order to hit your target

In terms of wind speed:



**Very Strong**      **20+ mph**

**Strong**            **16 mph**

**Fresh**             **12 mph**

**Moderate**        **8 mph**

**Gentle**            **4 mph**

**Light**              **2 mph**

## Wind (continued)

For your information, we do not shoot in wind speeds higher than 25 mph as there is a very real possibility of the actual target screens becoming detached and potentially hitting the markers or other persons below.

### Quick Test:



You are shooting on Century Range 600 yards as pictured above.

- Q 1. What approximate speed are the flags fluttering at?
- Q 2. Which direction is the wind coming from?
- Q 3. **APPROXIMATELY** what angle is the wind coming from (1, 2 or 3 o'clock?)

Don't turn the page until you have a good idea of the answers...

## Wind (continued)

Hopefully you got the following:

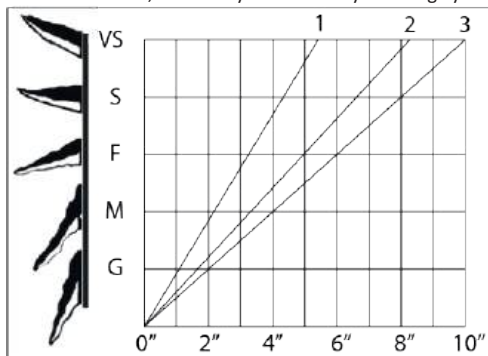
Answers:

Q 1. Fresh

Q 2. The LEFT

Q 3. About 2 o'clock

Based on the data, how many MoA would you change your sights?



- a) 12 MoA LEFT
- b) 2 ½ MoA RIGHT
- c) 5 MoA LEFT
- d) 6 MoA RIGHT

To find the answer, identify the wind speed and follow the line along until it intersects the desired o'clock. Once found, drop your finger down to the base on the "y" axis and read off the number.

Hopefully, you came up with the correct answer which is option (c). The wind is coming from the left so that's the way you want to adjust your sight system first. The flag looks roughly like it's blowing at a fresh speed of approximately 12 mph and judging from the picture, it is blowing over your left shoulder (from behind) at approximately 2 o'clock.

For your information, the graph above is designed for the 308 Winchester/7.62x51 NATO cartridge and this example has been formulated for 600 yards.

This graph works equally well for most standard velocity (approximately 2700- 2850 FPS) full bore calibres.

## Conclusion

As you can see from the previous example, it doesn't really matter if the wind is coming in from in front or behind you as the 1-2-3 o'clock method will work just the same.

Always double check though WHICH DIRECTION it's coming from. You might think that's obvious but there are many shooters who've gone the wrong way.

During Day 3 in the afternoon, you will be shooting at 600 yards. Read the graph on your score card after looking at the flag behaviour and talk to your Instructor.

Remember though that you can be forgiven for getting it wrong with reading the wind. What you cannot afford to get wrong is **ELEVATION!**

## Module 3: Section 2:

### The Score Card

The score card contains a number of very useful elements to the shooter. One thing to check though BEFORE using a card is that it's the right card for the distance you're shooting at. We will examine two score cards as reference in this section. One for 600 yards and one for 1000 yards.

First though, let's look at how the card is built up.

Please note, this section refers to the NRA Training score card, as used on Days 3 & 4. You will also see variants of this card with a graph across the bottom of the card. The methods for filling in this portion are not covered by the Probationary Course but are in fact covered by the Target Rifle follow on course.

Always check this first!

NRA Training Target Score Card

Range	600 yards	Name		Course Date	
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Physically mark your shots on the card as they are transmitted to you

Work out elevation and windage adjustments based on shot grouping using the MoA squares

The image shows the NRA Training Target Score Card. It features a target grid with concentric circles and MoA squares. To the right of the target is a score table with columns for Shot, Hit, Miss, and Score. Below the score table is a windage graph with a vertical axis for windage and a horizontal axis for elevation. Red arrows point from the text annotations to the corresponding parts of the score card.

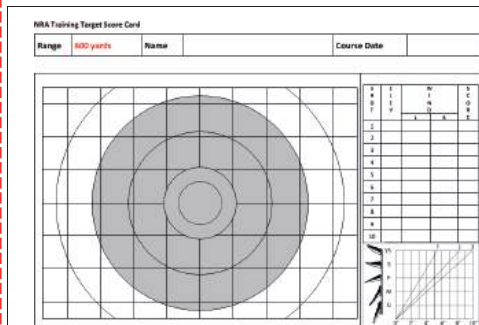
Record your score

Record windage & elevation changes

Lookup graph for calculating windage

## The Score Card (continued)

Below is a representation of two score cards. One for 600 yards and one for 1000 yards. The layout of both cards is the same but the distance is obviously different.

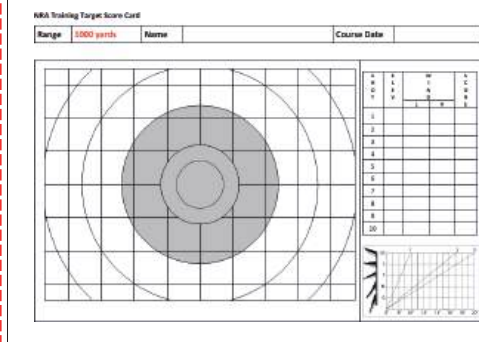


As you can see, the grid for these two cards are dissimilar. The target dimensions are also completely different.

Cast your mind back to what the approximate Minute of angle is at each of these distances:

- @ 600 yards, 1 MoA = 6"
- @ 1000 yards, 1 MoA = 10"

So, if you were to use a 1000 yards score card at 600 and your bullet strike was at 3 o'clock, cutting the line between 2 & 3, you'd have to guess as the line is slightly outside the card diagram. Your guess would probably be 5 MoA based on the grid.



Compare that with the real value of 3 ¼ MoA on the 600 score card

You can also see that the scoring rings for 1000 are only shaded for the V-Bull, Bullseye & 4 ring whereas the 3 ring is also shaded on the 600 target. This will almost certainly introduce further errors as you will probably plot according to shade.

This error, coupled with the previous one will produce a shot at 9 o'clock. You will be chasing errors and firing off additional ammo needlessly.

The score cards pictured above are different from the regular NRA scorecards available at the Range Office and are only used by the NRA Training Department as we have maximised the card for looking at groups and calculating windage and elevation changes.

The standard NRA Scorecard is pictured at the end of this section. So, how do you use the cards?

When a shot is fired:

- the marker will pull the target down
- find the hole
- put a fluorescent marking disk in it
- move the paddle to the correct hole at the bottom to confirm the ring hit
- push the target back up again

Sounds familiar? You carried out this process during your training on Day 2.

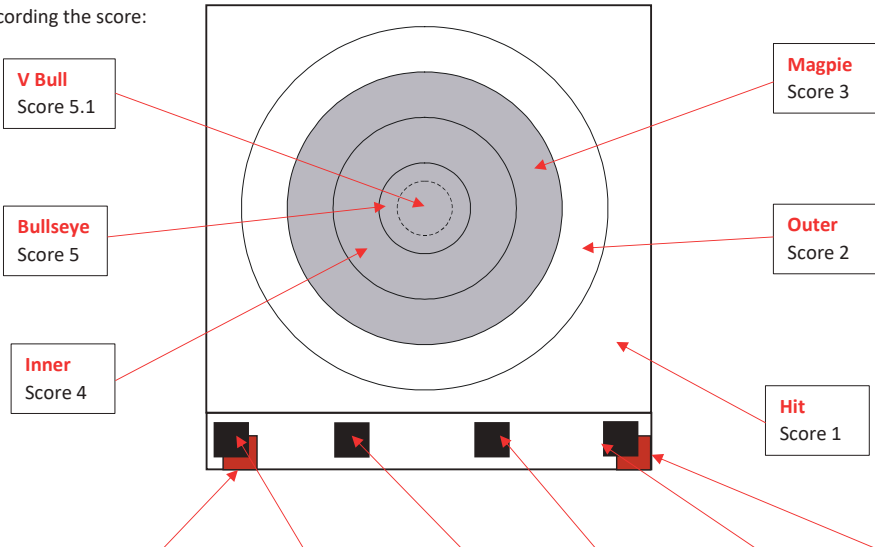
## The Score Card (continued)

### How to read target information

The target is pulled down every time you fire and a marker will indicate your bullet hole on the target with a fluorescent orange disk and a qualifying plate at the base of the target, confirming which ring the bullet struck. As you can see, there are 6 scoring zones on the target. If you miss, it's no score!

The base of the target is divided into 4 zones as you can see below. The far left is for recording a 1 (Hit) & 2, middle left for a 3, middle right for a 4 and far right for both 5 and 5.1 (V Bull).

Recording the score:



Term	Hit	Outer	Magpie	Inner	Bullseye	V Bull
Shown on bottom of frame as:	Orange plate on position 4 – far left	Black plate on position 1 – far left	Black plate on position 2 – centre left	Black plate on position 3 – centre right	Black plate on position 4 – far right	Orange plate on position 4 – far right

Don't worry too much about using terms like "Magpie" etc. We have included them for reference only.



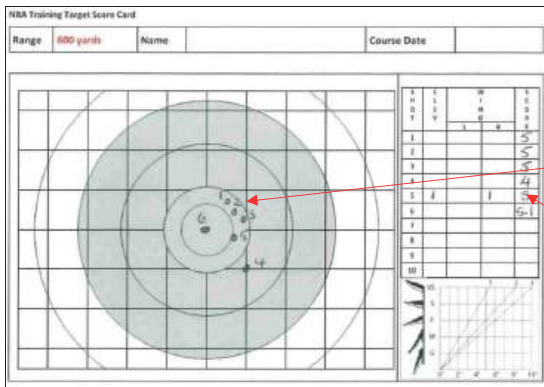
## The Score Card (continued)

Now you know where to mark the shots fired on the card by simply reading the information presented to you by the marker. Always double check the paddle position at the bottom of the target when plotting your shots on the card.

Let's look at this process in detail. You are shooting on target 41. As you can see, you got a V Bull – congratulations!



Have a closer look at the fluorescent marker placed in the bullet hole and compare it to the target on No 43. They look almost in the same place. That's why the paddle is used at the bottom of the target to confirm the scoring ring.



1. Assess EXACTLY where the fluorescent marker is on your target (above)
2. Mark it on the score card
3. Record the score and any corrections you made prior to firing in the column on the right
4. As you can see, record any changes to your sights, useful when returning your sight system back to its zero point

Filling in a score card is a useful tool, by referring to previous cards you can assess elevation & windage, your skills and whether your rifle is starting to lose its accuracy to name but a few.

## The Score Card (continued)

We just mentioned returning your sighting system to its zero point. This is very important as there is nothing worse than taking a firearm to a range and having no clue what range it was last shot at. Here’s an example:

- You used your rifle at 1000 yards and the elevation to hit the target with YOUR rifle is 40 MoA.
- You put it away without returning the sights to your chosen start point of 100 yards (your Zero Point)
- 4 weeks later, you are shooting at 600 yards.
- Your rifle needs 15 MoA to hit the target at this range
- You go ahead and apply 15 MoA

Let’s break this down in terms of compounding the error.

- We’ve got a Zero Point of 100 yards, your base from where you mostly shoot and from where you usually elevate from but...
- There are 40 MoA already applied from a previous shoot
- You just added 15 MoA to shoot at 600 yards
- There’s now a grand total of 55 MoA applied to the sights.

Remember Day 2 and the Minute of Angle

We’re at 600 yards - 1 MoA at 600 yards is 6”

We’ve got 55 MoA on our sight system, if 15 would get the bullets in the centre of the target and we’ve got an extra 40, how many inches are we going to be **OVER** the target?

Simple maths:  $40 \times 6 = 240'' = 20$  feet.

20 feet is just over 6 metres so that bullet will **NOT** be captured by the butts. Always remember that a bullet in flight, fired by you is **YOUR** responsibility until it comes to a dead stop...

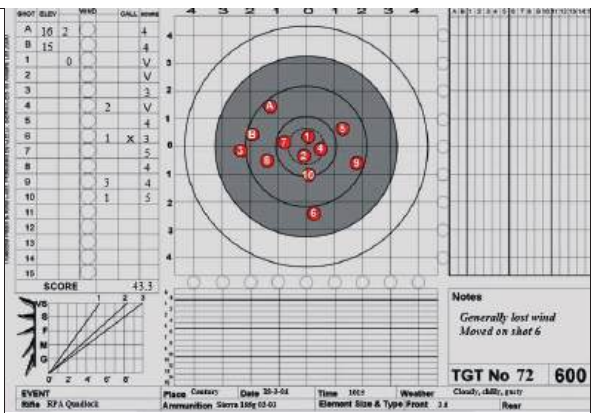
By correct use of the score card, you can easily remove any windage and elevation you applied so you always have the same start point to go from. Here’s an example of a filled in card:

This example is a card shot by a target rifle shooter. You will be using a target rifle in this Module for reference.

Shots “A” & “B” are what is known as sighters. They enable you to confirm zero and make small adjustments to your sights before shooting a 10 shot string.

As you can see, the shooter made a couple of changes to their sights during the shoot, mainly to compensate for the variable wind.

The “X” in the call column indicates the shot was bad so the shooter didn’t base their changes on that shot (no 6)



## Module 3: Section 3:

### The Zero Range

#### What's the Zero Range?

The Zero Range is a short range facility that is used at Bisley to check the zero of a firearm prior to making a visit to the actual range you want to shoot at, either for the first time or if you have made any changes to your sighting system.

It is virtually impossible to have a bullet leave this range by putting on far too much elevation but always remember, a range is only as safe as the people using it so if a rifle is fired at a 45 degree angle from the firing point, the bullet will leave the range template.

Remember Safety Rule No 2 – **ALWAYS POINT THE FIREARM AT YOUR TARGET**

Cast your mind back to Module 2 and the section on the Minute of Angle. You will recall that 1 MoA is EXACTLY 1.047 inches at 100 yards so that is why the Zero Range is 71 feet and 7 inches long so that 1 MoA is EXACTLY  $\frac{1}{4}$  inch at this distance.

For example: If your scope has 75 MoA of elevation available, the maximum height you can get a bullet from the centre line height would be  $75 \times \frac{1}{4} = 18 \frac{3}{4}$  inches above. You'd be safe on this range. Remember our previous example in the previous section about shooting at 600 yards. Dial up 75 MoA and you could theoretically be:

$$75 - 15 \text{ (your theoretical rifle) } \times 6 \text{ (1 MoA = 6 inches @ 600 yards) } = 300 \text{ inches} = 25 \text{ feet} = 7.62\text{m}$$

For info, on Century Range the Target Centre Height (where your bullets **SHOULD** be going) is just over 3 metres **BELOW** the top of the sand butts behind.

#### How to use the Zero Range?

There is one overriding factor when it comes to how a bullet reacts once it leaves the muzzle of a firearm and that constant is – **GRAVITY**.

To successfully hit a target at distance, the bullet must travel through a trajectory that will potentially take it above the height of the target before striking it. This all depends on the range. A bullet fired at 1000 yards can potentially reach a height of 35+ feet ABOVE the target centre height before coming back down and hitting it.

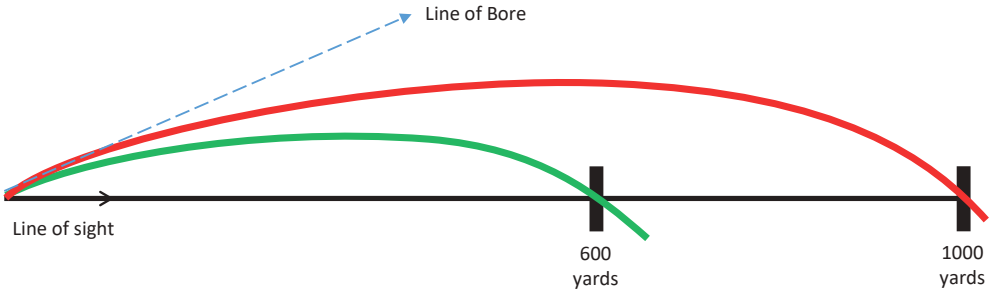
It is a common error to think that the bullet travels ABOVE the line of the bore. Gravity sees to that. You can experiment by throwing a ball. It will never climb above the line you threw it unless it develops wings or its own propulsion system!

We can use the fact that the bullet will follow a particular trajectory by simply inserting a target closer to the muzzle and applying the calculated elevation. The barrel is elevated by the sight setting and the bullet will cut through this intermediate target at a predicted height above the line of sight.

Let's look at this step by step next:

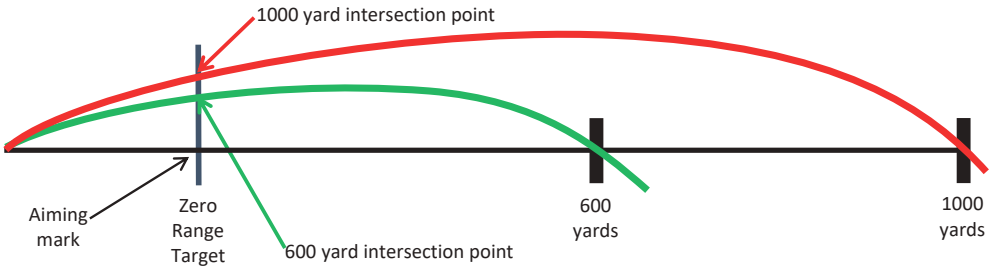
## How to use the Zero Range? (continued)

Let's say we are zeroing our theoretical rifle for 600 and 1000 yards for the first time.



Above is what you'd expect the trajectory to look like for the bullet to travel out to these two respective distances. The blue dashed line is the line of bore for reference.

You can see that at a much closer range, the bullet is already climbing through its trajectory so we can place a target much closer to the muzzle and use that trajectory to roughly zero our rifle at these two distances:

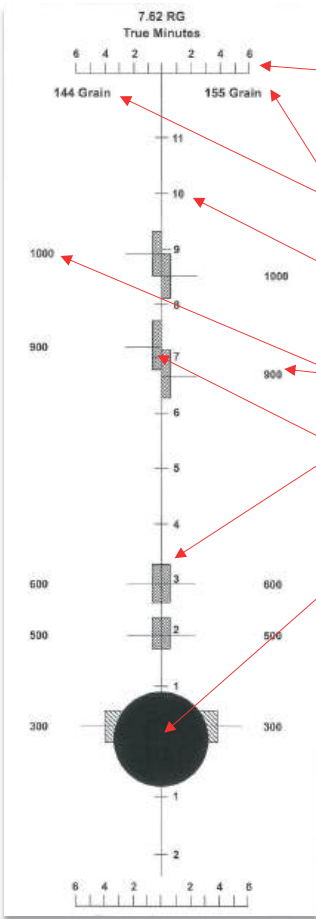


By adjusting the sights but aiming at the same mark throughout the exercise, you can effectively calculate how much elevation you need in as little as 3 rounds of ammunition. This process is infinitely safer than guessing on a long range and has a marked saving on your pocket in expended ammo too.

Always remember when using the Zero Range to aim in the same place throughout the zero process!

Let's now look at the actual card you will use on the Zero Range, known as the "Zero Card", available from the NRA Range Office.

## The Zero Card



At first glance, this card looks a little confusing so let's break it down into its constituent parts.

As you recall from the beginning of this section, the Zero Range is EXACTLY 71 feet and 7 inches long so that 1 MoA is EXACTLY  $\frac{1}{4}$  inch at this distance. The graduations across the top & bottom are TRUE MINUTE values at this distance

The Zero Card was originally formulated for the 7.62x51 NATO cartridge using 2 different bullet weights, 144 & 155 grains.

Next, you see vertical values running up the centre line, these are inch values, not distance. They are placed there for your benefit in measuring and assessing but many people get them confused with distance.

These values represent the RANGE you wish to zero for, dependant on the bullet weight you are firing.

The shaded areas represent a SAFE fall of shot at the target end. You can see that there are two for each range because the card is designed for two different weight bullets and their flight characteristics will be different the further away from the target you are.

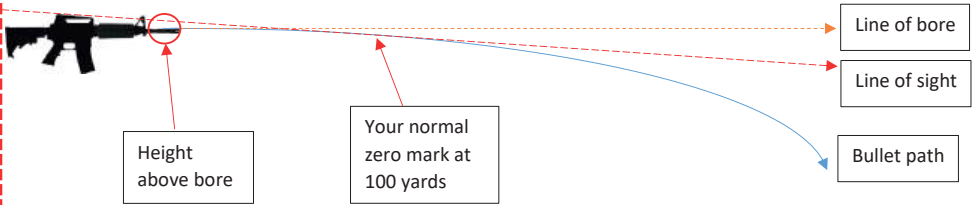
This black blob is your aiming mark and is the **ONLY** area you should be aiming at throughout this zeroing process.

Avoid adjusting your sights so that you hit the aiming mark because of two reasons:

1. Your sights will not be set where you think they are at closer ranges like 100 & 200 yards. You need to take the centreline of your sights and measure to the centreline of the bore to give an approximation of a 100 yard zero
2. As more bullets hit the aiming mark, the shape will become distorted and your eye will naturally try and adjust your aim to compensate. This increases the chances of inaccuracy at distance

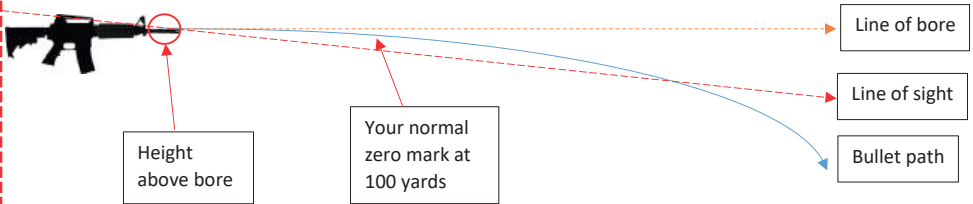
## The Zero Card (continued)

Let's expand on point 1 from the previous page.



You can see from the picture above that at very close range (like the Zero Range), the line of sight is above the line of bore so that at close ranges like the Zero Range, your bullet strike should be below the aiming mark because there is no discernible bullet drop from a centrefire rifle round at this range.

If you did adjust your sights to strike the aiming mark, your subsequent shots would strike higher than expected at your normal zero mark, in this example it's 100 yards.



The fall of shot would be dictated by the distance between your sight height above the bore so if we take an example of a scoped centrefire rifle, the average height would be approximately 2 inches so expect your shots to be somewhere in the same neighbourhood at 100 yards. It's not a game changer but you will have to adjust your sights accordingly with needless wastage of ammunition.

So, how exactly do you use the Zero Card?

## The Zero Card (continued)

Let's go through the process of setting up and using the Zero Card for 1000 yards when your rifle is set for 100 yards.

- Pick up **two** cards from the Range Office when you book on to use the Zero Range
- Set up one card at the butts so that it is perpendicular to the ground, use a plumb bob to achieve this
- If using a scope, adjust down your magnification and parallax setting to get as clear an image as possible
- Adjust the elevation setting at least 10 MoA **UP** so you don't strike the aiming mark
- Write down your current elevation & windage settings
- Fire a shot
- Assess the fall of shot and append it to your 2<sup>nd</sup> target
- Measure the inch value on your 2<sup>nd</sup> target for windage and elevation and write them on the card
- Calculate the MoA values you need to apply in order to hit at 1000 yards
- Apply the changes to your sights
- Fire a 2<sup>nd</sup> shot
- Assess the 2<sup>nd</sup> fall of shot and append it to your 2<sup>nd</sup> target
- It should be EXACTLY where you wanted it to be but...
- Always fire a 3<sup>rd</sup> shot to confirm your new zero mark
- It's a good idea to record your new settings as part of the process for future evaluation

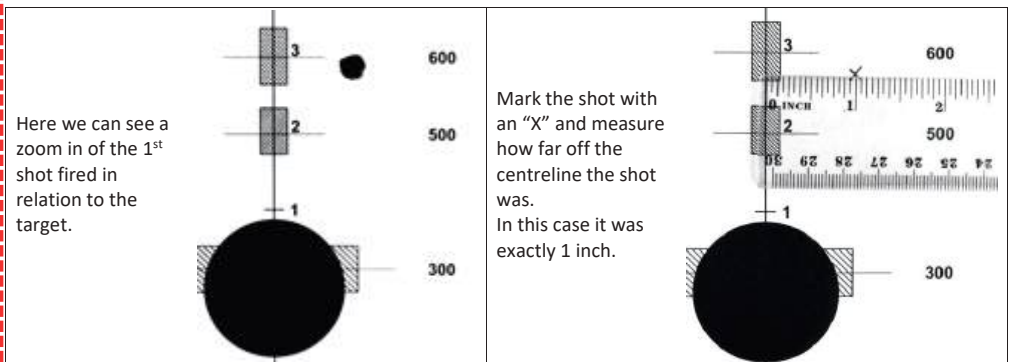
Now we'll go into greater detail of some of the points above.

You will ideally need two cards but it's not essential. One obviously for shooting at and one for plotting your hits and making calculations with on the firing point.

By setting up the card and ensuring it is as straight as possible will greatly reduce the chances of any windage errors creeping in when you carry out this drill.

The idea of adding an amount of elevation BEFORE you start the process guarantees that you will not inadvertently strike the aiming mark.

Once you have fired the first shot, assess the strike on the target and if you have a 2<sup>nd</sup> target, plot it accordingly. This gives you a much easier method of calculating the adjustments to your elevation and windage.



## The Zero Card (continued)

So, we've assessed the 1<sup>st</sup> shot for windage and found our sights are off. The return measurement is exactly 1 inch to the right of where we want to be so the next question is, how much would you think the windage needs adjusting?

The data:

- It's 1" off to the right
- The Zero Range is EXACTLY measured so 1 MoA is **EXACTLY** ¼"

We're at ¼ the distance so we multiply the exact inch value by 4 so 1" x 4: = 4

Now we know to move the windage on the sights 4 Minutes of Angle.

But which way?

That'll be left!

Next, we need to mark a line that bisects the centreline corresponding to the bullet just fired and measure from this line to where we actually want to next bullet to go:

We want to zero the rifle for 1000 yards, using 144 grain ammunition so we need to pick the left side of the card

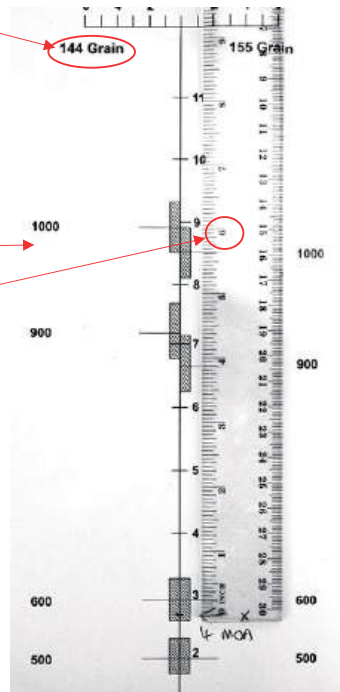
As you can see from the bottom of the ruler, we've marked off where the bullet would intersect the vertical line, this is the point at which we measure from.

Remember, all measurements have to be in inches to make the system work

We want our next bullet to hit here

If you look at the ruler, that line at 1000 yards on the left is exactly 6 inches away from where the 1<sup>st</sup> bullet was.

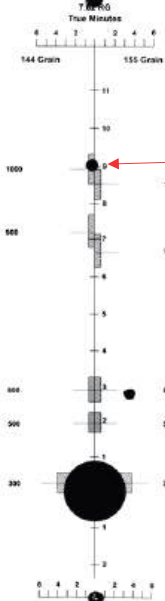
Again, it's simple maths of 6 x 4 which comes to exactly 24 MoA and that's the amount of MoA you need to apply to the elevation in order to successfully intersect the 1000 yard point





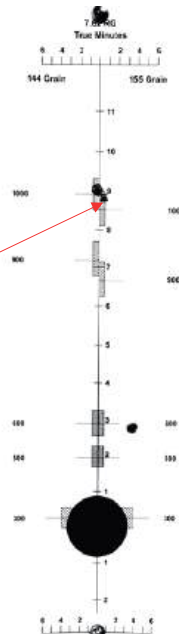
## The Zero Card (continued)

Once you've applied the elevation, fire a 2<sup>nd</sup> shot to confirm your calculation:



Here's our 2<sup>nd</sup> shot, exactly where we wanted it to be but...

Always confirm with a 3<sup>rd</sup> shot, just to make sure...



Congratulations, you've zeroed a rifle for 1000 yards using 144 grain ammunition

There is one thing you cannot do on the Zero Range though and that is work out how much wind to apply, based on the conditions. That job must be accomplished by you once on the 1000 yard firing point by following the process laid out previously in this Module.

## Conclusion to Day 3

Have a look through the list below and refresh yourself prior to your Day 3 visit

- **Can you remember the NRA Safe Shooting System**
- **Do you remember the 4 Safety Rules?**
- **Remember your muzzle awareness at all times**
- **Remember the Principles of Marksmanship**
- **Refresh on Minutes of Angle**
- **Have a look at the Elevation Table on Day 2**
- **Feel comfortable with reading the wind and applying the graph**
- **Have a general understanding of how the scorecard works**

Here are a couple of brain teasers for you to answer prior to Day 3. See how you do

1. Would a wind coming from directly behind you have any noticeable effect on the path of your bullet?
  - a. None
  - b. It would increase the muzzle velocity
2. How many “O’clock” positions are depicted on the wind graph, located on a standard NRA scorecard?
  - a. 12
  - b. 3
3. The gridlines on NRA scorecards represent individual MoA squares?
  - a. No, they are a conversion to inch values
  - b. Yes

Answers: Q 1 – a, Q 2 – b, Q 3 – b

# Module 4

## Module 4: Section 1

### Refresher

Module 4 is all about refreshing the topics you have learned throughout the course before applying those skills to successfully shooting (accurately!) at 1000 yards with a scoped 308 Win calibre rifle.

For this section of the Module, have a look back through Modules 2 & 3 before attending the course so you are fully comfortable with the processes behind applying elevations based on an elevation table and reading the wind conditions prior to shooting.

To summarise, to successfully complete this Module you need to refresh yourself on:

- Minutes of Angle
- Scope controls
- Using the Elevation Table
- Application of elevation to a scope
- Reading and gauging the wind
- Application of the correct windage to a scope
- Using the score card

To put the shoot into perspective, 1000 yards is just over  $\frac{1}{2}$  a mile. Remember Module 2 and the maximum range a 308/7.62 will travel. Modern firearms equipped with good sight systems that have enough elevation built in **WILL** accomplish accurate shooting at this distance.

This distance is daunting but remember, the training you've received to date is perfectly adequate for you to successfully and repeatedly hit the target.

Once you have successfully completed this Module, you will be issued with a restrictive 1 year SCC, dated from the day you were approved for Probationary Membership. This will allow you to:

- Attend the following optional additional activities, aside from your remaining mandatory probationary sessions of 2 x Shooting Club and Final Briefing Session:
  - NRA Shooting Club
  - 1 – 1 Training
  - Skills Courses (includes Gallery, CSR, Target Shotgun, Handgun and Precision Rifle only)
  - Competitions
  - Shooting under the supervision of a full NRA-Member, who holds a full SCC in the category of shooting you wish to do
- Hire firearms, for NRA organised events only
- Purchase ammunition, for NRA organised events only

## Refresher (continued) & some new Info

Module 4 Section 2 is both a refresh on prior lessons but also comprises elements of firearms general knowledge. You will revise the following topics as part of the refresh portion of part 2 in the classroom:

- The Safety Rules
- Stop, Stop, Stop
- Misfire Drill

We will also cover the following:

- Hooter Signals
- Home Office Approved Clubs
- Black Powder regulations
- Firearms Laws
- Firearms security
- Range Office Booking Procedures
- Using an NRA Radio
- NRA Rules & Regulations
- General Responsibilities
- NRA Safe Shooter System
- NRA SCC
- Basic Range layouts

### Hooter Signals

The hooter is a claxon that is repeated via outside speakers all over the camp to alert all present for various reasons

- Starting shooting (AM & PM) – The hooter sounds once
- Stopping shooting (AM & PM) – The hooter sounds twice
- Camp-wide emergency STOP-STOP-STOP – The hooter sounds no fewer than 4 times in quick succession

**If you hear the hooter sound 2 or more times or outside of usual claxon timings (AM/PM):**

- Immediately unload and show your firearm clear to a neighbour on the range (if present)
- Pack up your firearm(s) and ammunition in their carry cases to effectively “sanitise” the range of firearms by placing them in a car or other transportation, **off** the firing point
- If you are the sole range user, notify the Range Office on the Control frequency that the range is clear of firearms
- Monitor the control frequency for any updates
- **DO NOT** try and help with any suggestions as you will tie up the control frequency which is shared with the Military and you will receive a short and curt negative reply with a request you stay clear of what is now deemed the **EMERGENCY CHANNEL**
- **NEVER** assume it is safe to continue firing just because you can hear gunfire in the distance
- Wait for the single blast from the hooter and subsequent announcement on the Control Channel before shooting again

## Home Office Approved Clubs (HOAC's)

The NRA is the UK's largest Home Office Approved Club (HOAC) with numbers in excess of 10,000 members. Below is an excerpt from the Home Office web site:

“Under section 44 of the Firearms (Amendment) Act 1997, a person wishing to possess a rifle or muzzle- loading pistol solely for target shooting must be a member of an approved rifle club or, as the case may be, approved muzzle-loading pistol club. Section 44(1) (b) requires an approved club to be specified on the firearm certificate. The certificate should not list all clubs of which the holder is a member.

Any rifle, miniature rifle or muzzle-loading pistol club can apply to the relevant Secretary authority (i.e. the Home Office for clubs in England and Wales or the Scottish Government for clubs in Scotland) for approval. Approval is granted under section 15(1) of the Firearms (Amendment) Act 1988 (as amended by section 45 of the Firearms (Amendment) Act 1997).”

Which means:

Club members, including those who do not hold a personal firearm certificate, may possess (use) club- owned firearms and ammunition (and firearms of the above types owned by other club members) “when engaged as a member of the club in connection with target shooting” (Section 15(1) Firearms (Amendment) Act 1988 as amended by Section 45 Firearms (Amendment) Act 1997).

In essence, you can legally shoot at a HOAC without an FAC as you are covered by Section 15(1).

What it **doesn't mean** is you may take away from that club restricted items such as firearms and/or ammunition. If you are caught with any of these outside of your clubs boundaries, you are liable to arrest, a heavy fine and possible imprisonment.

The result being you may never be allowed to possess or even touch a firearm again. It also includes ownership of air weapons too if you are prohibited under Section 21 of the Firearms Act 1968.

You will have a criminal record that will follow you to your last days **AND** this makes you ineligible for many visas to visit other countries.

OK, now that we've got that out of the way. What can you legally do by being a member of a HOAC?

HOAC's **can** own and issue to their members the following:

- Full Bore Rifles (Bolt action, Straight pull, Lever Action)
- Small Bore Rifles (Bolt Action, Semi Auto, Lever Action)
- Muzzle Loading Pistols

HOAC's **cannot** own or indeed issue to their members the following:

- Any Section 1 Shotguns
- Long Barrelled Handguns (.22 Semi Auto and Full Bore revolvers) However...

If you have a S1 shotgun or LBP/R on your FAC, you may use it **BUT**, you cannot let anybody else “have a go”, even if they have a valid FAC with that class of firearm appended to it. So, no sharing, borrowing or trying out is allowed at all. You are effectively breaking the conditions of your FAC and if caught, the Police will almost certainly revoke your FAC at the very least. For more information on LBP/LBR's, please look at the section in “Reference Material”

## Black Powder

Currently, the NRA Probationary Course does not cover the use of black powder or indeed muzzle loading firearms as that is covered by courses designed and delivered by the Muzzle Loaders Association of Great Britain (MLAGB) but we do cover some of the laws currently in effect, governing the use of black powder on NRA Ranges.

Due to its nature, black powder is deemed an explosive as opposed to the powder in modern metallic cartridges which is collectively known as shooters powder and is deemed propellant.

In order to use black powder or a substitute (Pyrodex), you first need to apply to your local force area Licensing Authority via the local Explosives Liaison Officer for an Explosives License. Applications can be downloaded from most force area websites. They will advise you to apply for a keep and acquire Explosives License. We will not cover the format for this process as it is outside the scope of this document but there are certain rules you need to observe should you want to get involved in muzzle loading.

- You **CAN** shoot a muzzle loader that has been **pre-charged** by the legal owner as long as **THEY** have an Explosives License
- You **CANNOT** handle the black powder/pyrodex or use it to load the firearm though without a valid Explosives License

There is also a small section on black powder and cannons in the Reference Section.

Please note that at time of writing, the use of Pyrodex is no longer allowed without an Explosives License as it is no longer deemed a shooters powder but rather an explosive. For all queries regarding the use of muzzle loading firearms, please contact the MLAGB.

## The Law

There are at least 20 Acts of Parliament, Statutory Instruments and Amendments to Firearms Laws plus a number of other Acts that reference the use of firearms. To keep on top of all of these information sources is an onerous task.

As an NRA member, you have access to the NRA Safety, Legal & Technical Team who can help with queries about the Law and how it affects you.

When you apply for and subsequently receive your Firearm Certificate (FAC), you will notice the section entitled “Conditions” which comes after the 1<sup>st</sup> section on your personal details. The Conditions section basically and very **explicitly** tells you exactly what you can and cannot do. The first 4 Conditions are statutory and any others are appended as additional conditions depending on what format of shooting you are conducting and is dictated by the Chief Officer of Police for your area.

### Condition 1

*The holder must, on receipt of the certificate, sign in ink with his/her usual signature*

**Meaning:** Sign your FAC as soon as it pops through the door!

### Condition 2

*The holder of this certificate must inform the Chief Officer of Police by whom the certificate was granted as soon as reasonably practicable, but in any event within 7 days of the theft, loss or destruction in Great Britain of the certificate and/or the theft, loss, deactivation or destruction of any firearms and/or the theft or loss of ammunition to which this certificate relates*

**Meaning:** This condition covers the loss, theft or destruction of your FAC and the loss, theft, destruction or deactivation of you firearms and the loss or theft of any ammunition

### Condition 3

*The holder of this certificate must, without undue delay, inform the Chief Officer of Police by whom the certificate was granted of any change of permanent address*

**Meaning:** You HAVE to notify your Firearms Enquiry Team of any move, including where firearms and ammunition are to temporarily stored until your security of them is established to the satisfaction of your Firearms Licensing Officer

### Condition 4(a)

*The firearms and ammunition to which the certificate relates must at all times (except in the circumstances set out in paragraph (b) below) be stored securely so as to prevent, so far as is reasonably practicable, access to the firearms and ammunition by an unauthorised person*

**Meaning:** Always lock up your firearms and ammo when not being used, no exceptions!

### Condition 4(b)

*Where a firearm or ammunition to which the certificate relates is in use or the holder of the certificate has the firearm with him for the purpose of cleaning, repairing or testing it or for some other purpose connected with its use, transfer or sale, or the firearm or ammunition is in transit to or from a place in connection with its use or any such purpose, reasonable precautions must be taken for the safe custody of the firearm or the ammunition*

**Meaning:** When transporting your firearms and ammunition from where they are stored to where you're going, you HAVE to ensure their safety and security is paramount.



## The Law (continued)

In the case of persons under the age of 18 years, the following will also be added to Condition 4:

where the holder of the certificate is under the age of eighteen, arrangements must be in place for ensuring that either the holder's parent or guardian or a person aged eighteen or over who is authorised under the principal Act to have possession of such firearms and ammunition to which the certificate relates assumes responsibility for the secure storage requirements set out at a) above

Failure to comply with these or any other conditions will result in a potential maximum of **six months imprisonment** and/or **a fine** so it's desperately important you thoroughly read and understand the conditions on your license when you receive it.

### Transportation

As you've already seen, Condition 4(b) covers the actual transportation of any firearms and ammunition and the term "reasonable precautions" is mentioned again.

Let's look at a few scenarios regarding a shooter attending a competition far enough away from their home that involves staying over at a hotel.

Option A – Leave the firearm, ammunition and all related shooting paraphernalia in the boot of the car overnight and ensure it's locked

Option B - Leave the firearm and all related shooting paraphernalia in the boot of the car overnight and ensure it's locked but first remove the bolt or render the firearm inoperable through some other means and take it plus the ammunition with you and secure it in your room

Option C – Inspect the room first and assess whether there is a suitable anchor point within your room to lock the box containing the firearm(s) and ammunition securely to prevent theft but keep the bolts or other firing mechanisms with you and retain on your person throughout your stay

Option A offers an absolute minimum of reasonable precautions, only if you cannot practically use options B or C.

Option B should only be considered after an assessment has been carried out of the room you're staying in, detailed in Option C.

If you have a firearm stolen while away from your home, the Police will investigate and they will check that the processes you chose to ensure reasonable precautions were met. If they find you didn't take those reasonable precautions, you will be subject to breaking your conditions we're back to 6 months potentially in prison and/or a fine.

You do have the option to appeal any move to prosecution but bear in mind we are talking about firearms here and you will have to pull out some pretty heavyweight mitigating circumstances.

## FAC Application Process

Once you have completed the course and been signed off by your Instructors, you will continue as a probationary member of the NRA for a minimum of 3 months, dating from the day your payment for membership was processed.

The 3 month probationary period can be extended at the discretion of the NRA if the Instructor team feel you are not yet at the level we expect you to be at now.

Once you have completed the probationary period and been given full NRA membership status, you are now free to apply for a Firearm Certificate. There are however certain criteria you have to comply with before your local Firearms Licensing Authority will start your application process.

Below is an excerpt from the Guide on Firearms Licensing Law November 2022.

### Who can apply for a firearm certificate?

Permission to possess, purchase or acquire a firearm will only be granted to an individual who is assessed by the licensing authority, the police, as not posing a threat to public safety and having good reason to own the firearm. Organisations such as target shooting clubs, museums and firearms dealers must also apply for licences if they wish to possess or use firearms. Persons who are sentenced to a term of imprisonment of three years or more cannot possess a firearm or ammunition (including antique firearms) at any time.

### What is good reason to own a firearm?

Applicants should be able to demonstrate to the police that they require their firearm on a regular, legitimate basis for work, sport or leisure (including collections or research). Chief Officers are able to exercise discretion over what constitutes a good reason, judging each case on its own merits.

#### The Process

- Download Form 201 from the Firearms Licensing Department in your area
- Fill it in
- Take a digital passport style photo of yourself to accompany the form
- If under 18, complete the form in the presence of a parent or legal guardian
- Approach and get a medical suitability form (download), fill it and submit to your GP for signing
- Pay the appropriate fee

#### In the background

- The Police will check for convictions & criminal records on all relevant databases
- They will also check Intelligence and counter terrorism data
- They may also check with other countries where you may have resided too
- Any applications from other Force areas will also be checked
- The Police will check social media presence and activity
- The Police may wish to make checks with other agencies:
  - Health Professionals
  - Probation Services
  - Multi-Agency groups
  - Other UK licensing or regulatory bodies
  - Interview referees
  - Background checks on partners and others sharing your dwelling

## FAC Application Process (continued)

As you can see, there is an awful lot of work that needs to be carried out by your Licensing Department before the Chief Officer for your area will even pick up a pen and sign off your file. The application process can only go at the same speed as the slowest component of the checking process and that is why it takes a long time for your application to be processed. Bearing in mind the amount of background checking that has to be done, it is absolutely imperative that you fill in the Form 201 as accurately and honestly as you possibly can.

Once all the paperwork has been completed on the Police side, a nominated member of the Licensing Authority for your area will be appointed as your Firearms Licensing/Enquiries Officer. They will make contact and arrange a formal visit and interview.

During this interview, the Officer will continue to conduct a risk assessment that will have been already started about your location, the level of crime reported and longer term trends of property crime in the area. They will also assess:

- Remoteness and response times by the Police for assistance
- Premises structure
- How the property is overlooked and lit
- Occupancy
- Your choice of storage and anchor points
- The number of firearms held or intended to be held
- Knowledge of your interest in shooting sports
- Security levels in the direct area you intend storing – exterior windows/doors
- If you have a dog, mention it if the dog is not present. It's extra security.

Note - You will have already established by this stage where you want to site your cabinet(s) but don't actually bolt anything in place yet. Consult your FEO who might suggest you change that site to somewhere else in your abode that is more secure. Best practice is and always has been bolting the cabinet(s) to an exterior wall as they tend to be thick and usually constructed of brick and/or concrete. The easiest way you can assess your location is to look at it from another standpoint, how easy is it to pull the cabinet off the wall?

If you mounted it to a plasterboard stud wall, the answer is – easy! Your FEO will not be impressed with your choice!

There are various forms of security with regards to firearms ownership and they are measured in levels, detailed in the next section.

## FAC Application Process (continued)

Let's now look at what you need to fill in. In this section we're not going to deal with the ordinary questions like what's your name and where do you live.

We're going to look at the accuracy of what you enter. Please don't forget, everything you enter on the Form 201 will be scrutinized by the authorities.

**Part A** is all about your personal information, including details of where you currently live.

**Part B** details your medical history and your GP details including previous GP's. Please read the accompanying notes before and when you fill in this part.

You will also be required to sign a declaration, agreeing to arrange for a suitably qualified GMC registered Doctor to provide factual information to the police about any relevant medical conditions related to your suitability to possess a firearm or shotgun. Your GP **will** share your records with the Police and so you must sign a confidentiality statement included in the application form.

**Part C** is all about declaring any past offences. As previously stated, any offence involving conviction must be included but don't include fixed penalty notices or any parking offences, unless you are a habitual offender. The Police will check as habitual offending does show a flagrant disregard for the rules and authority. It is very important that you answer as best as you can here as all it takes is a quick interrogation of the Police National Computer to see if your admissions are in fact accurate.

Many people may not recollect an exact number of times they have been caught say speeding and good advice is to overdo it when it comes to making a guess. If your sum total speeding offences during your holding a UK Driving License was 2 and you're not sure, put down 3 to be on the safe side.

This section also covers details of previous addresses.

**Part D** is probably the most confusing part of the form as the first question asks you what you currently own and what you intend purchasing. It also asks how much ammunition you wish to possess and what, how and where you intend placing your security cabinet(s). If you do not currently have an FAC, the first question asking for details of firearms currently held should be entered as "None".

If you hold a license or similar authoritative document issued outside of the UK, don't be tempted to enter firearms in this table as the firearms are outside the borders of the UK and there is no record of them on the Police Firearms Licensing Database System. The Police will be asking you some questions!

You will now be asked for a list of what you would like to acquire. These listings are commonly referred to as "slots" and govern **EXACTLY** what you can and cannot purchase. Calibre is the first column, remember to always put both names for calibre if relevant – for instance "308 Win/7.62 NATO" or "223/5.56" are acceptable entries. The "Type" of firearm is almost always going to be either a Rifle, Sound Moderator, Shotgun, Muzzle Loading Pistol or Long Barrel Handgun or in the case of component parts, a Barrel, Bolt or Receiver. Last of all, the reason for possession. The most obvious is "Target Shooting" followed by where you intend using the firearm which would be the primary club you have decided to nominate. As a member of the NRA, that would be your first choice. Remember that you need **good reason** for each "slot" so good advice would be not to go for 500+ guns for your grant. They will laugh!

The next question asks you about how much ammunition you want to possess. Talk to your FEO first and discuss the frequency of your shooting. Again, it comes down to good reason so if you put 5,000 rounds of 308/7.62 on your application, there's a very good chance you'll get laughed at. You have to keep ammunition secured so it also depends on the amount of space available. There's also a weight consideration too, 5000 rounds of 308 ammo is going to weigh about 125kg! Lastly, you need to sign the declaration.

The Form 201 has an accompanying set of comprehensive notes. Read them thoroughly prior to filling in the form!

## Firearm Security

Let's do a recap and look at Condition 4 again:

### Condition 4(a)

*The firearms and ammunition to which the certificate relates must at all times (except in the circumstances set out in paragraph (b) below) be stored securely so as to prevent, so far as is reasonably practicable, access to the firearms and ammunition by an unauthorised person*

### Condition 4(b)

*Where a firearm or ammunition to which the certificate relates is in use or the holder of the certificate has the firearm with him for the purpose of cleaning, repairing or testing it or for some other purpose connected with its use, transfer or sale, or the firearm or ammunition is in transit to or from a place in connection with its use or any such purpose, reasonable precautions must be taken for the safe custody of the firearm or the ammunition*

As mentioned earlier, Condition 4 is all about how you keep your firearms when not actually in the act of shooting them and the key phrase is “**reasonable precautions**”

There is a word that affects all of us and that is:

# Complacency

Here's an example:

All it takes is to return from shooting, dump your gear (including firearms) in your hallway and say to yourself you will deal with all the kit later. The kit gets forgotten about and you retire to bed.

Next morning you wonder why the front door is ajar and then the realisation hits as you can no longer see your gun-bag. It's been stolen and you are now in extremely deep water as you failed to adhere to Conditions 4a and 4b.

You **HAVE** to notify the Police of the theft and they **WILL** arrest you on the spot. In this case, you will almost certainly have your FAC revoked, your firearms and ammunition will be confiscated without compensation and you will almost certainly end up in a cell.

Whatever the ultimate outcome, you will likely **NEVER** be allowed to come near, much less own a firearm again in the UK. The same applies to ownership of any air gun too.

Pretty serious, we think you'll agree...

## Firearm Security (continued)

Let's now look at what security you need to consider.

### Approved Safes for secure firearm/ammunition storage

When determining where to locate your cabinet(s) there are a number of points you need to take into consideration:

- Exterior wall strength and construction material – brick, concrete or masonry is ideal
- Location with regards to exterior doors and windows with respect to being out of view
- Method of securing the cabinet(s) to the wall (chemical bonding is highly advised)
- Formats for camouflaging the area from direct and indirect view in the case of casual visitors

Before purchasing a cabinet, carry out the following:

- Think ahead, don't buy a cabinet that only houses 2 guns if you intend on applying for more firearms
- Check with your FET about the cabinet maker – are they satisfactory?
- Check the dimensions of the cabinet(s) will physically fit where you intend placing them
- Will the floor take the increased weight?

### Keys

Remember, only you are authorised by your FAC to have access to your firearms and ammunition. That means **NOBODY ELSE** is allowed to even know where the keys are kept. Many FAC holders have a small key safe with a unique combination in a hidden area that they keep their spare keys in while maintaining control of the main set by simply having them with them at all times. If you choose to use a key safe, make sure the primary set are not stored with the spares.

As part of the visit and assessment, the FEO will notify you of any potential changes you need to apply to your existing security.

Under most circumstances, it is preferable that firearms should be secured within the occupied part of the structure. Separate, detached buildings, or those attached but having only external access, including outhouses and garages, should not be used unless the levels of security meet the standards set out in the Firearms Security Handbook. If used, these should also be protected by an intruder alarm linked to the household to BS EN 50131.

If the certificate holder's dwelling is a mobile home or static caravan, a different set of security concepts should be adopted. Details can be found in the Firearms Security Handbook. These are primarily concerned with the anchorage of the structure. That structure's capability to store items securely may require that an extra layer of security is needed to "target harden" the unit. It is unlikely that a gun room can be satisfactorily constructed within such a dwelling or unit of this type.

## Firearm Security (continued)

As with any other valuable articles, the security of firearms should be considered in layers:

- Perimeter - the protection of the surroundings etc. which are necessary for particular situations or risks. Exterior lighting, approaches overlooked etc.;
  - Shell - the protection of the surrounding structure (the building or part of a building) which contains the immediate or core layer for the firearms;
  - Interior - which secures the firearms directly.
- In most circumstances, the shell and interior layers are likely to be all that need to be addressed. However, conditions which affect either the ability of the outer structure to provide a defensive level commensurate with the particular risks, or any constraints upon the occupier, (for example crime level, property style or type of construction, constraints in tenanted property etc.) may require adjustments to either layer.
- If the occupant can show that the house has been designed and built to the requirements of BS8220 (the “Secured by Design” model, introduced in 1996) or has doors and windows to BS PAS 24 (2016) or the most up to date PAS standard, then those parts of the dwelling can be taken to have satisfactory security. The Secured by Design New Homes Guide is a source of reference. Other test standards for door and window sets exist such as LPS 1175 and STS 201.

Please note that any recommendations made by the FEO are not just made up on the spot but are in fact taken from the following guidelines:

### Levels of Security

The 3 levels of security listed below will each be considered depending on your abode and the risk assessment.

#### Level 1

This level of security is considered the normal standard of security applicable in the majority of cases.

- A gun cabinet, or (where only one rifle or shotgun is held and a low level of risk is involved) a gun clamp or similar device fixed to the building is normally considered to be reasonable security. This should be located to frustrate or obstruct points of attack and identification by casual visitors to the premises. Other considerations might be:
  - Final exit doors of good construction, ideally PAS24 and secured with locks to the appropriate British Standard.
  - Suitable locks/securing devices on ground floor windows and French/patio windows.
- As an additional level of security, ammunition and easily removable component parts – such as rifle bolts etc. – should be stored separately from the firearms they fit, if it is safe and reasonable to do so and they may not be confused between firearms. This could be either by use of a detached storage container fitted elsewhere in the dwelling, or one built into or onto the firearms cabinet.
- There is a need to consider other alternatives for unusual firearms such as punt guns, cannon etc. In these cases, such items may be secured in buildings other than the dwelling. Suitable securing points may be required where the situation or construction of such buildings make it necessary. Where possible any removable part that would render the gun inoperative should be stored separately.
- When only one rifle or shot gun is held and a lower level of risk is involved, gun clamps or similar devices or arrangements may be adequate (see 1<sup>st</sup> point above).
- In more modern houses, the above requirements will be met in properties with PVCu doors or specialist doors with a multi-locking system which is secured by a deadlock. These requirements will also be met in properties with PVCu or specialist windows by a similar style of system secured by a keyed lock, either handle or independently mounted.
- When providing advice to fit locks to PVCu doors and/or windows it must be stressed that the manufacturer/supplier should be consulted about which locks would be appropriate, as the fitting of non-specified locks may cause damage to the article and invalidate the product warranty.

## Firearm Security (continued)

### Levels of Security

#### Level 2

- Where the individual circumstances are such that additional security might be required due to factors such as repeat victimisation, a high crime location, building regularly unoccupied, substantial number of firearms on the premises, in addition to the provision of a suitable cabinet, gun room or safe, the following may be considered:
  - The final exit door locks should be to BS3621 or equivalent and any French doors/ patio windows should have an integral locking system or be provided with supplementary locks to frustrate forcible opening, together with anti-lift blocks if applicable. These requirements will usually be met in properties with UPVC doors or specialist doors with a multi-locking system secured by deadlock.
  - Windows on the ground floor and those accessible from flat roofs etc. should be fitted with an appropriate type and number of locks which are self-latching or key operated. These should have casement-to-frame locking along the opening edge;
  - An audible intruder alarm to the appropriate standard protecting either the whole premises or those parts of the premises where guns are stored.
- The latest Secured by Design New homes guide provides guidance on Home Security for new and refurbished properties and is considered to be the Police Preferred specification for home builders.
- In the case of outbuildings or garages where the main building is not alarmed, consideration should be given for a stand-alone monitored alarm.
- For these purposes, a “substantial” number of firearms should be considered with regard to the type of firearms, their potential danger if misused and their likely attractiveness to criminals – for example, forces may wish to exclude muzzle-loading shot guns and muzzle-loading rifles given they rarely feature in criminal use. At the lower end the number might vary between 6 and 10, depending on the type of firearm concerned, whilst anything over 10 would rarely be lower than level 2. It must be stressed, however, that it is not enough to base an assessment on the number of firearms alone - all factors mentioned above should be taken into account. Sound moderators, spare barrels, spare cylinders and component parts should not be considered as part of this total.
- A different form of security which equates to that above (such as providing a reinforced gun room or other area), may also be suitable. Advice should be sought from Firearms Licencing.

#### Level 3

- If the risk is assessed as being greater than the previous level (for example by virtue of a higher crime rate, certain high profile certificate holders, a larger number of firearms held or any other factors which substantially increase the risk of burglary), then the following should be considered as well as the previous level of security:
  - Dividing the risk, for example by the provision of separate cabinets, perhaps in different locations within the premises, to reduce the number of firearms per enclosure;
  - Additional target hardening of the storage (cabinet with individual gun locks, or extending to a gun room);
  - Protected by an intruder alarm to BS4737 3.30:2015 or equivalent and ideally monitored by a NSI monitoring centre with an appropriate response.
- For these purposes, a “larger” number of firearms may be taken as meaning more than twelve guns (again being cognisant as to whether to include the likes of muzzle-loading firearms). As with level 2, it is not sufficient to base an assessment on the number of firearms alone; all other factors mentioned above are equally important, and regard must also be had to the type of firearms, their potential danger if misused and their likely attractiveness to criminals. Again, sound moderators, spare barrels, spare cylinders and component parts should not be considered as part of the total.



## The Range Office

Your shooting experience at Bisley starts and ends with the Range Office.

This is where you book on to a range, and collect/return a radio (if required). It is also the central location of the Range Control team and the NRA Armoury.

### How to Book a Target

Please visit [www.NSCbisley.co.uk](http://www.NSCbisley.co.uk), select Ranges, select Book Now (Availability) for more information on opening times, how to make a booking, and upcoming availability.

There are three ways to secure a target to shoot at Bisley:

- Book Online – Use the NSC online booking system to check the availability of the range you require first, then book, following the instruction in the how to guide. You will be emailed by the Range Office with a confirmation of your booking. <https://www.nscbisley.co.uk/media/btymwpji/how-to-make-a-range-booking-v2-jan-25.pdf>
- Book over the phone (ext 152) – If the Range Office staff are not busy, they can answer the phone and visually and verbally confirm the range you require on the day you wish to shoot. The main pitfall though is if the day is particularly busy, the chances are very high that the phones will not get answered. Over the phone bookings require payment at the time of the call.
- Book on the day as a walk in – Useful for that last minute booking BUT... your chances of getting what you want are extremely slim unless you are very lucky!

### Picking up a radio

The camp covers approximately 3000 acres and there are parts that do not have any mobile phone coverage so the NRA communicates via the use of licensed radios. These radios usually have 16 channels:



All buttons on these radios are disabled apart from the ON/OFF Volume switch, the Channel Select switch and the PTT (Push To Talk) switch on the side (not visible).

They are expensive (over £300) and if you lose one, the bill from the NRA will make your eyes water!

## The Range Office – Picking up a radio (continued)

There are only 2 working channels in operation though, they are:

- Channel 1 – This is a paired channel with your marker (if booked and assigned) and is a private channel which cannot be accessed by any other public use radio in operation on the camp. You use this frequency for:
  - Talking to your marker
- Channel 16 – Control Channel – Used to communicate directly with the Control team in the Range Office. You use this frequency for:
  - Help from Control for issues on your range
  - Confirmation of your target if there are issues
  - Monitoring the frequency should there be an emergency
  - Reporting an emergency

**Do NOT** use this frequency for:

- Non-emergency use
- Trying to call your marker
- Swearing or using any form of profanity

When you receive your radio from the Range Office, always check and confirm the channel selector switch is set to the lowest number (1) by rotating it. Don't force the switch further as it will break in all likelihood and you will have to pay for a replacement.

When you finish shooting, part of your procedures for signing off the range involves the handing back of the radio. If you forget to return it, you will be fined.

When it comes to communicating with your marker, the NRA uses a set of coded messages to relay clear instructions to the marker. You will have already heard a number of these during the course.

The radio messages are designed to ensure no doubt is introduced between the shooter and the marker. Let's take Message One: *"Firing about to commence"*

You're all ready to start shooting with a group of friends, you've all laid out all your kit and equipment on the firing point and all you need to start is to let the marker know as you've signed out the radio.

If you said over the radio "We're all set and ready this end mate, looks like Bob is getting ready to go. You all set?" It's a bit ambiguous and long sentences can get garbled over radios. The marker will almost certainly reply with "Did you mean Message 1?" You'll answer "err, yes. Sorry about that"

- Keep it simple – "Firing point to Butts – Message One –Over"

They will reply and up comes a fresh, clean target for you to shoot at. Overleaf is the complete list of NRA radio Messages.

## The Range Office (continued)

### Radio Messages and their meanings

Message No.	Meaning
0	Raise sighting targets
1	Firing about to commence
2	No spotting disc visible
3	Spotting disc unmistakably disagrees with signalled value. Check that the spotting disc shows last shot and that the panel signals its correct value. RCO is to view target before passing message.*
4	A shot has been fired but no signal has been made. Examine the target carefully and signal the shot if found, or a miss*.
5	Firer has challenged for a higher value for his shot. Examine the whole target and signal the correct value*
6	It is suspected that there is a second shot on the target. Inspect the target for a second shot. If found, mark and signal both shots. If not, leave spotting disc in original shot hole*
7	A miss has been signalled but firer has challenged for a scoring hit. Re-examine the target carefully and signal the hit if found, or a miss*
8	The spotting disc appears not to have moved. Butt Officer is to consult marker and confirm spotting disc is in the latest shot hole. If successive shots have been very close to each other the RO to be advised accordingly*
9	Marking/shooting appears to be unduly slow. Butt Supervisor/RCO to check and correct where necessary
10	Stand Easy. Half-mast target
11	Blow-off shots are about to be fired. Ensure that all, or the specified targets are fully lowered until Message 1 is given
12	Stand Easy. Lower target, patch out and put target back up
13	Radio the number of hits as score board figures are not clear
14	Firer has challenged his score. Re-examine target and show the correct number and value of shots*

#### Notes;

Messages marked with asterisk: Confirm result to firing point by radio/telephone

In reality, the most common messages are 1, 4 and 10.

Just a word of caution regarding Message 10. It's a good idea to expand the message to "Message 10 for X minutes" to ensure a marker doesn't think they are finished for the session and take your target down and off the frame before exiting the butts and leaving.

## The Range Office (continued)

### Firearm hire and Ammunition purchases

The Armoury is an integral part of the Range Office and you can hire firearms here (48hr notice required via email [Armoury@nra.org.uk](mailto:Armoury@nra.org.uk)). It is a very good idea to hire a firearm you have an interest in purchasing first as there is nothing worse than getting behind your purchase for the first time on the range and realising it was a disastrous mistake. The firearm doesn't necessarily have to be the same calibre as the firearm you are interested in but it will give you a good idea of its fit to your body.

Similarly, you can hire a firearm in a calibre you are interested in and assess its suitability for what you want.

Ammunition in most popular calibres is available for purchase from the Armoury section. If you have an FAC, they will enter your purchase in the appropriate table. If you do not hold a current FAC but are now a full/probationary member of the NRA, they will still sell you ammunition but only to be used on the NRA ranges. Remember, you cannot remove ammunition from the NRA Bisley Camp as you will now be in illegal possession and subject to the full penalties detailed earlier in this section.

The Armoury staff are all fully qualified and can assist in any issues you may have with firearms.

### Range Enquiries

If you encounter any issues with your range booking that does not necessitate a radio call, report them when you are in the Range Office instead. Always remember that there is no such thing as a silly question when it comes to the safety for yourself and other range users, so if there is anything you are unclear about, ask about it in the Range Office and the staff will help as best as they can.

### Range Regulations

The NSC Range Regulations are published annually on:

- the NSC website
- Are located at the front of the Bisley Bible

The regulations are all designed for your safety and that of everyone else attending the Camp. You will recall your introduction to the NSC Regulations on Day 1 of the course and it is good practice to have a good read through them again just to re-acquaint yourself with them. Always remember that if you fall foul of the regulations, you could find yourself being investigated by the disciplinary committee and depending on the severity of your error you could be penalised.

You will have already received a copy of the current Range Regs at the start of the first day.

## Recording and reporting your shooting attendance

This section is supplemental to the section on the JustGo system, detailed in Module 1 at the end of section 1.

All aspects of the operation of HOA clubs are coming under increased scrutiny by the licensing authorities.

The NRA, like every Home Office Approved (HOA) club, is under a legal obligation to keep a record of the attendance of every member and the firearm(s) that they used. This requirement applies in respect of all members, not just those who have the NRA named on their Firearm Certificates and regardless of any other club that a member might belong to. The requirement arises from the Conditions of Home Office Approval, which have legal effect under Section 15 Firearms (Amendment) Act 1988, the bit of law that sets up the Home Office Approved club scheme. Approval enables members of the NRA to possess a rifle and ammunition without a certificate, which provides the entry route to the sport, allows members to use each others' firearms, and enables several classes of NRA activity. Approval is critical to the Association's operations, and compliance with the Conditions is critical to maintaining Approval.

Given the size of the NRA and the freedom of access to Bisley, it is only possible to maintain the required records by active input from members. The data is recorded electronically within the membership database (JustGo). You can make an entry from any web-enabled device by logging in to your personal record through the NRA website. Once in your personal area of the database, select MEMBER DETAILS. If you haven't already entered the firearm(s) you need to record, click on FIREARM INFORMATION, click the ADD button and enter the firearm details. You only need to do this once for each firearm. Once the firearm details are in the database, click on FIREARM USAGE, click on the ADD button and select the firearm you used from the drop-down menu in the top box. The other boxes will complete automatically with the default settings. Change any of the defaults that you need to and click SAVE. If you used more than one firearm or are logging use on more than one day, click ADD to create each additional record. There are also paper slips in the Range Office where you can fill in details to be uploaded by NRA staff.

The NRA is updating a number of procedures to confirm compliance. To ensure that it starts from the best possible position, the NRA needs all members to be rigorous in recording their activity. Also, it is an obligation of NRA membership to complete that record. The obligations listed below have been extracted from the NRA Handbook (page 23 in the 2024 edition) and will be included in all NSC Range Regulations:

### Obligations of Membership

- The following obligations apply to all members other than Guest Members:
- To ensure that the contact information held by the Association in the member's personal record is correct;
- To inform the Association of any material difference between the contact address provided to it and the address entered on a personal Firearm Certificate;
- To notify the NRA of the grant of a Firearm Certificate and of the name of any club entered on it under S44 Firearms (Amendment) Act 1997, and subsequently of any change of the club so named, and of any personal action to surrender or not renew a Firearm Certificate;
- To notify the NRA of any revocation or refusal to renew a Certificate and of any seizure of firearms held by authority of a Certificate;
- **To enter details of all shooting done as a member of the Association in the electronic or manual record provided by the Association, thus assisting the Association in complying with its obligations to maintain such a record;**
- To co-operate with any NRA technical investigation.

## Recording and reporting your shooting attendance (continued)

We emphasise that:

- The record keeping and reporting is a legal requirement for the NRA;
- It is impossible for the NRA to comply accurately without members' input;
- There is no other direct input – none of range bookings, course attendances, competition entries, GB team events and suchlike feed directly into the record;
- It is a breach of the obligations of membership not to complete the record.
- An NRA member shooting on Bisley ranges *may* record that activity as "shooting with the NRA" even if the range space was booked by an affiliated club for that club's members' use.
- An NRA member shooting on Bisley ranges in their individual capacity, or as a participant in any NRA course or event anywhere (GB Team Members please note), *must* record that activity.
- If a group of individual members share a target, all those who shoot must record the activity.

An additional legal obligation laid on the NRA is to report to the licensing authorities details of any member who has not shot as an NRA member in any 12-month period. The attendance record contains the source data for establishing that. Conversely, a record showing regular attendance is an indicator of continued good reason to possess firearms and can be used to support an application for grant, renewal or variation of a firearm certificate. It follows that there are personal benefits for members in keeping their record up to date.

Please update your personal shooting record as soon as practicable to help keep the NRA in compliance with Home Office Conditions. If you have missed reporting any attendance, it is possible to enter data retrospectively. The date field defaults to the current date, but has a calendar that allows input of any past date.

The legal basis for this recording and reporting is in the Criteria for Home Office Approval, which is given legal authority by Section 15(3) Firearms (Amendment) Act 1988.

If you need further information please contact the NRA Safety Legal & Technical Officer at [legal@nra.org.uk](mailto:legal@nra.org.uk)

## Responsibility

The prime responsibility for the security, and safe use of a firearm & ammunition *rests with the user*, But...

### **SAFETY IS EVERYBODY'S RESPONSIBILITY!**

This statement forms the basis of good practice when using this or any other shooting range.

If you see somebody or a group of shooters doing something that you deem unsafe in any way, try to first suggest they stop if what you are seeing is potentially dangerous.

This could even require you shout “**STOP! STOP! STOP!**”

What you then need to do is get on a range radio and call the Range Office to voice your concerns about what you have seen. Include the following:

- Identify yourself
- Identify the range location
- Identify your target number
- Give a brief description of what you have seen but keep it short
- Request assistance from the Range Safety Team

What you do not want to do is get drawn in to a protracted argument on the range floor – in that case, always report it first!

Here are some examples of basic stupidity:

- Waving a firearm around with the action closed & muzzle sweeping you or others
- Advancing forward to the targets while others are shooting on the firing point
- Firing more than 10 rounds in quick succession

A firearm must not be loaded unless on the firing point and it is in all respects safe to shoot.

AND...

### **A LOADED FIREARM MUST NEVER BE REMOVED FROM THE FIRING POINT**

If a firearm cannot be unloaded, the user **MUST** contact the Range Office for assistance from an NRA Armourer. They will come out and attend to the stuck firearm. If you have no radio, use a phone. If you have no phone, speak to another range user and borrow theirs. There is absolutely NO way you or anybody else can remove a firearm from the firing point if it cannot satisfactorily be shown to be clear.

If you are the sole user of the range and nobody is nearby, you don't have a range radio and your phone just ran out, you have NO option other than to sit tight and wait until a Range Safety Supervisor comes out for a periodic visit. That visit might be at the end of shooting for that day. There is no shortcut you can take. Imagine if you removed a firearm from the firing point after getting a live round stuck and on your way home, your car bounces over something as inconsequential as a hole and your firearm discharged with the bullet passing through your car into a toddler in a pram on the pavement...

**Doesn't bear thinking about**

## Shooter Certification Card

This process was introduced in 2008 to ensure that all shooters using MoD ranges met a high standard in terms of shooting skills.

It is a requirement that a Shooter Certification Card (SCC) be presented to the range staff at the Range Office before you can be let out on the ranges once you have passed this course. If you join an affiliated club to the NRA and that club shoots on Military Ranges, you will have to show your issued card to whoever is organising the event. Be aware that Range Wardens do visit ranges periodically and will demand all present show their cards. If they find missing cards OUTSIDE of probationary training or assessment processes, they will probably ask the entire club to leave the range and there will be a formal investigation. The club will be banned from using the range until the military authorities are satisfied of an outcome.

During your journey through the Probationary Course, you will have already noticed that you are being supervised on a one-to-one basis and this is how you are allowed to shoot at Bisley without an SCC.

The SCC basically tells the person viewing it that the shooter is in fact competent in the disciplines they are signed off for.

Here is a list of the current subsets you can be signed off for:

- **Telescope Sighted Rifle**
- **Iron Sighted Rifle**
- **Gallery Rifle/Carbine**
- **Short Range Pistol**
- **Long Range Pistol**
- **Muzzleloaded Rifle**
- **Muzzleloaded Pistol**
- **HME**
- **Target Shotgun**
- **Handloading**



The card is made of plastic and is the same size as a credit card for convenience. As you can see from the picture above, it is printed with the name & number of the certified shooter, the expiry date of the card, and the subsets that the shooter is certified as competent with.

You will be issued a **restricted SCC** (see overleaf) upon completion of this Module and the subsets will be:

- Iron Sighted Rifle
- Scoped Rifle
- Gallery Rifle/Carbine

Next, we will look at what each subset is.



## Shooter Certification Card (continued)

Below is a self explanatory table of all SCC subsets

<p><b>Iron Sighted Rifle</b> Exactly what you'd expect and something you used on Day 3</p>	
<p><b>Long Range Pistol</b> These are large calibre rifles with the barrels cut down to 12" and a rod inserted securely into the formed pistol grip to make it 24" overall. Used mainly in long range shooting from a support structure or bench</p>	
<p><b>Muzzleloaded Rifle</b> A rifle which is loaded with black powder and either a ball or similar lead projectile. Can be either rifled or smoothbore</p>	
<p><b>Muzzleloaded Pistol</b> As above but in a handgun. There is no law regarding the length of the barrel, only that the firearm is loaded from the muzzle</p>	
<p><b>Telescope Sighted Rifle</b> By now, you will be very familiar with this subset</p>	
<p><b>HME</b> Or High Muzzle Energy, any firearm that produces more than 4,500 Joules of energy but less than the maximum allowed at Bisley which is 7,000 Joules. An example would be the 300 Winchester Magnum</p>	
<p><b>Gallery Rifle/Carbine</b> As used on Day 1. This category is governed by the max distance of 50 yards/metres, irrespective of whether a scope is fitted or not</p>	
<p><b>Short Range Pistol</b> These firearms made an appearance post the 1997 handgun ban and adhere to firearms law because of the 12" barrel and rod in the pistol grip, making it 24" Overall Length (OAL)</p>	
<p><b>Target Shotgun</b> Any shotgun with a magazine capacity greater than 2 rounds is Section 1 and therefore appears on an FAC</p>	
<p><b>Handloading</b> Those shooters who assemble their own ammunition instead of commercially purchased</p>	

## Restricted Shooter Certification Card

When you pass the test on Mod 4 and have successfully completed the handling assessment as part of the afternoon, you will be issued with a restricted SCC. You will not be issued the card if you still require remedial training.

As part of this course, as mentioned previously, you will be signed off for “Iron Sighted Rifle”, “Scope Sighted Rifle” and “Gallery Rifle/Carbine”. You will see from the card that it is valid for **1 year** from the date that you were approved for Probationary membership.

### What is it?

This restricted card will enable you to rent out firearms from the NRA Armoury in order to:

1. take part in NRA Shooting Club days which are a mandatory part of your finalization of training
2. attend NRA Further Skills Development Courses
3. enter a registered NRA competition

They are restrictive in that you can only use the firearms you have rented under the direct supervision of a duly delegated NRA authority. This can be either an NRA Instructor or RSO who will always be present.

You can also attend 1 to 1 Training via the NRA Training Dept if you wish; they are a great way of expanding your knowledge base.



In order to complete the NRA Training Course, you must attend the NRA Shooting Club on two separate days.

They are a great way of seamlessly easing you into the way of shooting here at Bisley. The NRA Instructors mentioned above will be on hand, usually working as RSO’s throughout these two days and are there to help if needed and answer questions about anything you might think of. Always remember – there’s no such thing as a silly question!

What you can do	What you cannot do
<p><b>Additional Club days</b> There is no restriction on how many visits you wish to make to the NRA’s shooting club. In fact it’s a great way of extending your knowledge base.</p> <p><b>Competitions</b> You can also take part in NRA competitions being conducted as you will be supervised at all times by properly qualified fellow shooters, so what are you waiting for? Go and take part, remember – it’s all about having fun with safety.</p> <p><b>Skills Development Courses</b> These courses are detailed on the NRA website. They are a great way of getting into competition shooting at Bisley. For more information, please see the section “Where to next” under Further Training and also the NRA website.</p> <p><b>One – to – one shooting</b> You may also shoot at Bisley whilst being accompanied by a full member of the NRA who has the required subset(s) on their SCC, but you <b>CANNOT</b> hire a firearm from the NRA Armoury since this is not an NRA organised event.</p>	<p><b>Shoot on your own</b> You must never be unsupervised on a range with your restricted SCC. If you were shooting with an NRA member that holds a 4 year SCC and they had to leave early for some reason, you <b>cannot</b> continue to shoot as your restricted SCC prohibits it.</p> <p><b>Book a range</b> You <b>cannot</b> make a range booking with your restricted SCC. If you would like to shoot with a friend who is a full member of the NRA and holds a 4 year SCC, you can attend a range booking that they have made as long as it is under their 1 to 1 supervision and they have the required subset(s) on their SCC.</p>

## Restricted Shooter Certification Card (continued)

The restricted SCC you will be issued looks like this:

Front	Back
	
<p>Your file photo will be printed where the NRA logo is, complete with your name and NRA Membership number. The “Valid until” date is 1 year from the date you were approved for Probationary membership.</p> <p>The large <b>“P”</b> denotes Probationary</p>	<p>The rear of the card carries the restrictions for a probationary card with regards to the hiring of firearms and purchase of ammo. When you retrieve firearms booked for a shooting club event, skills course or competition, the Armourer on duty will ask you for your card so keep it with you at all times.</p>

### What if my Probationary SCC expires before I have completed my training?

Your Probationary SCC will expire 1 year after the date that you are approved as a Probationary member. As we would like all probationers to complete their full training within 1 year of being approved, your Probationary SCC should therefore still be in date by the time you have finished your training. This will be the case for the majority of Probationers.

If you are unable to complete your training within 1 year of being approved, your Probationary SCC will expire meaning that you will no longer be able to book and attend any of the optional additional shooting activities. You will still be required to attend your remaining mandatory sessions of 2 x Shooting Club and the Final Briefing Session, in order to complete your training.

However, your mandatory Shooting Club sessions without an in-date Probationary SCC will be under the 1 to 1 supervision of a Range Officer (RO). The Training team will book an RO to supervise you during your sessions.

## Restricted Shooter Certification Card (continued)

Once you have completed and passed your Probationary training, you will receive your full NRA-member SCC. This is valid for 4 years.

### Future SCC Renewals

The Membership Dept. will automatically send you a renewal notice a few months prior to your SCC expiry date.

To renew your card, you will be required to book an appointment to be re-assessed. The process takes only 20 minutes or so and you will be assessed on the subsets you already carry on your card. If you wish to be assessed for any other subsets for addition, you need to make sure you have notified the Membership Dept. prior to your assessment to ensure the correct paperwork and assessor is assigned the task.

If you wish to add a subset before your SCC expiry, contact either the Membership Dept. or the Training Dept. and an assessment can be booked for you.

The assessments sound daunting but they are based around everything you have been taught to date. Remember your muzzle awareness at all times and it should be plain sailing.

The SCC is effectively like a driving license, hard to get and easy to lose! Always remember –

**Safety is your 1<sup>st</sup>, middle and last concern!**

# **NRA**

# **Shooting Club**

## Shooting Club

Now that you have completed the mandatory training within the modular system, we now require you to attend at least two visits to Bisley on two separate occasions. The NRA Shooting Club is the means of attaining this.

The NRA Shooting Club is free to join and is available to all NRA members, which you are now. The Club provides opportunities to meet other members, shoot in a group, share information and ease you into using the ranges.

A variety of ranges and distances are available, covering most NRA shooting disciplines, typically including:

- 25 yards
- 200 & 300 yards
- 600 yards & 1000 yards

You can shoot on one or more of the available distances but it is important to let the Membership Dept. know at the time of booking.

Ranges are supervised by an experienced NRA qualified Range Conducting Officer, the chances are very high that you will have already met them as they are also fully qualified NRA Instructors.

The purpose of your two visits to the Shooting Club is to introduce you to shooting at Bisley on your own so to speak although the attending Instructor will ostensibly be there on a 1 to 1 basis should you need any assistance or simply ask a question or two.

### **Don't forget this manual when attending as the RSO will be required to sign it!**

We have found that in the past, students have felt rather daunted by simply being pushed out of the insulated training regime and fending for themselves. By attending the Club, you can experience a degree of independence but still retain a safety net should you need it. Remember, it's all about safety at the end of the day!

Shooting Club visits are booked much the same way as you booked onto the Modules, via the NRA website. You must then choose AM or PM and the distance available.

The Shooting Club is run usually twice a month, once on a weekday and once on a weekend but excludes July when the Imperial Meeting is run. Full day bookings don't count as 2 separate bookings!

In addition, you may want to book a 1 to 1 session with one of our Instructors. These days are tailored to your own requirements and many students have used this to increase their skillsets beyond the basic training already received.

1 to 1 training can literally cover anything you feel you want to concentrate on.

There is no constraint on the topic (as long as it's legal!) as the Instructor will get in touch with you prior to the event to discuss what you want to get out of the session.

Sessions can be booked for either a half day or full day. For pricings, please see the NRA website or contact the Training Dept for a quote.

In addition to using the Shooting Club, you can also now book onto one of the many 1-to-many further skills courses. These currently cover: CSR, Gallery Rifle, Handgun and Target Shotgun. Details are available on the NRA website.

# **Final Briefing Session**

## Final Briefing Session

What? - Another day?

Yes, consider this as your finalization of the whole probationary process.

This will be a morning session in a classroom at Bisley.

In addition to formal course completion, this gives us the opportunity to:

- Deliver final briefing on solo shooting at Bisley and coverage of self RO'ing
- Answer any questions you have, how to get involved in shooting competitions
- Discuss the FAC application process
- Let you know of the further NRA Training courses you may find interesting
- Introduction to competition shooting from a representative of the Shooting Division
- Short range fun shoot
- Finally, a wrap up session on where to go next. This is the ideal time to ask any questions you have.



The fun shoot is at 25 yards using .22 LR semi auto Ruger rifles but this time they will be equipped with Red Dot sights.

Lastly... The Membership Department will then send out a full unrestricted SCC valid for 4 years along with your full NRA Membership Card.

Always remember though:

**Muzzle Awareness!**

**Congratulations!**

You have successfully completed the NRA Probationary Course.


**Safe Shooting!**



# Reference Material

Reference Material	The Firearms: Ruger 10/22®
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## The Firearms: **RUGER 10/22® RIFLE**

	
Calibre	22 LR
Action	Semi-Automatic : Fires with each pull of the trigger and automatically reloads using the residual cartridge energy to chamber a fresh cartridge from the magazine and re-cock the trigger/hammer assembly
Magazine	Detachable 10 round rotary style polymer construction
Section	Section 1 Firearm
Course?	You will use this firearm on the course
Description	The Ruger 10/22® is a semi-automatic rifle in 22 LR which has been in production since 1964. It is one of the most popular and successful rimfire firearms in history. It is extremely popular with both clubs and individuals as the rifle can be customized into virtually any format due to the huge aftermarket selection of parts.

### Naming of the parts (Overview):



Reference Material	The Firearms: Ruger 10/22®
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## Naming of the parts

### (Trigger Assembly & Control Surfaces):



<p><b>Trigger</b> Obviously you pull this back and it fires the rifle. The plunger you can see behind it is called the trigger return plunger which has a spring behind it. Designed to push the trigger back into it's set position for firing again</p>	<p><b>Safety Catch</b> This style of safety catch is applied by pressing from the LEFT side of the trigger assembly. When activated, it stops the trigger from being pulled back. Pushing with your trigger finger (if you're right handed) takes the safety off.</p>	<p><b>Bolt lock &amp; release catch</b> The operation of this catch does require a little practice to get the hang of. <b>For a full description of the system, please refer to the next part of this section</b></p>	<p><b>Magazine release catch</b> This catch will unlock the plunger inside the receiver and the magazine will fall out. Notice the scalloped shape of the release catch, this is designed to be pushed forward by your trigger finger.</p>
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## The Ruger 10/22 bolt lock & release catch (The Bolt Lock)

<p><b>To lock the bolt open:</b> Retract the bolt handle to its extreme rearward position and, while holding it there, press in on the lower section of the bolt lock.</p> <p>Release pressure on the bolt handle and it will move forward a fraction of an inch, and then be locked in its open position.</p>	
<p><b>To release the bolt:</b> Retract the bolt handle to its extreme rearward position and then press in on the upper section of the bolt lock. Release the bolt and it will move fully forward.</p> <p><b>NOTE:</b> Simply retracting the bolt will not disengage the lock. The bolt lock must be deliberately pressed up while the bolt is held fully to the rear. Only then will the bolt close when released. This is designed to prevent accidental release of the bolt from its open position.</p>	

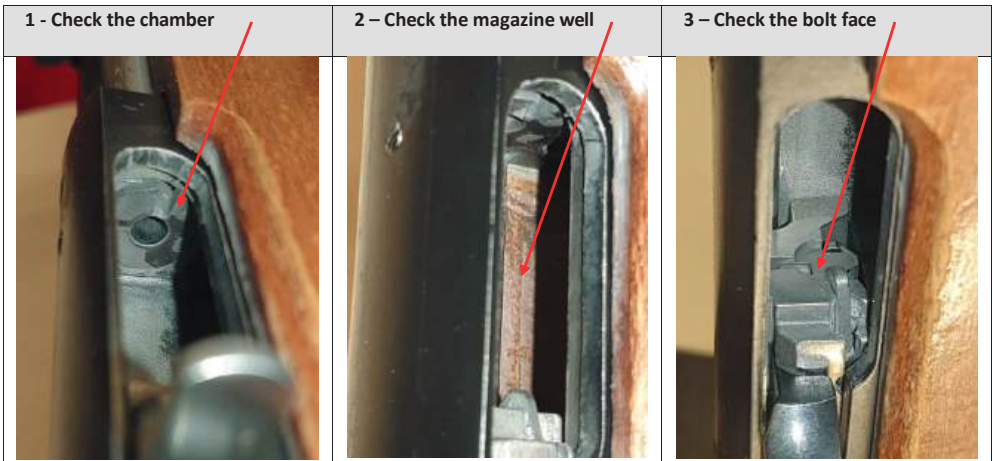
Reference Material	The Firearms: Ruger 10/22®
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## NSPs or Normal Safety Procedures:

First complete the unload sequence as described in the previous section. Once complete you need to check that the firearm is completely empty of any live rounds.

- Maintain muzzle awareness at all times!
- Ensure action is locked back
- Have a good look into the receiver at the chamber, it should be clear of any empty case or live round (See the 1<sup>st</sup> picture below)
- Check the magazine well to ensure the magazine was removed previously (See the 2<sup>nd</sup> picture below)
- Check the bolt face to ensure there is no round of ammunition being held there (See the 3<sup>rd</sup> picture below)
- Once you are satisfied the firearm is now clear...
- Present the firearm to an RO (if present) for a second opinion
- If needed, you may now let the bolt assembly go forward
- If needed, you may now “ease springs” by firing off the action
- Bag, bench or transport the firearm off the firing point
- Throughout this process - Maintain muzzle awareness!

As you can see, the process is very similar to the NSPs of other firearms with some small variations.



## Load, Unload, Fire & Stoppage Sequence:

Load – The insertion of a charged magazine into the Magazine Well (see Naming of Parts for location).

The firearm may be loaded with the bolt assembly, also known as the working parts locked to the rear or unlocked and in the forward position. For ease of use and to avoid accidental pointing of the firearm at anything other than the targets, we advocate first unlocking the working parts on an empty chamber, then inserting the magazine.

### Load Sequence:

- Maintain muzzle awareness at all times!
- Take control of the firearm
- Unlock the working parts (see previous section on the bolt lock & release catch) and let the bolt go forward through spring pressure
- Apply the safety catch
- Insert a loaded magazine into the magazine well (see section on Magazine charging for more info)
- Test and adjust position & hold + natural alignment
- Draw cocking handle all the way back and release – don't ease it forward – This is known as "make ready"
- If not already in the shoulder, do so and take careful aim

### Unload Sequence:

- Maintain muzzle awareness at all times!
- Apply the safety catch if possible (fired state vs. unfired)
- Press the magazine release catch forward with your trigger finger
- Try and catch the magazine which will fall out the bottom through gravity
- Pull back on the cocking handle and engage the slide lock/unlock catch by pushing up. Maintain upward pressure while simultaneously slowly releasing the cocking handle
- Carry out NSPs

### Firing Sequence:

- Maintain muzzle awareness at all times!
- Identify your designated target
- Take aim
- Take off the safety catch
- Fire by pulling back on the trigger
- Firearm will cycle the spent case out the right side on the receiver, move forward and chamber a fresh round while also resetting the firing mechanism, also known as the action which is all housed in the receiver
- Continue firing until firearm is empty or given the command to stop

### Stoppage Sequence:

What's that? – A stoppage is any issue that prevents the firearm from discharging when you go to pull the trigger. It is usually a stuck fired case in the receiver but can also be a round that has failed to present itself in the chamber.

To solve a stoppage, follow the unload sequence.

Reference Material	The Firearms: Ruger 10/22®
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## Sight System:

The Ruger 10/22® is equipped with what are commonly referred to as “iron sights”. The basic concept of how to use them is basically line up the target with the foresight which is then all lined up with the rear sight... simple!

The image below is known as the 6 O’clock or “lollypop” hold. The other widely used sight picture is “Point of Aim” where the foresight/rear sight combination is elevated to cover the centre of the target. Please see below for the benefits and pitfalls of each sight picture.



This is the rear sight. You will notice that there is a notch at the base of the aperture with a white diamond below it. The bead of the foresight (right) is designed to drop into this notch. All you need to do is align the two sights with the target and that is where the bullets will go.

The bead of the foresight sits on top of the stem of the rear sight. This is what is referred to in the description to the left



Remember, with this style of sighting system, you focus on the **FORESIGHT**.





Hold	Benefit	Pitfall
6 O'clock	Clear visibility of the target to locate centrally	Sights will need to be altered when a different size or style target is being shot at
Point of Aim	No need to adjust sights for different style or sized targets “one size fits all”	Large black targets increase the potential for the sights to wander, increasing inaccuracy

Reference Material	The Firearms: Ruger 10/22®
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## How to charge the magazine:

The magazine (mag) is of a rotary design, meaning that instead of being stacked one on top of the other, the cartridges are held in a circle within the magazine by a propeller shaped rotor. The rotor is pictured below and is red in colour. It is spring loaded so will always maintain pressure on the loaded cartridges, enabling them to be positively positioned each time the firearm mechanism loads

To load – In this section of pictures, the rounds are loaded from the right side

When loading a mag, you need to make sure the orientation in relation to the tip of the cartridge is correct. These mags have a flat end & a round end. The cartridge is loaded from the round end towards the flat end.	Place a cartridge on top of the magazine throat (mag lips) & position the rim of the cartridge in the groove located in the centre of the lips	Push the cartridge down then start pushing it towards the back of the mag	Complete the process by continuing to push the cartridge to the back of the magazine until it cannot go any further
			


Repeat the process above another 9 times and you have a fully loaded magazine or magazine for short.

## Frequently asked questions:

Q	A
What's the thread on the end of the barrel for?	Almost all new Ruger 10/22's on sale in the UK are screw cut for moderators.
What's a moderator?	It is a tubular vessel that is designed to capture the high pressure gas from the act of firing and reduce the pressure. This drastically reduces the noise or rapport at the muzzle. The bullet does not touch any part of the moderator and velocity is not affected
Why are Ruger 10/22® rifles not fitted with an auto bolt release?	The design was implemented to maximise safety and prevent any accidental unlocking of the bolt, especially when a loaded magazine was inserted as the firearm would instantly be put in a made ready condition. Due to the nature of the rim fire cartridge and the fact that the base of the bolt strikes the rim when stripping it from the magazine, there is a very small but very dangerous potential for an accidental discharge. Imagine that if the rifle was dropped and subsequently went off...
The rear sight is lying flat on the barrel	They are designed to fold down when not being used. Simply lift the sight and it will click in place
I've inserted the mag, operated the cocking handle and am pulling the trigger but nothing's happening	Safety catch? Aha!
I'm pulling the cocking lever back from the open position but it's not releasing?	Please read the section titled " <b>The Ruger 10/22 bolt lock &amp; release catch (The Bolt Lock)</b> " for full details of how the system works

Reference Material	The Firearms: Marlin 1894
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The Firearms: **Marlin 1894C RIFLE**

	
Calibre	357 Magnum
Action	Lever Action : Fires with each pull of the trigger and is reloaded by camming the lever downwards to eject a spent case, then returning it to cock the hammer and position a live round in front of the bolt to be chambered upon closing.
Magazine	Fixed 8 round tubular magazine
Section	Section 1 Firearm
Course?	You will use this firearm on the course
Description	The Marlin Model 1894C is a lever-action repeating rifle introduced in 1894 by the Marlin Firearms Company of North Haven, Connecticut. The design has remained the same since its inception

Naming of the parts (Overview):





Reference Material	The Firearms: Marlin 1894
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## Naming of the parts

### (Trigger Assembly & Control Surfaces):



<p><b>Safety Catch</b> This style of safety catch is applied by pressing from the LEFT side of the trigger assembly. When activated, it stops the hammer from fully falling. Pushing with your trigger finger (if you're right handed) takes the safety off.</p>	<p><b>Trigger</b> Obviously you pull this back and it fires the rifle. The small pin protruding behind the trigger is a safety mechanism, preventing the rifle from being fired if the lever is not in the fully closed position</p>	<p><b>Lever</b> The operation of this lever:</p> <ul style="list-style-type: none"> <li>• ejects a case/loaded round</li> <li>• cocks the hammer</li> <li>• upon closing, chambers a fresh round from the lifter</li> </ul>	<p><b>Loading Gate</b> This is a sprung gate that allows you to load the rifle. 1<sup>st</sup>, the action has to be closed. The rounds are inserted nose first into the loading gate and pressed forward <b>WITH THE THUMB!</b></p>
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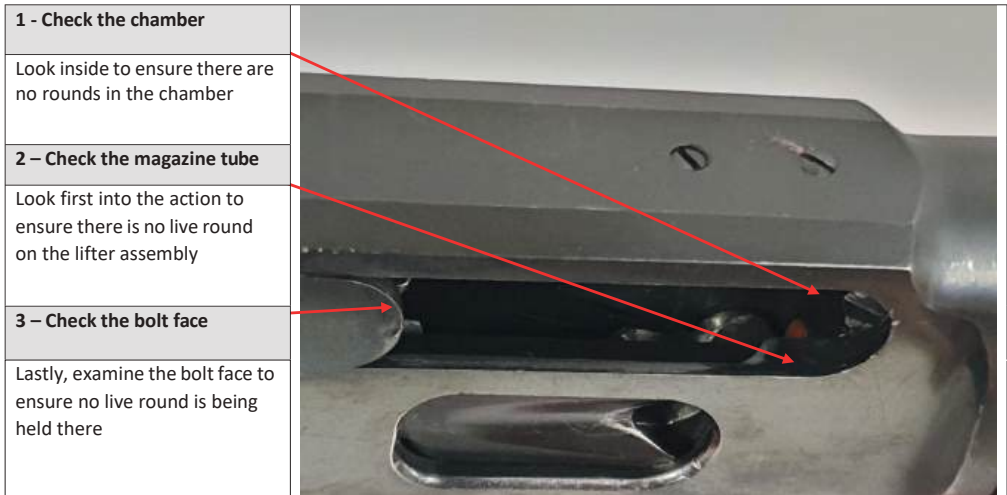
Reference Material	The Firearms: Marlin 1894
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## NSPs or Normal Safety Procedures:

First complete the unload sequence as described in the previous section. Once complete you need to check that the firearm is completely empty of any live rounds.

- Maintain muzzle awareness at all times!
- Ensure action is locked back
- Have a good look into the receiver at the chamber, it should be clear of any empty case or live round (See the picture below)
- Check the magazine tube to ensure there are no live rounds present AND – check the lifter assembly to ensure no live rounds are there either
- Check the bolt face to ensure there is no round of ammunition being held there
- Once you are satisfied the firearm is now clear...
- Present the firearm to an RO (if present) for a second opinion
- If needed, you may now let the bolt assembly go forward by closing the action
- If needed, you may now “ease springs” by controlling the hammer whilst pulling the trigger to decock the action
- Bag, bench or transport the firearm off the firing point
- Throughout this process - Maintain muzzle awareness!

As you can see, the process is very similar to the NSPs of other firearms with some small variations. First though, the action must be opened by operating the lever.



## Load, Unload, Fire & Stoppage Sequence:

Load – The insertion of cartridges individually into the loading gate (see Naming of Parts for location).

The firearm can only be loaded with the bolt assembly in the forward or closed position. To close this assembly, the lever must be operated into the closed position.



### Load Sequence:

- Maintain muzzle awareness at all times!
- Take control of the firearm
- Work the lever to ensure the firearm is not loaded and is functioning properly
- Apply the safety catch
- Close the action via the lever
- Grasp the hammer firmly and slowly pull the trigger so that the hammer may be lowered into the “half cock” position
- Introduce ammunition singly into the loading gate, push with your thumb
- Test and adjust position & hold + natural alignment
- Work the lever fully down then back up to the closed position – This is known as make ready
- If not already in the shoulder, do so and take careful aim

### Unload Sequence:

- Maintain muzzle awareness at all times!
- Apply the safety catch
- Open the lever and shake the round on the lifter out through the ejection port
- Close and re-open the action and repeat until the magazine is empty
- Carry out NSPs

Reference  
MaterialThe Firearms:  
Marlin 1894

## Load, Unload, Fire & Stoppage Sequence (continued)

### Firing Sequence:

- Maintain muzzle awareness at all times!
- Identify your designated target
- Take aim
- Take off the safety catch
- Fire by pulling back on the trigger
- Work the lever down to eject the fired case and close to re-load with a fresh round
- Continue firing until firearm is empty or given the command to stop

### Stoppage Sequence:

A stoppage is any issue that prevents the firearm from discharging when you go to pull the trigger. It is usually a stuck fired case in the receiver but can also be a round that has failed to present itself in the chamber.

To solve a stoppage, follow the unload sequence.

In the case of the Marlin, partially working the lever can cure a missfeed.

Reference Material	The Firearms: Marlin 1894
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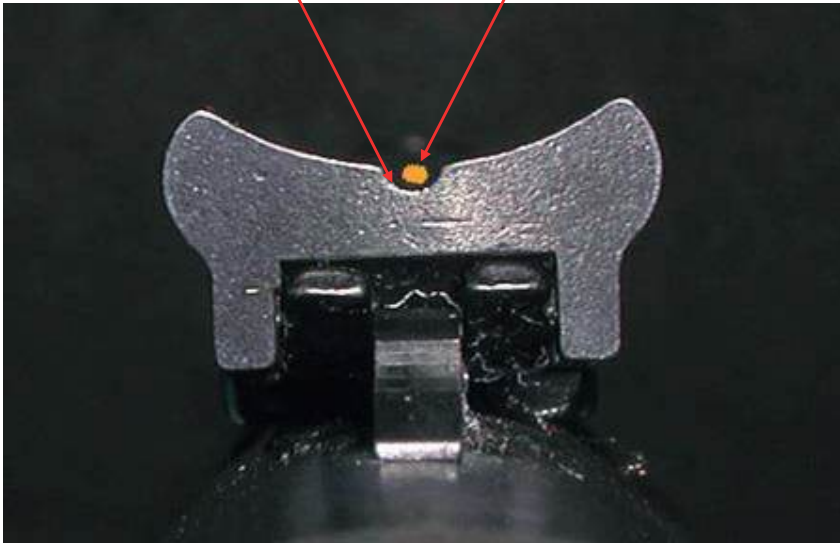
## Sight System:

The Marlin 1894C® is equipped with what are commonly referred to as “iron sights”. The basic concept of how to use them is basically line up the target with the foresight which is then all lined up with the rear sight... simple!

The image below is known as the 6 O’clock or “lollypop” hold. The other widely used sight picture is “Point of Aim” where the foresight/rear sight combination is elevated to cover the centre of the target. Please see below for the benefits and pitfalls of each sight picture.

This is the rear sight. You will notice that there is a notch at the base of the aperture. The bead of the foresight is designed to drop into this notch. All you need to do is align the two sights with the target and that is where the bullets will go.

The bead of the foresight sits on top of the stem of the foresight. This is what is referred to in the description to the left



Remember, with this style of sighting system, you focus on the **FORESIGHT**.

Hold	Benefit	Pitfall
6 O'clock	Clear visibility of the target to locate centrally	Sights will need to be altered when a different size or style target is being shot at
Point of Aim	No need to adjust sights for different style or sized targets “one size fits all”	Large black targets increase the potential for the sights to wander, increasing inaccuracy

<b>Reference Material</b>	<b>The Firearms: Marlin 1894</b>
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## How to charge the magazine:

The Marlin Lever Action rifle incorporates an integral tubular magazine that runs along the length of the barrel, situated just beneath it. It is known as a tubular magazine and is loaded by the insertion of ammunition through the loading gate, situated on the right of the receiver.

First the action must be closed, this allows ammunition to be inserted into the loading gate. Please note that you cannot load this firearm with the lever in the open position.

Insert a cartridge by pressing the nose of the bullet against the loading gate which is basically a sprung door.

The gate will be pushed back into the receiver of the rifle and the live round subsequently pushed into the magazine. If the cartridge is not fully pushed into the loading gate, the chances are high that it will be forced back out by spring pressure.

Always remember to push each round in with your thumb – NOT A FINGER!

If you push rounds in with your finger, there is a good chance you may get your finger stuck in the loading gate aperture. On the outside of the firearm, it is nice and polished but you cannot say the same for the inside which is usually pretty sharp and it will trap your finger and in all likelihood – hurt.


The magazine will usually take 8 rounds of 357 Magnum ammunition or 9 rounds of 38 Special. If you are meeting with extreme resistance when loading, don't force additional rounds into the magazine.

## Frequently asked questions:

Q	A
How do I hold the firearm and what do I do with my fingers when shooting	The lever has two apertures, one for your trigger finger and the one behind for your other fingers. Keep your other fingers in the rear portion but always remember to remove your trigger finger from the front aperture, as on closing you are likely to skewer it with the trigger
The action is stuck half way open	Try rattling the lever forward and back a small amount, there is a large lug located within the action that moves out of the bolt when the lever is actuated and it is probably just stuck
I've pulled the trigger and the gun goes click but I've just loaded it?	Try taking off the safety
The rear sight is lying flat on the barrel	They are designed to fold down when not being used. Simply lift the sight and it will click in place but be careful as the sight blade is especially fragile
The hammer looks to be almost in the cocked position but nothing happens when I pull the trigger	The hammer is in what is called the "half cock" position. To fire, draw the hammer back to full cock first.
I cannot open the lever at all, it's stuck in the closed position	The chances are that you have suffered what is commonly known as the <b>Marlin Jam</b> . That is when there is a live round on the lifter assembly AND a live round has found its way underneath the lifter too.  <b>Call an Armourer to your location, don't leave the range under any circumstances with a firearm in this condition!</b>

Reference Material	The Firearms: Ruger Long Range Rifle
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## The Firearms: **Ruger Long Range**

	
Calibre	.22 LR
Action	Bolt Action : Fires with each pull of the trigger and requires operation of the bolt to chamber a fresh cartridge and re-cock the trigger/firing assembly
Magazine	10 round rotary magazine
Section	Section 1 Firearm
Course?	You will use this firearm on the course
Description	Exceptionally accurate .22 LR rifle

### Naming of the parts



Reference Material	The Firearms: Ruger Long Range Rifle
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## Naming of the parts

### (Trigger Assembly & Control Surfaces)



**Safety Catch**

This rifle employs a safety catch that is located directly behind and below the rear of the bolt and is set by pressing forward.

**Bolt handle**

As with all bolt action styles, the bolt on the Ruger is no different. To remove it though, first you need to open the action, depress the bolt release catch (on the left side of the receiver) and while depressed, withdraw the bolt.

**Trigger Blade safety**

The Ruger is fitted with a safety system similar to the Savage rifle. This system is designed so that accidental discharge is controlled and kept to a minimum.

**Magazine release catch**

The magazine release on this rifle is exactly the same as the 10/22®. Designed to be operated by the shooter's trigger finger so works as an additional safety feature.



<b>Reference Material</b>	<b>The Firearms: Ruger Long Range Rifle</b>
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## NSPs or Normal Safety Procedures:

First complete the unload sequence as described in the previous section. Once complete you need to check that the firearm is completely empty of any live rounds.

- Maintain muzzle awareness at all times!
- If not already complete, move the bolt to its rearward position.
- Have a good look into the chamber, it should be clear of any empty case or live round
- Check the magazine well to ensure the magazine was removed previously
- Check the bolt face to ensure there is no round of ammunition being held there
- Once you are satisfied the firearm is now clear...
- Present the firearm to an RO (if present) for a second opinion
- Remove the bolt or insert a safety flag.
- Bag, bench or transport the firearm off the firing point
- Throughout this process - Maintain muzzle awareness!

As you can see, the process is very similar to the NSPs of other firearms with some small variations.

1 - Check the chamber	2 – Check the magazine well	3 – Check the bolt face
		

## How to charge the magazine:

This process is covered in the Ruger 10/22 section of the Reference Material

## Frequently asked questions:

Q	A
How do I get the bolt out?	<ul style="list-style-type: none"> <li>○ Unlock the action (bolt to the rear)</li> <li>○ Push in the bolt release catch above the trigger on the left side of the receiver</li> <li>○ Pull out the bolt</li> </ul> Replacement is a reverse of the above
What's the black blade on the trigger for?	This is a safety measure to ensure that the trigger is not accidentally pulled by side pressure. It also ensures that the shooter's finger positively applies rearward pressure
Can I adjust the stock for fit?	Yes, the stock has a cheek rest that can be adjusted via a sprung catch located in the stock on the right side.
What's the thread on the end of the barrel for?	Almost all new Ruger 10/22®'s on sale in the UK are screw cut for moderators.

## Load, Unload, Fire & Stoppage Sequence:

Load – The insertion of a charged magazine into the Magazine Well (see Naming of Parts for location).

### Load Sequence:

- Maintain muzzle awareness at all times!
- Take control of the firearm
- Move the bolt to its rearward position.
- Insert a magazine into the magazine well
- Push the bolt forward to chamber a round.
- Ensure the rifle is pointing horizontally and in your own target lane - Ideally in the shoulder.
- Fully Close (rotate) the bolt, and take careful aim

### Unload Sequence:

- Maintain muzzle awareness at all times!
- Remove the magazine
- Unlock the bolt by rotating the handle and move it to its rearward position.
- Observe the ejection of the spent case.
- Carry out NSPs

### Firing Sequence:

- Maintain muzzle awareness at all times!
- Identify your designated target
- Load with a magazine
- Make sure the stock is in your shoulder
- Work the bolt and chamber a round
- Take aim
- Fire by pulling back on the trigger
- Repeat

### Stoppage Sequence:

What's that? – A stoppage is any issue that prevents the firearm from loaded or being discharged.

- In the case of a stoppage during loading.
  - Check for a fired case that has failed to eject or be removed.
- If the bolt cannot be closed on a live round, check:
  - The ammunition is not deformed in any way.
  - That there is not already a round in the chamber.

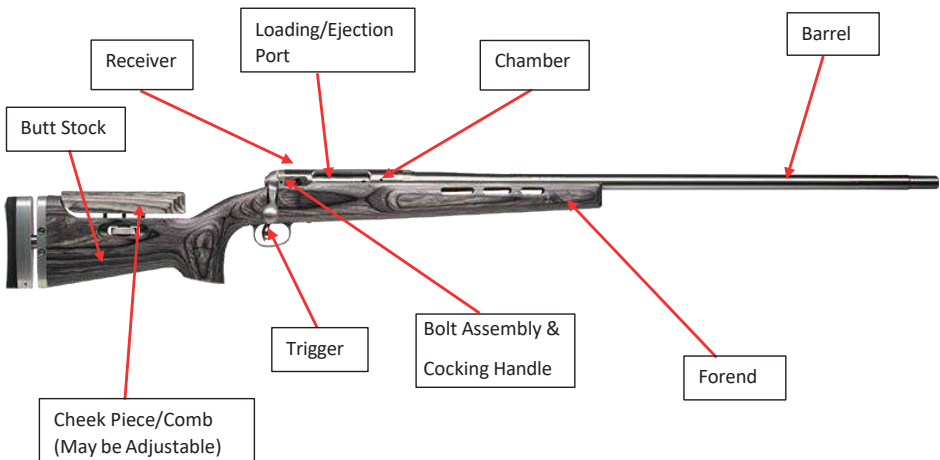
Reference Material	The Firearms: Savage (scoped & iron)
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## The Firearms: **The Savage FTR**

This section covers both variants of the same rifle (scoped and Vernier sighted). The sights have been omitted to stop confusion.

	
Calibre	.308/7.62x51mm
Action	Bolt Action : Fires with each pull of the trigger and requires operation of the bolt to chamber a fresh cartridge and re-cock the trigger/firing assembly
Magazine	None
Section	Section 1 Firearm
Course?	You will use this firearm on the course
Description	Highly customisable with extreme precision. This type of rifle is used competitively from distances of 300 yards to 1000 yards with either vernier or telescopic sights. For the Target Rifle (Vernier sights), the Forend is fitted with a rail to allow the attachment of a sling-swivel and a hand stop.

### Naming of the parts:



Reference Material	The Firearms: Savage (scoped & iron)
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## Naming of the parts:

### (Trigger Assembly & Control Surfaces)



<p><b>Stock Adjustment</b> The stock on newer target rifles is adjustable in the 'comb' or cheek piece, and for stock length.</p>	<p><b>Bolt lock &amp; release catch</b> The operation of this catch does require a little practice to get the hang of. <b>For a full description of the system, please refer to the section below.</b></p>	<p><b>Trigger</b> Obviously, you pull this back and it fires the rifle. Trigger weight and pull are adjustable via an internal screw.</p>	<p><b>Accutrigger Blade®</b> The AccuTrigger® system is easily adjustable by the shooter, offers a light, clean pull with no creep, and prevents the firearm from discharging if jarred or dropped.</p>
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### Safety Catch

This style of safety catch is applied by moving the 'slider' forwards and backwards. Forward to fire, rearward to engage the safety.

When activated, it stops the firing mechanism from operating.

Red is for Danger/Fire



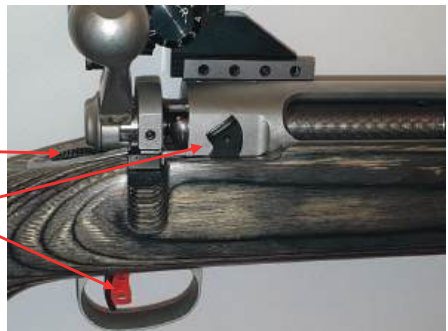
### Removing the Bolt (see above to identify parts)

Ensure the gun is unloaded.

Put the safety in the fire position.

Pull the trigger and hold back and simultaneously press bolt release catch, situated on the right of the receiver, forward of the bolt handle

Pull bolt out to the rear and out of the receiver



Reference Material	The Firearms: Savage (scoped & iron)
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## NSPs or Normal Safety Procedures:

First complete the unload sequence as described in the previous section. Once complete you need to check that the firearm is completely empty of any live rounds.

- Maintain muzzle awareness at all times!
- Move the bolt to its rearward position.
- Have a good look into the chamber, it should be clear of any empty case or live round
- Check the Loading/ Ejection port to ensure there is nothing there
- Check the bolt face to ensure there is no round of ammunition being held there
- Once you are satisfied the firearm is now clear...
- Present the firearm to an RO (if present) for a second opinion
- Remove the bolt or insert a safety flag.
- Bag, bench or transport the firearm off the firing point
- Throughout this process - Maintain muzzle awareness!

As you can see, the process is very similar to the NSPs of other firearms with some small variations.



## Frequently asked questions:

Q	A
How do I get the bolt out?	Unlock the action (bolt to the rear) Pull and keep rearward tension on the trigger Push down the bolt release catch above the trigger on the right side of the receiver Pull out the bolt Replacement is a reverse of the above
What's the red blade on the trigger for?	This is a safety measure to ensure that the trigger is not accidentally pulled by side pressure. It also ensures that the shooter's finger positively applies rearward pressure
Can I adjust the stock for fit?	Yes, the stock has a cheek rest that can be adjusted via a rotary wheel located in the stock. The rear butt pad can also be adjusted for extra length of pull to increase comfort. The butt plate is secured by two wheel adjusters located on the right rear of the stock

Reference  
MaterialThe Firearms:  
Savage (scoped & iron)

## Load, Unload, Fire & Stoppage Sequence:

Load – The insertion of a live round into the Loading/ Ejection port (see Naming of Parts for location).

The firearm can only be loaded with the bolt assembly, also known as the working parts to the rear. To prevent the bolt handle from hitting the face, the bolt may be pushed forward. To avoid accidental pointing of the firearm at anything other than the targets, the bolt **MUST NOT** be locked down on a live round until the rifle is horizontal.

### Load Sequence:

- Maintain muzzle awareness at all times!
- Take control of the firearm
- Move the bolt to its rearward position.
- Insert live round into the Loading/ Ejection port.
- Ease the bolt forward.
- Ensure the rifle is pointing horizontally and in your own target lane - Ideally in the shoulder.
- Fully Close (lock) the bolt, and take careful aim

### Unload Sequence:

- Maintain muzzle awareness at all times!
- Unlock the bolt and move it to its rearward position.
- Observe the ejection of the spent case.
  - Some Target Rifles are not fitted with 'ejectors'. This means that the spent case will not be ejected by the rifle, and will need removing manually by the shooter.
- Carry out NSPs

### Firing Sequence:

- Maintain muzzle awareness at all times!
- Identify your designated target
- Load
- Take aim
- Fire by pulling back on the trigger
- Unlock the bolt and move it to its rearward position. This will allow the firearm to breathe/cool down.
- When your target re-appears; reload with a fresh round and repeat until you have completed your course of fire or are told to stop


### Stoppage Sequence:

What's that? – A stoppage is any issue that prevents the firearm from loaded or being discharged.

- In the case of a stoppage during loading.
  - Check for a fired case that has failed to eject or be removed.
- If the bolt cannot be closed on a live round
  - The ammunition is correct for the rifle.
  - That there is not already a round in the chamber

Reference Material	The Firearms: AR15
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**The Firearms: AR15**

	
Calibre	5.56x45 mm
Action	<p>Straight Pull :</p> <p>Manual cocking mechanism similar in configuration to a traditional bolt action but spring assisted so manipulation should only be to the rear. Once fully to the rear, bolt is released and buffer spring will load a fresh round from the magazine, chamber and lock the bolt, ready to fire.</p>
Magazine	Detachable 10 to 30 round, double stack system
Section	Section 1 Firearm
Course?	You will use this firearm on the course
Description	The AR15 platform is a very popular one, especially with those who take part in the Civilian Service Rifle (CSR) competition. It is easy on the shoulder and very accurate. Many owners regularly take their firearms out past 600 yards

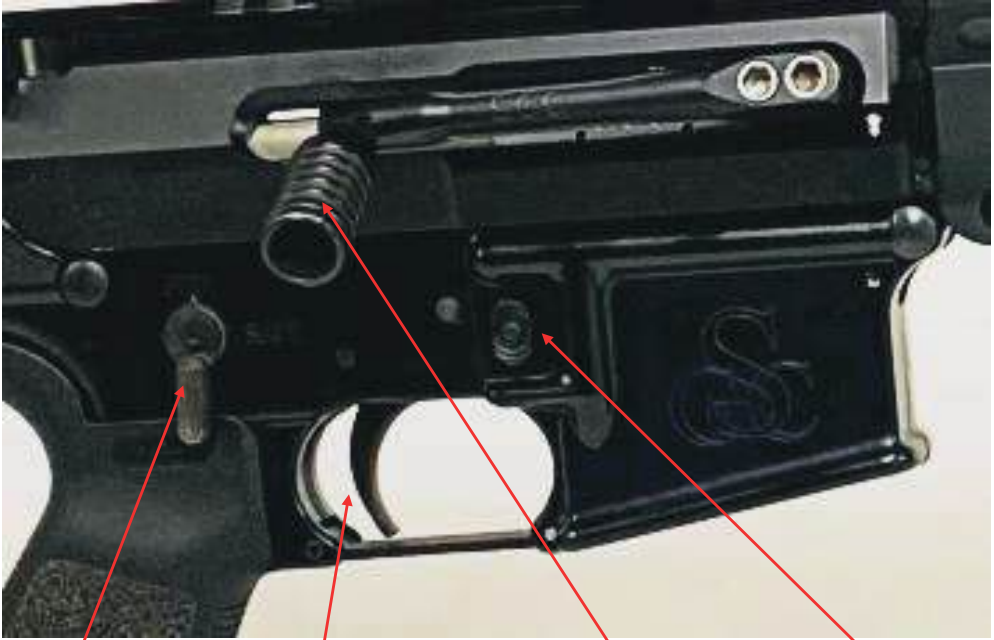
**Naming of the parts (Overview):**



Reference Material	The Firearms: AR15
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## Naming of the parts – Right Side

### (Trigger Assembly & Control Surfaces):



**Safety Catch**

This style of safety catch is ambidextrous and has 2 positions. Pictured is in the “FIRE” position.

To apply the safety, rotate until the catch is pointing towards the target. The safety cannot be engaged when the firearm is in a discharged state

**Trigger**

Obviously you pull this back and it fires the rifle.

**Bolt Assembly & Cocking Handle**

The rifle has 4 methods for loading and the easiest is via this cocking handle which is drawn back once a loaded magazine has been inserted into the magazine well. Once the bolt is back as far as it will go, simply release and the buffer spring will do the rest

**Magazine release catch**

This catch will unlock the mechanism inside the receiver and the magazine will fall out.



Reference Material	The Firearms: AR15
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## Special Mention: The Stock

Let's have a look at the AR stock as there are two features you need to be aware of before using the firearm.

The stock can be adjusted for length of pull by simply applying pressure to the lever situated here:

When using this firearm, avoid cradling the stock with your weak hand when firing as you might inadvertently depress the stock adjustment catch, thus unlocking the telescoping stock.

The result will be the scope along with the rest of the firearm coming back towards you under recoil. There is a potential for minor injury by being struck by the scope ocular. It's called a "scope kiss" and hurts!

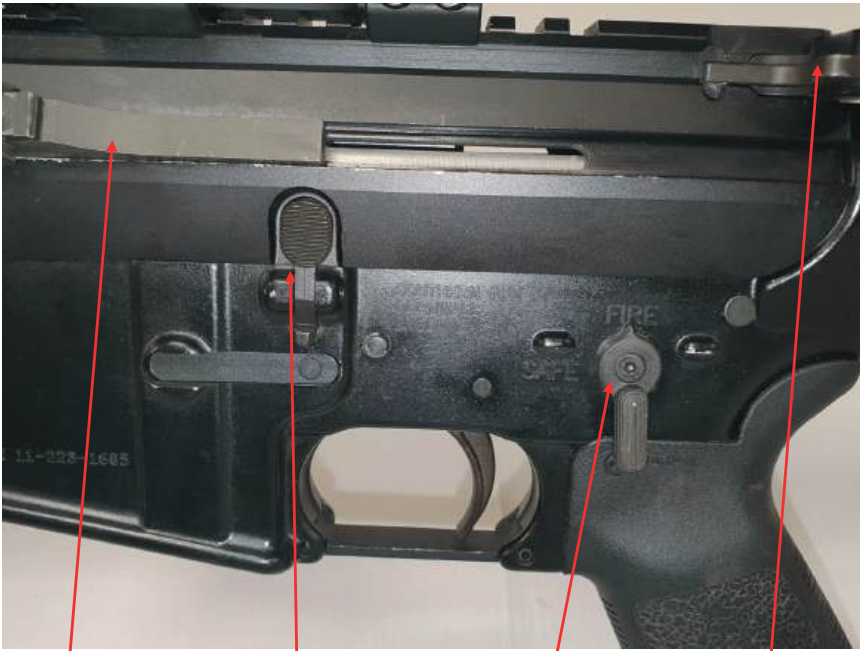
This control locks the mechanism in each desired location but is still unlocked by pressure on the above mentioned lever



Reference Material	The Firearms: AR15
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## Naming of the parts – Left Side

### (Trigger Assembly & Control Surfaces):



**Bolt Assembly & Cocking Handle (Left)**

This rifle is equipped with a left side cocking handle. To use, simply pull out the folded away handle and draw the assembly to the rear.

**Bolt Catch/Release**

This catch has two operations:  
 Release – When the bolt is locked to the rear, the upper part of the bolt catch may be pressed and the bolt will be released and go forward.  
 Catch – To manually lock the bolt to the rear, pull the bolt back and apply pressure to the lower part of the catch and hold, release the bolt to lock.

**Safety Catch (Left)**

This style of safety catch is ambidextrous and has 2 positions. Pictured is in the “FIRE” position.  
 To apply the safety, rotate until the catch is pointing towards the target. The safety cannot be engaged when the firearm is in an un-cocked state

**Charging handle Assembly**

This is the original cocking handle that is found on the semi and fully automatic variants of this rifle. It is rarely used as the shooter has a tendency to hit themselves in the nose if they don’t move their head out of the way. It is also serrated which will become uncomfortable

Reference Material	The Firearms: AR15
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## NSPs or Normal Safety Procedures:

First complete the unload sequence as described in the previous section. Once complete you need to check that the firearm is completely empty of any live rounds.

- Maintain muzzle awareness at all times!
- Ensure action is locked back
- Have a good look into the receiver at the chamber, it should be clear of any empty case or live round (See the 1<sup>st</sup> picture below)
- Check the magazine well to ensure the magazine was removed previously (See the 2<sup>nd</sup> picture below)
- Check the bolt face to ensure there is no round of ammunition being held there (See the 3<sup>rd</sup> picture below)
- Once you are satisfied the firearm is now clear...
- Present the firearm to an RO (if present) for a second opinion
- If needed, you may now let the bolt assembly go forward
- If needed, you may now “ease springs” by firing off the action
- Bag, bench or transport the firearm off the firing point
- Throughout this process - Maintain muzzle awareness!

As you can see, the process is very similar to the NSPs of other firearms with some small variations.



## Sight System:

The AR15 you will use on the course is equipped with a telescopic sight system. For more information on this sight system, please refer to the section in Module 2 of this manual

## Load, Unload, Fire & Stoppage Sequence:

**Load** – The insertion of a charged magazine into the Magazine Well (see Naming of Parts for location).

For safety reasons, we advocate loading the firearm with the bolt assembly in the forward position. The reason being that AR15's require a sharp tap to the base of the magazine to ensure a positive lock within the magazine well and as the Bolt Catch/Release mechanism wears, there is a very good chance the firearm will accidentally go into battery when the shooter is not ready.

### Load Sequence:

- Maintain muzzle awareness at all times!
- Apply the safety catch
- Unlock the bolt and allow it to go forward through spring pressure
- Insert a loaded magazine into the magazine well (see section on magazine charging for more info)
- Test and adjust position & hold + natural alignment
- Position firearm in the shoulder, pointing down range
- Draw cocking handle all the way back and release – don't ease it forward – This is known as the make ready

### Unload Sequence:

- Maintain muzzle awareness at all times!
- Apply the safety catch if possible (fired state vs. unfired)
- Press the magazine release catch inwards with your trigger finger (if right handed)
- Try and catch the magazine which will fall out the bottom through gravity
- Pull back on the cocking handle and engage the bolt lock & release catch by pressing the upper part inwards.
- Maintain pressure while releasing the bolt
- Carry out NSPs
- Insert the magazine well safety flag

### Firing Sequence:

- Maintain muzzle awareness at all times!
- Identify your designated target
- Take aim
- Disengage the safety catch
- Fire
- To reload, pull back on the bolt assembly to its rearmost position and release. The bolt will cycle the spent case out the right side on the receiver, move forward and chamber a fresh round while also resetting the firing mechanism, also known as the action which is all housed in the receiver
- Continue firing until firearm is empty or given the command to stop






### Stoppage Sequence:

What's that? – A stoppage is any issue that prevents the firearm from discharging when you go to pull the trigger. It is usually a stuck fired case in the receiver but can also be a round that has failed to present itself in the chamber. The AR15 employs a dual ramp facility internally to aid in ammunition transfer from the magazine to the chamber but occasionally the rounds get trapped. The result is usually that the bullet is forced further into the case. If this happens, **DO NOT ATTEMPT TO RE-FIRE THAT ROUND!** – The resulting pressure will be in excess of the firearms operational limits due to drastically reduced case capacity. To solve a stoppage, follow the unload sequence.

Reference Material	The Firearms: AR15
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## How to charge the magazine:

The magazine for this firearm is known as a twin stack system, meaning that rounds are not stored directly above each other in the magazine but at an angle.

<p>As you can see, the magazine (mag) has a taper towards the front, this is the correct orientation for loading ammunition</p>	
<p>Place the first round on the top of the magazine and press down. You will hear an audible click as the round of ammunition is captured by the feed lips of the mag</p>	
<p>Here we see the first round secured in place</p>	
<p>Next, place another round on the top of the magazine and repeat the process of pushing down.</p> <p>Keep repeating this process until the desired number of rounds are loaded into the mag.</p>	
<p>This is a fully loaded magazine</p>	

<b>Reference Material</b>	<b>The Firearms: AR15</b>
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## Frequently asked questions:

<b>Q</b>	<b>A</b>
What's the thread on the end of the barrel for?	Almost all AR15's on sale in the UK are screw cut for a muzzle brake which means they can also accept moderators.
What's a moderator?	It is a tubular vessel that is designed to capture the high pressure gas from the act of firing and reduce the pressure. This drastically reduces the noise or rapport at the muzzle. The bullet does not touch any part of the moderator and velocity is not affected
I've inserted the mag, operated the cocking handle and am pulling the trigger but nothing's happening	When you pulled the bolt assembly to the rear, did you let go or did you ride it forward into battery. Riding the bolt forward will not positively engage the bolt lugs within the chamber area and result in a fail to fire.  Or  Safety catch still applied?
I'm pulling the cocking lever back from the open position but it's not releasing?	Is the magazine safety flag still inserted?

Reference Material	The Firearms: Enfield No 4
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## The Firearms: **The Enfield No. 4**



Calibre	.303"
Action	Bolt Action: The bolt must be manually operated to cock the firing mechanism, strip a cartridge from the top of the magazine and move it into the chamber before each shot.
Magazine	10 round pressed steel box. Detachable, but rarely detached.
Section	Section 1 Firearm
Course?	You will use this firearm on the course
Description	The Enfield No. 4 was introduced to the British & Commonwealth armed forces in mid 1941 as the standard infantry weapon. It remained in service in standard form until the late 1950's, when it was replaced by the Self Loading Rifle L1A1. Selected rifles in Sniper configuration (No.4T) remained in service until the early 1970's.

### Naming of the parts (Overview):



Reference Material	The Firearms: Enfield No 4
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### Naming of the parts -Trigger Assembly:



<p><b>Trigger</b> Pull this back and it fires the rifle. Enfield No. 4 rifles have a two stage trigger – lots of movement where nothing happens (First Pressure) and then the trigger tightens up (Second Pressure) before functioning.</p>	<p><b>Catch, Magazine.</b> Push this upwards to release the magazine. However, the magazine is only removed for cleaning &amp; inspection. It is loaded through the top of the action. (See following pages for more detail.)</p>
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### Naming of the parts – Safety Catch (a.k.a. Locking Bolt):



Safety Catch – not applied.  
Rifle is cocked



Safety Catch – applied.  
Rifle is cocked



Reference Material	The Firearms: Enfield No 4
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## NSPs or Normal Safety Procedures:

First complete the unload sequence as described in the previous section. Once complete you need to check that the firearm is completely empty of any live rounds.

- Maintain muzzle awareness at all times!
- Ensure bolt is fully rearwards.
- Have a good look into the receiver at the chamber, it should be clear of any empty case or live rounds.
- Check the magazine well to ensure the magazine is empty.
- Check the bolt face to ensure there is no round of ammunition being held there.
- Once you are satisfied the firearm is now clear...
- Present the firearm to an RO (if present) for a second opinion
- Insert a breech flag, remove the bolt or “ease springs” by firing off the action.
- Bag, bench or transport the firearm off the firing point
- Throughout this process - Maintain muzzle awareness!

As you can see, the process is very similar to the NSPs of other firearms with some small variations.



Bolt  
Face

Magazine  
Platform

Chamber

## Load, Unload, Fire & Stoppage Sequence:

Load – The insertion of cartridges into the magazine (See naming of Parts for location).

The firearm must be loaded with the bolt drawn to the rear in order to reveal the charger guide and the top of the magazine.

### Load Sequence:

- Maintain muzzle awareness at all times!
- Take control of the firearm
- Lift the bolt handle and pull the bolt fully rearwards.
- Insert a charger of 5 cartridges into the charger guide and press sharply downwards on the top cartridge to push the cartridges into the magazine. Repeat this step if fully loading the magazine.
- Alternatively, push loose cartridges down into the top of the magazine. (See section on Magazine charging for more info.)
- Test and adjust position & hold + natural alignment
- Push the bolt handle firmly forwards and then lock it down when it is fully forward.
- Apply the Safety Catch.
- If not already in the shoulder, do so and take careful aim

### Unload Sequence:

- Maintain muzzle awareness at all times!
- Lift the bolt handle and pull it sharply backwards.
- Repeat this step until all cartridges have been expelled from the magazine.
- Carry out NSPs

### Firing Sequence:

- Maintain muzzle awareness at all times!
- Identify your designated target
- Take aim
- Take off the safety catch
- Fire by pulling back on the trigger
- Lift the bolt handle and pull it sharply backwards. This will extract the fired case from the chamber and eject it from the firearm, usually to the right and slightly forward.
- Push the bolt firmly forwards. This will strip the next cartridge from the top of the magazine and feed it into the chamber. This action also re-cocks the firing mechanism.
- Lock the bolt by turning it downwards.
- Fire by pulling back on the trigger.
- Repeat until ordered to stop or all cartridges are expended.

### Stoppage Sequence:

What's that? – A stoppage is any issue that prevents the firearm from discharging when you go to pull the trigger. In the case of the No. 4 it is usually a round that has failed to feed correctly into the chamber.

To solve a stoppage, follow the unload sequence.

<b>Reference Material</b>	<b>The Firearms: Enfield No 4</b>
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## Sight System:

The Enfield No. 4 is equipped with what are commonly referred to as “iron sights”. The basic concept of how to use them is basically line up the target with the foresight which is then all lined up with the rear sight.

The image below is known as the 6 O’clock or “lollipop” hold. The other widely used sight picture is “Point of Aim” where the foresight/rear sight combination is elevated to cover the centre of the target. Please see below for the benefits and pitfalls of each sight picture.



Remember, with this style of sighting system, you focus on the FORESIGHT.

Hold	Benefit	Pitfall
<b>6 O’clock</b>	Clear visibility of the target to locate centrally	Sights will need to be altered when a different size or style target is being shot at
<b>Point of Aim</b>	No need to adjust sights for different style or sized targets “one size fits all”	Large black targets increase the potential for the sights to wander, increasing inaccuracy

The Enfield No. 4 has an **Aperture Rear Sight**. In Fact, it has 2 of them - one for quick snapshots (commonly called the Battle Sight), which is “adequate” for distances between 100 and 300 yards, and another for more precise shooting.

“Battle Sight”



Rear Sight – set to 200 yards



Reference Material	The Firearms: Enfield No 4
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## Sight System (continued):

The two rear sight apertures are combined in the same unit. The following pictures show it from a side view:

Battle Sight in use



Precision rear sight in use



The foresight is much simpler. There's only one of them!

Notice that the foresight blade below is protected from being knocked out of alignment by the two much sturdier front sight protector wings. Note: It is very unusual to see an Enfield No. 4 where the sight blade is exactly central.



Reference Material	The Firearms: Enfield No 4
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## How to charge the magazine:

The magazine is of a twin stack design, meaning that instead of being stacked one on top of the other, the cartridges are offset slightly sideways. It is important that the rims on the cartridges are in the correct order when loading an Enfield No. 4 magazine if jams are to be avoided. This is shown in the following pictures.

As previously mentioned, although the magazine can be removed from a No. 4 rifle for loading, it usually isn't. Military thinking of the time decreed that loading would be performed using charger clips - often incorrectly called "stripper clips" - while the magazine remained on the rifle.



A charger clip and 5 drill rounds.  
Notice the up/down/up/down/up position of the cartridge rims

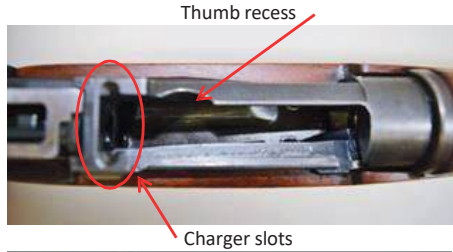


Drill rounds correctly placed into the charger.

The magazine of a No. 4 will hold 10 cartridges, so two chargers are required for a full load.

## How to charge the magazine (continued):

Once the rounds are in the charger, the charger can be fitted into the charger slots in the receiver of the rifle as shown below:



All that's needed now is a sharp push downwards towards the base of the top cartridge, and the rounds will feed into the magazine in the correct sequence. The charger can then be removed. It should end up looking like this:



Reference  
MaterialThe Firearms:  
Enfield No 4

## Frequently asked questions

Why does it take so much effort to close the bolt?	The Enfield No 4. Mechanism cocks as the bolt is closed. The last inch (2.54 cms) of forward travel compresses the striker spring, ready for it to power the firing pin (or striker) forward when the trigger is pulled.
Why can't I open the bolt or pull the trigger?	<p>There are two possible causes for this:</p> <p>Firstly, the locking bolt (safety catch) might have been applied. To recover from this, release the locking bolt (safety catch).</p> <p>Secondly, the mechanism might have dropped into the "half cocked" position. This is an additional safety feature of the Enfield No 4. action that prevents the trigger from being pulled if the bolt is not completely locked in place. It sometimes happens if someone has attempted to lighten the trigger pull by attacking certain parts of the mechanism with a file or emery stone.</p> <p>To recover from this event, keep the rifle pointing downrange, grasp the cocking piece at the back of the bolt and pull it backwards, keeping your finger OFF the trigger. The cocking piece should then lock into the cocked position.</p> <p>If this happens frequently, take the rifle to a gunsmith for investigation.</p>
What is inside the trapdoor in the end of the stock?	This covers the cavity that allows access to the large bolt that secures the stock to the receiver. In military service, the resulting hole was used to store an oil bottle and pull-through.
Why is there so much movement in the trigger?	The Enfield No. 4 was designed as an infantry weapon. The last thing a nervous, tired, cold and wet soldier needs is an ultra-sensitive trigger on his rifle. Firing the No. 4 requires conscious effort.
Why do I often smack myself in the mouth with my thumb when firing my Enfield No. 4 from the prone position?	<p>Enfield's were never really designed to be shot prone, and as a consequence have rather short stocks, unless you are lucky enough to find one with the letter "L" stamped on the top of the stock.</p> <p>Try keeping your thumb alongside the rifle or getting a cheek piece fitted.</p>

## Cleaning & Maintenance

### Introduction

Why do I need to clean my rifle? I haven't got it dirty! It still looks all shiny to me.....

It might be nice and clean on the outside after your shooting session, but every time a cartridge is fired, the resulting gasses leave fouling inside the chamber and barrel, sometimes accompanied by traces of unburned propellant. The passage of the bullet down the barrel leaves traces of lead, copper, cupro-nickel or whatever else the bullet might be made of.

There are many views regarding when and how firearms should be cleaned. (It's a great subject to bring up in a social environment after shooting is over for the day!). Some shooters clean their rifles after every shoot. Some clean their rifles after a predetermined number of rounds or after a predetermined period of time. Some clean their rifles only when rounds are difficult to chamber or extract, when misfires become a regular event or when accuracy has noticeably deteriorated.

The rifles you will use during your training course are cleaned as soon after being fired as is possible – usually within a couple of days. They are intensively used, and cleaning them regularly provides an opportunity to inspect them for wear and to ensure that all screws, bolts and other fixtures and fixings are tight. Remember that “Safe Equipment” stuff from earlier in the manual?

The cleaning methods described in the following pages are those adopted by the NRA Training Department armoury, using equipment and consumables available from the NRA armoury shop in most instances. However, a quick look at the internet will show that there are many alternatives on the market.

### Things you will need or might need

- A bench with a vice / something to rest the firearm in while you clean it
- Cleaning rods appropriate to the bore size of your rifle
- Cleaning jags & brushes appropriate to the calibre of your rifle
- Bore guides/rod guides appropriate to your rifle (optional)
- Cleaning patches appropriate to your rifles
- Cleaning fluids
- A chamber stick
- Gun oil or other light oil
- A set of hex keys (often called Allen keys) and/or Torx keys (often called star keys)
- A set of screwdrivers with hollow ground tips
- A set of cleaning picks
- A small wire brush
- A small nylon brush
- Pull-throughs or cleaning cables appropriate to your rifle, if applicable.
- Latex/Nyrex/Polythene/Plastic gloves.

Phew! That's quite a shopping list. Let's have a look at each of the items in a bit more detail.



## A bench with a vice (etc.)

Cleaning the barrel of a dirty rifle can require quite a bit of effort, so having to fight to keep the rifle still during the process just makes life difficult. In the worst case, you can end up damaging the rifle, or ruining the dining room table. The ultimate luxury would be a dedicated workbench with a large front-mounted vice capable of holding your largest rifle immobile while you work on it.

However, a very good substitute for this is a moulded plastic maintenance rest, like the one shown below. Not only does it hold the rifle securely, it also provides a tray in which to put the tools you are using and any screws, nuts, bolts or component parts that may have been removed from the rifle during cleaning or maintenance. (So much easier than hunting on the floor for that missing firing-pin-retaining-split-pin...)



Moulded plastic maintenance rest.

## Cleaning Rods

These are used for barrel cleaning, in conjunction with jags and brushes, which we will look at next.

You need a cleaning rod of sufficient length and diameter for the barrel you are about to clean, also allowing for the length of the action/receiver. And some space for your hand.

Cleaning rods are generally made of steel, sometimes with a plastic coating, or, at the top end of the market, of carbon fibre. The rod rotates with the rifling of the barrel during cleaning, so the handle is either located loosely by a couple of circlips, or is equipped with a set of roller bearings in the more expensive versions.

The plastic coating found on some rods is there to prevent metal to metal contact during the cleaning process and to provide a durable finish. However, if the rod is allowed to snag against any sharp edges of the rifle action during the cleaning process, small shavings of plastic can enter the myriad nooks and crannies within. This can be partially obviated by the use of a bore guide, which we will examine shortly.

Reference Material	Cleaning & Maintenance
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### Cleaning jags & brushes

These fit onto the end of the cleaning rod. Jags are used to hold patches of cleaning material, and can be wrap-around or spear-tipped. They can be made of brass, aluminium or nylon. Brushes also fit onto the end of the cleaning rod, and can be made of brass, phosphor bronze or nylon



Make sure you buy the correct jags and brushes for your rods. Some rods have internally threaded ends, some have external threads.

Also, make sure you use jags and brushes of the correct material for your choice of cleaning fluid (usually specified on the fluid container) otherwise you may end up dissolving your cleaning tools without realising it.

**L to R:** Wrap around brass jag (internal thread), spear-tipped brass jag (external thread), nylon brush (external thread), phosphor-bronze brush (external thread).

### Bore guides/rod guides.

These are tubular devices that fit into the action of a rifle in place of the bolt during cleaning. They ensure that the cleaning rod enters the barrel centrally, thus avoiding metal to metal contact, which can cause wear, or plastic to metal contact, as described previously. These aren't essential, but do make life easier because they also stop the cleaning rod from flexing.



This is a rather well used bore guide for an Accuracy International rifle. Notice how it looks very much like the bolt (below).



## Using a Bore Guide



Bore guide for a Lee Enfield.

Bore guide

Cleaning rod



Bore guide in place in a No.4 Enfield Rifle.

## Cleaning patches appropriate to your rifles

These are cloth squares, rectangles, circles or ovals that fit onto or around the cleaning jag (see above) and apply the cleaning fluid to the inside of the barrel. They are also used to remove the resulting dirt. And they are really handy for getting into nooks and crannies in conjunction with a pick.

It is important to use the right sized patches for the calibre of rifle being cleaned. Patches that are too small will slide through the barrel without removing any dirt. Patches that are too big will cause the cleaning rod to get stuck, which often requires a tremendous amount of brute force to remove, sometimes resulting in a broken cleaning rod.

## Cleaning fluids

These are what actually soften and dissolve the dirt inside the barrel, allowing it to be carried out on the patches. Older cleaning fluids were usually solvent based, but in recent years they have been reformulated or replaced with water based products.

Various formulas are available to remove gas fouling, carbon fouling, copper jacket fouling, black powder fouling etc. Some are designed to be used as stand-alone products, some are designed to be used in a set sequence, and some require the use of a complimentary fluid after cleaning to remove any residue.

Whichever fluids you choose to go with, in order to get the best results, **FOLLOW THE INSTRUCTIONS ON THE BOTTLE.**

Shooters used to using solvent based products will often decry the modern offerings because they don't have a smell that makes their eyes water or gives them a headache, and they take a bit longer to use. However, if used in accordance with the manufacturers' instructions, modern fluids will do the job just as well.

## Chamber stick

This is a plastic rod with one end shaped to fit the chamber of your rifle. The shaped end has a slot in it, into which a cleaning patch is fitted. The completed assembly is used to clean the chamber of the rifle, which will not only have some gas fouling, it will also have accumulated an amount of cleaning fluid during the barrel cleaning procedure. Fluid of any description is a dangerous addition to the chamber of a firearm, and all traces must be removed.



Reference Material	Cleaning & Maintenance
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## Cleaning & Maintenance (continued)

Here's the shaped end – notice how it looks like a cartridge case, and also notice the slot for the cleaning patch:



### Gun oil or other light oil

Most firearms require a small amount of lubrication in one or more places where there is moving metal to metal contact or where surfaces rotate against each other. Over oiling a firearm will cause problems because dirt or fouling will stick to the oil, resulting in a sticky paste that prevents smooth operation. The same thing will happen if you decide to use 20w50 engine oil!

### Hex keys/Torx keys

These are used to tighten or undo screws as required during the cleaning process and for general maintenance.

Beware - Hex keys are available in metric and Imperial sizes. Using the incorrect type or size will result in damaged screws.

As a rule of thumb, American made firearms will use Imperial sizes, whereas European made firearms will use metric.

## A set of screwdrivers with hollow ground tips

Hollow ground tips are less likely to slip out of a slotted screw head when compared to a standard taper tip screwdriver. Some screwdriver sets also include a selection of hex and Torx bits. Using the wrong sized screwdriver bit can result in damage to the screw and/or the surface finish of the firearm, as seen in these pictures.



Damaged bedding screw on a No.4 Enfield



Damaged loading gate screw on a Marlin 1894. (Compare this to the two other screws visible in the picture.)

Reference Material	Cleaning & Maintenance
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## A set of cleaning picks

Just like the ones the dentist puts in your mouth! These aren't mandatory, but come in extremely useful for removing dirt from nooks and crannies inside the receiver when used in conjunction with cleaning patches.

## A small wire brush/ small nylon brush

About the size of a toothbrush. Useful for cleaning bolt faces, magazines and a multitude of other things.

## Pull-throughs or cleaning cables

Some rifles can't be cleaned using a rod because of their design. A solution to this problem is to use a wire or nylon cable with an attachment to pull patches or brushes through the bore, instead of pushing them through with a rod. Some fabric based pull-throughs have a phosphor-bronze brush embedded in the weave at a certain point. These are useful as a method of giving the bore a quick clean while on the range, and, being small, will fit into even the smallest of shooting bags. (In fact, it's the entire cleaning regime for some folks!)

## Lens cleaning cloth & fluid

Good telescopic sights are expensive and deserve care. Cleaning kits comprising a microfibre cloth, a soft brush and some lens cleaning solution are available from various shooting equipment suppliers. Or you could go to your local opticians.

## Latex/Nyrex/Polythene/Plastic gloves

To keep your hands nice and soft. Even the modern cleaning fluids sting when they get into a cut!

## What to do...

OK, you've been shopping and have a big pile of new tools and toys. Next, let's look at how we put them to use on the NRA Training Armoury rifles.

**Bolt Action Rifles - All**

1. Check the rifle is unloaded
2. Remove the bolt
3. Remove the magazine (if fitted) if possible – we don't want to fill it with cleaning fluid or debris
4. Insert the rod guide into the action (see photo in previous section)
5. Fit the jag to the cleaning rod
6. Wet a patch with the cleaning fluid, put it on the jag and push it through the barrel, via the rod guide
7. Repeat this step 3 or 4 times.
8. Fit the brush to the cleaning rod and soak it in cleaning fluid
9. Pass the brush up and down the barrel 10-15 times
10. Refit the jag to the cleaning rod and repeat step 6 another 3 or 4 times.
11. Wait for 5 minutes for the fluid to soak into the fouling
12. Now is a good time to clean the chamber, using a chamber stick and patch or a chamber brush. Otherwise, when you get to step 14, you will be pushing dirt & debris from the chamber back into the barrel
13. While waiting, use the time to check that all of the screws, bolts and any other fixings or accessories on the rifle are tight, using the appropriate tools (Resist the temptation to overtighten)
14. Using the jag and cleaning rod, push clean, dry patches down the barrel until they come out as clean as you want them to.
15. Using the dental picks and some clean dry patches, clean the inside of the action and magazine housing
16. Clean the face of the bolt – this may require the brass wire brush or a pick and some patches.
17. Wipe the sides of the bolt with a lightly oiled cloth. Keep the oil away from the bolt face.
18. Clean the magazine platform with a brush or cloth
19. Clean the scope lenses using the lens cleaning kit
20. Reinsert the bolt and magazine
21. Function test the rifle, paying particular attention to the safety catch
22. Wipe over the outside of the rifle with a clean dry cloth.



## Lever Action Rifles - Marlin

Similar to bolt action rifles, but the operating lever must be removed in order to remove the bolt. See the picture below.

There's no need to use a chamber stick when cleaning the Marlin – as the cartridge case is the same diameter as the bullet, the chamber is (almost) the same diameter as the barrel, so the barrel cleaning jag and brush do the job.

Bolt – partially opened



Operating Lever

Operating Lever retaining thumbscrew

Once the retaining thumbscrew has been removed, the operating lever can be pulled out of the bottom of the action. (The bolt needs to be partially open to do this, as above.) The bolt can then be slid out of the rear of the action.

When sliding the bolt out, the ejector spring might pop out too, so watch out for it. It needs to be removed when cleaning the rifle, but hunting on the floor for it becomes tiresome quite quickly.

## Lever Action Rifles - Marlin (continued)

The picture below shows the ejector in place inside the action.

Ejector



Marlin ejector in situ.

The following picture shows the ejector by itself. (This is what to look for if it escapes!)



Marlin ejector on the floor.

## Ruger 10/22

Things get a bit more complex now – we have a bit more disassembly to do before we can start cleaning.

1. Check the rifle is unloaded
2. Cock the action and apply the safety catch
3. Remove the action and barrel from the stock. Depending upon what type of stock has been fitted, this might just require one hex screw (Just in front of the magazine well) to be undone, or it might also require the barrel band to be removed.
4. Push out the 2 pins that hold the trigger group into the action
5. Put the trigger group safely to one side.
6. Push out the recoil buffer
7. Pull the cocking handle fully rearwards.
8. The bolt will now drop out of the action, or can be lifted out if you are holding it upside down
9. Lift out the cocking handle, guide rod and bolt spring assembly, if they haven't launched themselves across the room.

These pictures identify the parts mentioned above:



Action securing screw

Reference Material	Cleaning & Maintenance
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Ruger 10/22 (continued)

Recoil Buffer



Trigger group locating pins

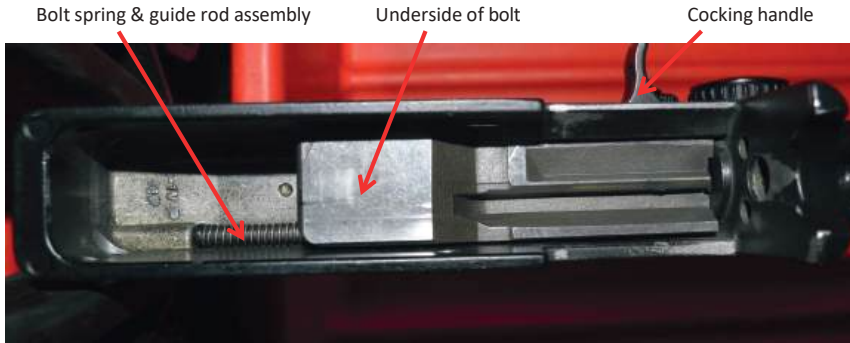
Hammer



Trigger group removed from action.

Reference Material	Cleaning & Maintenance
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Ruger 10/22 (continued)



Ruger 10/22 action seen from below.



Cocking Handle bolt spring and guide rod assembly and bolt removed from action

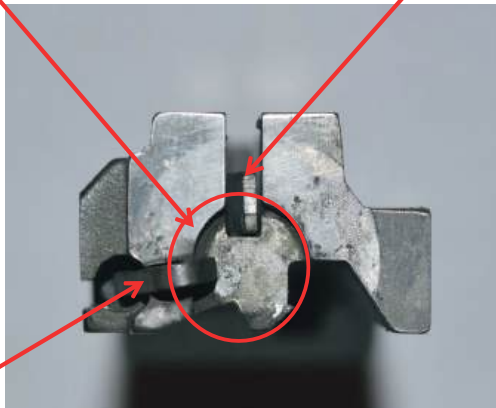
**Ruger 10/22 (continued)**

Now you have a pile of bits in your maintenance tray. That's as far apart as it needs to go for cleaning. (Thankfully.)

1. Clean the bolt using a patch soaked in cleaning fluid, a pick and possibly a wire brush. The bolt face can get particularly dirty, and it is common to find a build-up of carbon under the extractor. See the picture below.
2. Clean the cocking handle, rod and spring assembly and then apply a tiny amount of oil where the handle slides along the rod
3. Fit the jag to the cleaning rod
4. Wet a patch with the cleaning fluid, put it on the jag and push it through the barrel from the muzzle end. Be very careful not to damage the crown of the muzzle, as this will affect accuracy.
5. Repeat this step 3 or 4 times.
6. Fit the brush to the cleaning rod and soak it in cleaning fluid
7. Pass the brush up and down the barrel 10-15 times
8. Refit the jag to the cleaning rod and repeat step 4 another 3 or 4 times.
9. Wait for 10 minutes for the fluid to soak into the fouling
10. Using the jag and cleaning rod, push clean, dry patches down the barrel until they come out as clean as you want them to.
11. Using cleaning fluid, dental picks and some clean dry patches, clean the inside of the action and magazine housing. Make sure it is dry when you finish, otherwise fouling will stick to the residue.

Fouling (Dark grey)

Firing Pin



Extractor

Ruger 10/22 bolt face.

## Ruger 10/22 (continued)

Fouling (dark grey) Chamber Extractor slot



Ruger 10/22 chamber face showing fouling.



The same Ruger 10/22 chamber face after cleaning.  
Spot the difference!

## Ruger 10/22 (continued)

Now we have to put it all back together:

1. Holding the action upside down, insert the cocking handle recoil spring and guide rod assembly into the action via the ejection port
2. Pull and hold the cocking handle fully rearwards
3. Drop the bolt into the action, and press firmly downwards. It should click into place on top of the cocking lever
4. Release the cocking handle. The bolt should now slide forwards to the front of the action
5. Reinsert the recoil buffer
6. Wipe the face of the hammer clean (if dirty) and brush or blow any debris out of the trigger group
7. Holding the trigger group in place within the action, reinsert the two locating pins.
8. Refit the stock to the barrelled action assembly and tighten the hex screw in front of the magazine housing
9. Refit the barrel band if present
10. Function test the rifle
11. Check that the fixings for scope rails, scope rings and any other accessories are tight.
12. Wipe over the outside of the rifle with a clean dry cloth.
13. Clean the feed ramp and lips of the magazine(s) using a wire brush or cloth moistened with cleaning fluid.

The following pictures illustrate some of the steps described above:

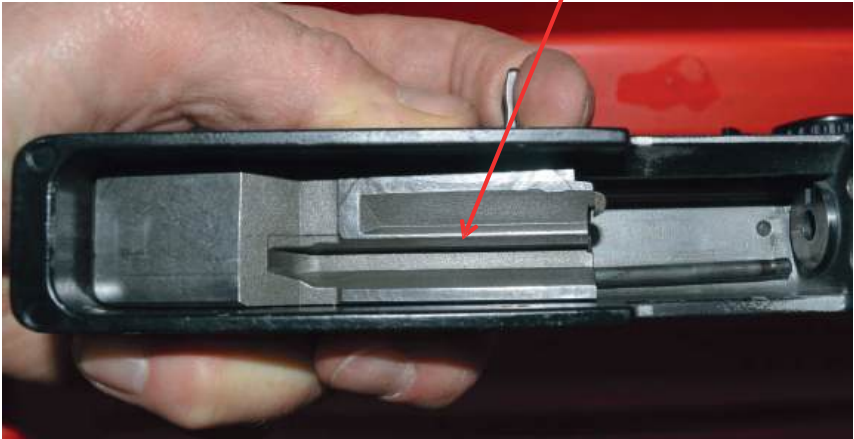


Cocking handle recoil spring and guide rod assembly in place.

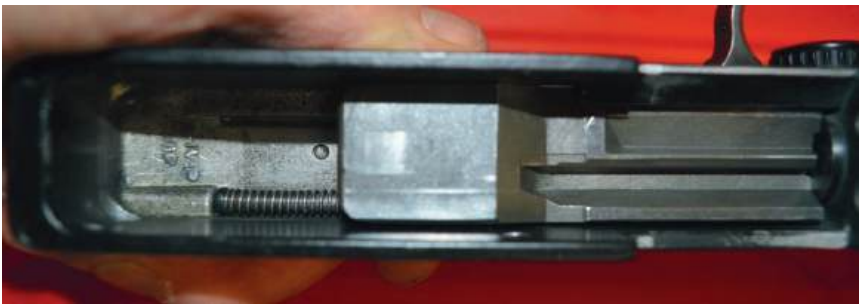


## Ruger 10/22 (continued)

Push down here to locate bolt on cocking handle



Bolt inserted but not fully located.



Cocking handle released, bolt in forward position.

**Note:** To avoid 90% of the above operations, some shooters just use a pull through to clean their 10/22 without disassembling it, and clean the bolt face via the magazine well or ejection port.

However, the NRA Ruger's get used intensively, and therefore a full clean is warranted every time. It doesn't take long once you have done it a few times – approximately 15 minutes.

Reference Material	The Spotting Scope
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## The Spotting Scope

A spotting scope is basically a compact, high power telescope that we use to observe fall of shot at distance. The resolution and light gathering power of a spotting scope is determined by the size of the objective lens (See Module 2).

Magnification is usually variable on most spotting scopes and usually they range from 20 x to 60 x power.



The easiest method of first finding your target is to wind down the magnification ring until you have a clear view of the targets. Adjust the focus ring until they are clear and position the object of interest in the centre of the ocular lens via manipulation of the tripod controls. Once completed, magnification can be wound up to the desired amount but always remember Parallax. As you increase magnification, there is a high chance that the image will gradually go out of focus. Re-apply adjustments via the focus ring until the image is clear. At high mag, it only takes a very small amount of adjustment before the image becomes blurry again.

## The Tripod



The tripod is operated by a pan and tilt adjuster, located just below the Arca-Swiss head mount.

The tripod height can be set via the 3 leg sections that each have telescopic capabilities to set the height.

The legs also have a choice of 3 angles they can be set to, thus enabling the use of the scope when shooting prone.

The tripods are sturdy but like all mechanical objects they will break if subjected to manipulation outside of their design!

When setting up the tripod, always ensure that the leading leg is facing forward so you have enough room to use the scope effectively without having to straddle the back leg.

The pan & tilt adjuster should be orientated towards the rear of the tripod for ease of use.

Always check the mounting bracket fitted to the spotting scope is tight otherwise the scope will move about

Reference Material	Scope fitting
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## How to fit a scope sight

This is probably one of the most daunting tasks that the shooter can face.

### First...

Before committing to the purchase of a scope, check first that the system will actually get out to the distances you want to shoot at.

Rule of thumb is to take the full amount of adjustment available in the scope and divide it by 2. This will give you a rough idea of the true amount of elevation you have to hand.

An example would be:

The scope you want to buy has 60 Minutes of Angle available.  $60/2 = 30$  so you will have **approximately** 30 minutes available to you.

If your rifle needs 40 MoA to get to the distances you wish to shoot at, you're not going to get there with the scope you have chosen.

Why divide the value by 2? Because the manufacturer does not know what system the scope is going to be fitted to and they have to cater for all eventualities. This could be a 6 foot pound air rifle or a 300 Win Mag. The trajectories of both being at opposite ends of the spectrum.

There are 2 choices open to you, either choose an alternative scope with **AT LEAST 100** minutes available.

### OR

Add a rail.






These come in various heights, measured in MoA and once fitted beneath the scope and rings, will claw back the same amount of MoA adjustment originally lost. Refer to Module 2 in the manual for a detailed description of the rail.

Reference Material	Scope fitting
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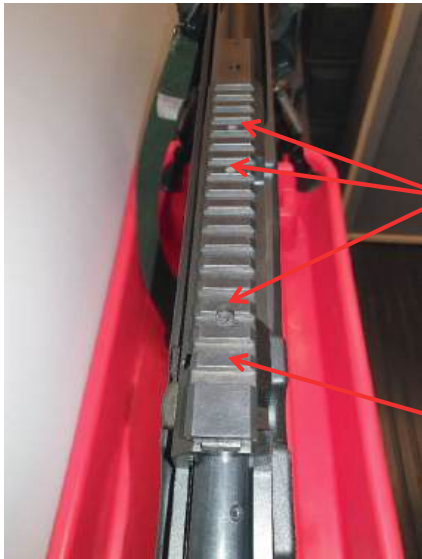
## How to fit a scope sight (continued)

### Next...

You've assembled the following items, what should you do next?

	<p>This is a 20 Minute of Angle Rail. When fitting it to your receiver, make sure the thick end is towards the rear. The idea being that the rail makes the scope point downwards</p>
	<p>These are rings including mounts. They attach to the rail or top of the receiver of the rifle securely and then hold the scope in place on top of the rifle</p>
	<p>This is a scope (no kidding!) As you can see, the rings (above) need to be mounted around the barrel of the scope (for definitions, please see the appropriate section in Module 2). Generally speaking, fixed mounts/rings as pictured are usually mounted to the rail or receiver with the screws facing right.</p>

### Rail



When buying a rail, it is imperative you make sure it is for your exact model of rifle. When torquing up the supplied screws that come with the rail, always refer to the manufacturers torque setting instructions. The amount of torque can vary from 14 in/lbs to as much as 68 and it is very easy to strip a screw if you apply too much.

Again, make sure the orientation is correct. Most manufacturers have different distances between the front and rear threaded holes in their receivers so this will determine the correct orientation.

Before torquing down the screws, ensure the base of the rail and the top of the receiver are clean and free of any dirt or grit.

You will notice that the rail/receiver has cross cut notches machined into it at regular intervals. These notches are designed to mate up with a bar on the underside of the mounting part of the rings. This locking system ensures the scope does not move around on the rail/receiver during firing.

## How to fit a scope sight (continued)

### Scope Placement

Next, you need to position the scope at an appropriate distance from your eye which necessitates positioning the rings in the right place first.



The easiest method of accomplishing this is to loosely fit the rings to the scope first and then loosely fit the mount portion of the rings to the rail or receiver. There is a certain amount of balancing while you carry out this preliminary procedure and our advice would be to carry out this initial setup with your rifle resting on something soft that can also hold the rifle in place. An ideal system is pillows or cushions.

You will want to position the rings so that they each are in the middle of the barrel either side of the saddle.

Once the rings are loosely secured to the rail/receiver and the scope is nestled within the rings, hand tighten all screws to prevent accidental loss of the scope when you offer the rifle up to your eye.

Before finalising the scope position on the rifle, now is a good time to assess which position you will be using for the majority of the time you are shooting. If you are going to mainly be shooting in the prone position, the scope will be mounted forward of the position it would be in if you were going to be mainly shooting standing, kneeling or sitting.

Remember from Module two about using your hand as a rough guide for gaining the correct exit pupil? You can use it now with the rough position of the scope. Lastly, don't forget to wind the magnification down to a lower setting.

Assume a shooting position based on your chosen primary position and pick up the rifle while **keeping your eyes closed**. Place it in your shoulder.

Open your scope eye and assess the distance from your eye to the reticle. Is it a clear, full image or do you need to move your head?

## How to fit a scope sight (continued)

### Scope Placement

Move the scope back and forth until it is in the desired position within the rings and assess the position by repeatedly closing and opening your eyes.

At this stage, the scope should be held in place by the rings and should be able to move with just the smallest amount of exertion. Too loose and the scope might move, too tight and you could scratch it.

Don't be too concerned about the orientation of the reticle at this stage but if it is a problem, go ahead and twist it into an approximation of a good vertical position.

Once you have a good exit pupil established, you now need to re-assess the position of the scope in relation to the rings mounted to the rail/receiver. Is it acceptably balanced on the barrel or will you need to relocate the rings and slip them up or down the rail/receiver to the next available notch while maintaining the desired scope location.

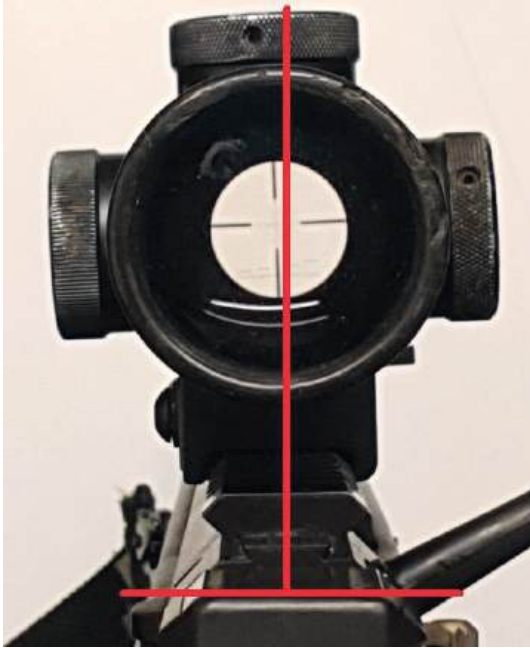
You are now in a position to lock off and torque up the ring mount screws to the rail/receiver.

Reference Material	Scope fitting
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## How to fit a scope sight (continued)

### Reticle Positioning

The final step is to align the reticle into a perfect orientation in relation to the rifle. First, ensure the ocular is perfectly in focus for you.



As you can clearly see, the reticle is not in line with the rifle and rail but canted off to the left.

Any shooting conducted with this scope in this plane will have to be restricted to a single range as any addition of elevation will then force the bullet strike over to the left of the target.

Another issue with scopes that are not properly aligned to the up/down geometry of the rifle tend to be compensated for by the shooter who will add an angle to the rifle when shooting which will exacerbate windage changes at longer ranges.

If your ring system came with an appropriate wedge shaped tool, then use that but if not, the easiest method is via your mark 1 eyeball, a piece of paper and something with a straight edge like a ruler.

If not already done, wind down the magnification to its lowest setting.

Place the sheet of paper on the floor in front of you and place the muzzle of the rifle on the paper, pointing down. Hold the butt stock and place the straight edge on the butt pad, aligned with the two screw holes you will see. The screw holes contain the locating screws for the pad and due to manufacturing processes, the holes will be perfectly aligned in a central up-down configuration.

## How to fit a scope sight (continued)

### Reticle Positioning

The straight edge should be positioned so that the base of the straight edge is located at the base of the butt pad



Bring your eye in line with the scope and straight edge. You will see the vertical line of the reticle. Move your head from side to side until the reticle line is very close to the straight edge. You will see that the reticle line is probably at an angle to the straight edge. Rotate the scope incrementally until the reticle line is perfectly aligned with the straight edge.

Your reticle is now in perfect orientation and will be good out to at least 1000 yards.

Torque down the ring screws (below) to the correct manufacturers settings.



What do you do next? – Boresight! (see Module 2)

Well done, you are now ready to take your assembled kit to the range and enjoy it.



Reference Material	The MilRad
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## MilRad systems

The most common form of angular measurement applied to sighting systems in the UK is the Minute of Angle but there is another, the milliradian or MilRad system for short.

So, what exactly is a MilRad?

The purest definition is an angle subtended from the centre of a circle which intercepts an arc equal in length to the radius of the circle (a Radian) divided by 1000.

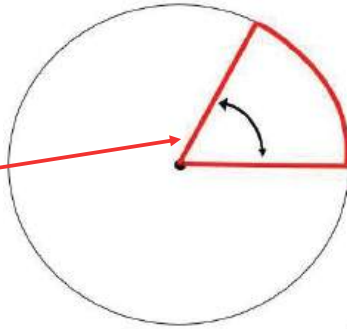
### Eh?

Let's draw a circle and take the radius

Bend it round the circumference

Join it back to the centre of the circle

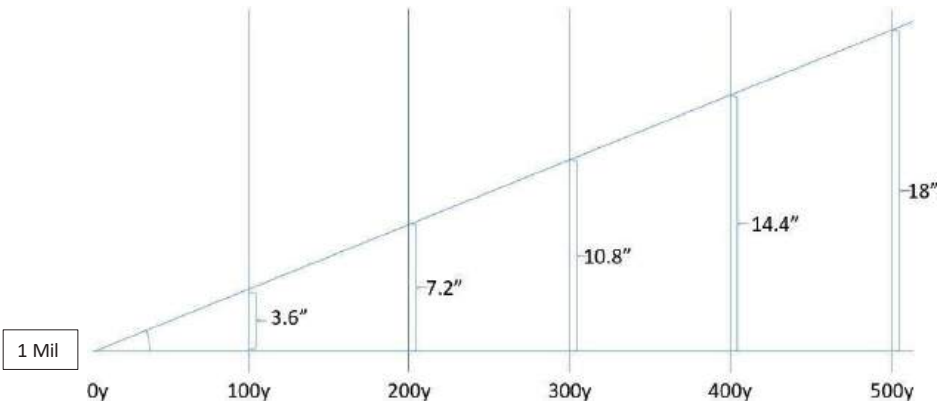
The resulting angle is a **radian**



A **milliradian** or Mil is the angle (radian) divided by 1000.

As you can see, the idea is similar to the MoA system however the angle of the MoA is just over 3 times smaller than the Mil.

1 Mil is approximately 3.6 MoA when using Imperial ranges (yards) so an approximate comparison can be formulated below:



Reference Material	The MilRad
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## MilRad systems (continued)

The scope will usually have 1/10<sup>th</sup> click increments but this is not always the case and as mentioned before in the MoA section, always check the click value prior to making any adjustments.

As a direct comparison, let's look at elevation values between Mils and MoA on an **Imperial Range**:

Range YARDS	MoA	Mils
100	0	0
200	1 ¼	.4
300	3 ¾	1.0
400	6 ½	1.8
500	9 ½	2.6
600	13	3.6
700	17	4.7
800	21 ½	6
900	26 ½	7.4
1000	32	8.9

The calculation is the MoA value divided by 3.6

If you are using a score card, the data being given to you will be in MoA and you need to easily convert it across to Mils. The simplest method is divide the MoA value by 3.6

Let's look at an example based on minutes below.

You are shooting at 900 yards and your firearm requires 28 Minutes of Angle elevation to reach the target accurately. You have recently swapped out your older MoA scope for a Mils version, subtended in 1/10<sup>th</sup>'s and you have successfully zeroed it for 100 yards.

To get the correct Mil value, use the older data you already have from your old scope, 28 MoA for 900 yards. Take that 28 and divide by 3.6 = 7.7777 so you would round the figure up to 7.8 Mils.

Apply the elevation and assess the fall of shot.

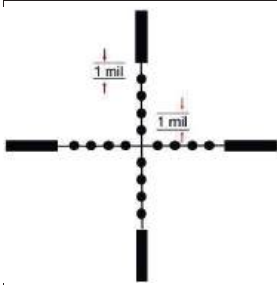
Always remember that there will always be a small amount of difference so you may have to add or subtract one or more 1/10<sup>th</sup>'s to fine tune the accuracy.

If you are shooting on metric ranges, it is easy. 1 Mil at 100m is 10cm and if the graduations are in 1/10<sup>th</sup>'s on the scope (as most are), then a single click would represent 1cm (10mm).

Reference Material	The MilRad
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## MilRad systems (continued)

The Mrad system can be used very effectively to range to target. On a typical Mrad scope, the crosshairs will look like this:



Each graduation on a MilDot scope represents a Mil but only at a predetermined magnification if the scope is second focal plane (where the reticle remains the same size throughout the magnification range). To ascertain what magnification setting is correct, always consult the owner's manual.

If the scope is first focal plane, the measurement is always the same.

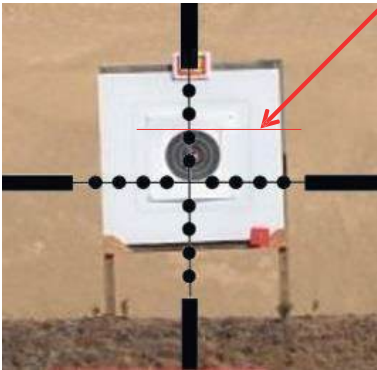
As you can see, the distance between the centres of each "dot" is exactly 1 Mil. Most Mil Dot scopes "Dot's" usually measure .2 Mil so the straight line between each "Dot" is exactly .8 Mil.

When the range is uncertain but the height of the target is known, a simple mathematical calculation can be used to determine the range

This is the calculation:

$$\text{Distance (m)} = \frac{\text{Target ht (mm)}}{\text{Angle (Mrad)}}$$

So, let's say the black part of this target measures 45" and looking through the scope using the dots you found it measures from the centre of the Reticle to the top of the first dot above. That equates to approximately 2.1 Mils.



We know that the black centre of the target measures 45" which we need to translate into **millimetres**:  
 $45 \times 25.4 = 1143\text{mm}$

Looking at the target, you use the horizontal line as a base and visually measure the height of the target. In this case it's :  
 $2 \times 1 \text{ Mil (ret centre to dot centre)} + 0.1 \text{ Mil (centre of top dot to its outside)}$   
 $= 1.0 + 1.0 + 0.1$   
 $= 2.1$

So, using the formula above, we get:  
 $1143/2.1 = 544.28 \text{ metres}$ . If you want that in yards, multiply by 1.094  
 $= 594.9 \text{ yards}$

As you can see, the conversion from inches to mm then back is lengthy. When using Imperial measurements with Mrad scopes, use the formula:

$$\text{Distance (yards)} = \frac{\text{Target ht (inch)}}{\text{Angle (Mrad)}} \times 27.78$$

So, in our case above,  $45/2.1 = 21.43$  multiplied by 27.78 = 595 yards. Almost the same if you take rounding up and down into the equation.

Reference Material	The MilRad
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## MilRad systems (continued)

You can also evaluate range using a 2<sup>nd</sup> focal plane scope (see Module 2) but need to add an extra calculation to the base equation which is x by magnification divided by 10:

$$\text{Distance (m)} = \frac{\text{Target ht (mm)}}{\text{Angle (Mrad)}} \times \frac{\text{Mag setting}}{10}$$

Taking the example previously, repeat the measurement process as before but now check the magnification on the scope.

Let's say you are on an Imperial range so the modified calculation is:

$$\left( \text{Distance (yards)} = \frac{\text{Target ht (inch)}}{\text{Angle (Mrad)}} \times 27.78 \right) \times \frac{\text{Mag setting}}{10}$$

You now need to plug in the measurements and calculate.

Let's say it is set at 10x magnification so 10/10 = 1 so the change to the original calculation is nothing but if your magnification was set to say 14 x power, the original calculation would come out as 595 x (14/10) = 425 yards.

As you can see from the example above, getting the magnification setting wrong will have a marked effect on the end range estimate and will affect your subsequent change to elevation. If you're shooting on open ground, you will almost certainly miss your target.

This all depends on the calibration of the 2<sup>nd</sup> focal plane scope. To check if your scope is calibrated, examine the magnification ring to identify 10x mag. It should be coloured differently. If not, check which magnification setting is a different colour and substitute that magnification for the denominator in the additional calculation. For instance, if the 12 x magnification marker on your scope is coloured red, your additional calculation would be magnification setting divided by 12:

$$\frac{\text{Mag setting}}{12}$$

Reference Material	Sound Moderators
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## Sound Moderators

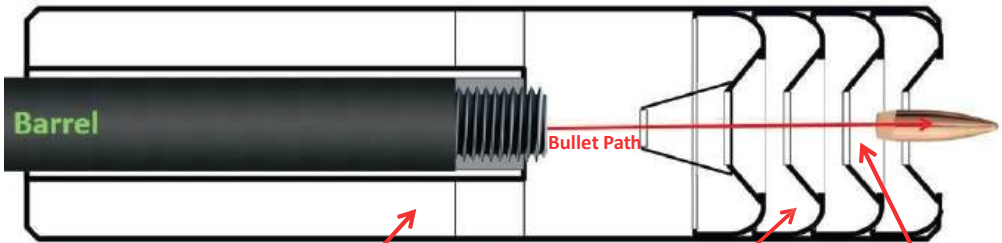
What is a sound moderator?

Basically, it is a device that usually screws onto the end of the barrel to capture the high pressure gas as the firearm is discharged and reduce the pressure to moderate levels. The sound of the shot is this release of high pressure gas so the moderator effectively almost removes it, resulting in a loud “sneezing” sound instead of a bang.

The sound moderator does not touch the bullet, nor does it affect the velocity of the bullet so there is still a loud “crack” downrange as the bullet exits at supersonic speed. In the case of subsonic ammunition though, sound moderators are exceedingly effective and it is possible to hear the sound of the firing pin contacting the case in some circumstances.

The easiest analogy would be a comparison between a sound moderator and a car exhaust. Both systems have a series of baffles internally that are designed to reduce the pressure and subsequent noise emission.

This is a cross section of a typical sound moderator:



The initial blast of gas is first captured in the expansion chamber

The baffles at the front of the moderator then slow the gas and subsequently reduce the pressure before exiting the moderator at the front

The channel that runs down the centre of the moderator is slightly larger than the diameter of the bullet to ensure the moderator does not get clipped by the bullet when it passes through the moderator.

## Clipping

This occurs when the moderator is not fitted securely to the threaded end of the barrel or if the thread is not 100% square to line of the bore. Clipping is when the bullet physically touches the internally mounted baffles and will always result in damage to the moderator. Remember also that the impact will have a detrimental effect on the accuracy of that shot and there is no guarantee that the bullet will not exit the range.

This moderator has suffered an internal strike that has subsequently tumbled the bullet INSIDE the moderator before exiting and blowing a hole through the end of the moderator



Reference Material	Sound Moderators
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## Thread pitch

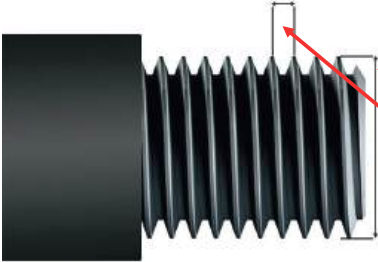
There are 2 forms of threading on firearms, Imperial and Metric. The thread on a moderator HAS to be the same as the thread on the muzzle of the firearm!

Here are some examples of the various thread sizes:

Thread Size	Imperial/Metric	Commonly found on
1/2" x 20 UNF	Imperial	Most 22LR rifles and many older full bore rifles. The thread is 1/2" across and there are 20 threads per inch
1/2" x 28 UNEF	Imperial	Most AR15 style rifles with standard diameter barrels and many 22 LR AR's. Also found on full bore rifles with smaller barrel diameters. The thread is 1/2" across and there are 28 threads per inch, making it a finer pitch than the above
M18 x 1.0	Metric	Commonly found on the Accuracy International range of rifles and other larger diameter barrels
5/8 x 24 UNEF	Imperial	Very common thread pitch found on any barrel that has the available diameter
M14 x 1	Metric	Can be found on some European made firearms with small diameters – hunting rifles being the obvious choice

If you are unsure of the thread on your firearm, our advice is to take the firearm to a competent gunsmith and they will be able to very easily ascertain what style of thread you have but below is a tip for self-assessment of the thread

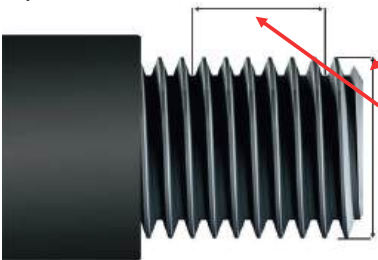
### Metric Thread



If you suspect the thread is metric, first measure across the diameter of the thread with a micrometer set to "MM or Metric". The number should be very close to a whole number (for instance, if the thread was M15x1, it will measure 14.9 or thereabouts, never more.

Next, measure the pitch from peak to peak, this will give you a very accurate assessment of pitch (say 1mm)

### Imperial Thread



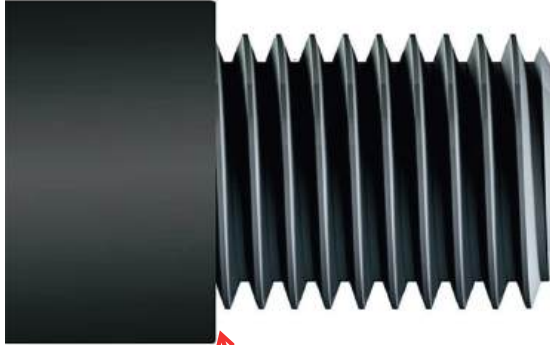
If you think it's an Imperial thread, like before measure the diameter first with your micrometer set to "IN or Imperial". The measurement will be fairly close to an Imperial measurement across but never slightly more.

To assess the pitch on Imperial threads, measure from trough to trough and count the peaks but you will have to set your micrometer to exactly 1/2" and multiply the resultant peaks by 2 to get the number of peaks per inch

Reference Material	Sound Moderators
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## Thread pitch

Let's look at a number of other very important parts of the threaded end of the barrel:



### The Shoulder

This is the mating surface between the back of the moderator and the barrel. It **HAS** to be cut exactly 90 degrees on to the centre line of the bore of the firearm or inaccuracy and potential clipping will occur. It should be flat and as smooth as possible. Always check there is no detritus around the shoulder as it will impart deflection to the moderator.

### The Crown

This should also be cut exactly 90 degrees to the centre line of the bore. Some crowns are cut with an 11 degree inward slant, this is perfectly acceptable as the contact from the bore to exit will still be consistent. Check the condition of the crown and look for evidence of pitting or excessive wear as it will affect accuracy.

## Note on cleaning:

Always include cleaning up the threads, crown and shoulder of your firearm as part of your normal cleaning regime and when the moderator is removed from the barrel, always make sure to fit the thread protector back to the barrel as there is nothing worse than trying to screw a damaged, high carbon steel thread into a much softer material like aluminium (depending on moderator manufacturer). Always follow the manufacturer's instructions when it comes to cleaning mods. Many recommend a simple squirt of WD40 down the end to deter moisture build-up.

Moderators are a great addition to general use firearms and are regarded as mandatory if you are hunting due to noise pollution. Apart from the obvious noise reduction, mods also absorb approximately 50+% of the recoil which make them very useful on heavier recoiling firearms like those used in sporting shooting. They are a heavy item though and can upset the balance of a firearm.

Moderators are generally constructed from steel, aluminium or a combination of both. There are other materials being used like delrin and carbon fibre but in the case of carbon fibre, they are generally more expensive. A moderator is considered a consumable in shooting terms, much like a barrel and many manufacturers will list the round count prior to recommended replacement.

Reference Material	Ballistic Applications
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## Introduction to Ballistic Applications

What is a ballistics app? - It is a program using a set of very complicated calculations based on data sets you input in order to give you a highly accurate table of elevations and approximations of windage at set distances. The calculations within the app will never place your round EXACTLY in the centre of that target as there are just too many variables that are constantly changing but it will get you onto the target board, enabling you to manually dial in your subsequent shots. Given the CORRECT data, they are extremely effective at saving you time and money in getting you close to the target centre.

Benefits	Pitfalls
<ul style="list-style-type: none"> <li>• Will supply very accurate data for elevation at a multitude of different ranges</li> <li>• A great tool for checking your initial calculations are in the right ball park</li> <li>• On the fly calculations can be created based on very specific ranges (i.e. the drop at 759 yards)</li> </ul>	<ul style="list-style-type: none"> <li>• Data is only as good as the information you give it Always use the app as a backup to <b>CONFIRM</b> your calculations are correct</li> <li>• Always reference the calculation against the nearest predetermined range</li> </ul>

In this manual, we won't go into what apps are better than others but when looking at availability, always check the number of downloads and the comments received by others.

### What data do they need?

Usual input parameters include:

#### General Parameters:

- Zero Range
- Wind Speed
- Temperature
- Air Pressure

#### Specific Parameters:

- Bullet Velocity
- Bullet Weight
- Rifle Twist rate
- Click values for elevation and windage
- Preferred Elevation/Windage unit
- Bullet make or ballistic coefficient

Based on the above **ACCURATE** data, the ballistic app will give you a very accurate assessment of how much elevation it thinks you need.

In our Module 4, our range table recommends an elevation of 32 Minutes of Angle to hit a target 1000 yards away in zero wind.

The following is an example of the data being fed into a ballistics app



Reference Material	Ballistic Applications
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## Introduction to Ballistic Applications

Ballistic Calculator					
INPUT VARIABLES					
Ballistic Coefficient:	0.442	Velocity (ft/s):	2850	Weight (GR):	155
Maximum Range (yds):	1000	Interval (yds):	100	Drag Function ():	G1
Sight Height (inches):	2	Shooting Angle (Deg.):	0	Zero Range (yds):	100
Wind Speed (mph):	0	Wind Angle (Deg.):	90	Altitude (ft):	1000
Pressure (hg):	29.53	Temperature (F):	75	Humidity (%):	50

### Ballistic Results

RANGE (YDS)	VELOCITY (FPS)	ENERGY (FT.-LB)	TRAJECTORY (IN)	COME UP (MOA)	COME UP (MILS)
0	2850	2795	-2	0	0
100	2656	2428	0	0	0
200	2471	2101	-2.9	1.4	0.4
300	2292	1809	-11.6	3.7	1.1
400	2122	1549	-26.9	6.4	1.9
500	1958	1320	-49.9	9.5	2.8
600	1803	1119	-82	13	3.8
700	1657	945	-124.8	17	5
800	1521	790	-180.4	21.5	6.3
900	1396	671	-251	26.6	7.7
1000	1285	569	-339.4	32.4	9.4

The key data applied to the app to produce the data in the table above was the following:

What sort of bullet was being fired?	A 155gr Sierra Match King bullet in a 308 cal rifle with a G1 BC of <u>0.442</u>
What was the velocity?	A muzzle velocity of <u>2,850 fps</u>
What is the zero range?	100 yards
What is the max range?	1000 yards
What intervals between zero and max did you want?	100 yards please
Lastly, give the app the atmospheric data (wind speed & angle, Temp, Humidity, altitude & pressure)	Get that from a search of the current weather in your area

Now, let's accidentally make a mistake with the BC (Ballistic Coefficient) and see what happens...

Reference Material	Ballistic Applications
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## Introduction to Ballistic Applications

Ballistic Calculator					
INPUT VARIABLES					
Ballistic Coefficient:	0.242	Velocity (ft/s):	2850	Weight (GR):	155
Maximum Range (yds):	1000	Interval (yds):	100	Drag Function ():	G1
Sight Height (Inches):	2	Shooting Angle (Deg.):	0	Zero Range (yds):	100
Wind Speed (mph):	0	Wind Angle (Deg.):	90	Altitude (ft):	1000
Pressure (hg):	29.53	Temperature (F):	75	Humidity (%):	50

### Ballistic Results

RANGE (YDS)	VELOCITY (FPS)	ENERGY (FT.-LB)	TRAJECTORY (IN)	COME UP (MOA)	COME UP (MILLS)
0	2850	2795	-2	0	0
100	2502	2154	0	0	0
200	2180	1635	-3.6	1.7	0.5
300	1883	1220	-14.6	4.6	1.3
400	1614	896	-35.4	8.5	2.5
500	1380	656	-69.8	13.3	3.9
600	1193	490	-122.4	19.5	5.7
700	1064	389	-199.5	27.2	7.9
800	977	329	-307.5	36.7	10.7
900	913	287	-451.0	47.9	13.9
1000	861	255	-637.7	60.9	17.7

We've made a typo and entered "0.242" instead of "0.442" for the BC. Look at the expected trajectory and subsequent amount of elevation the app is telling you to apply.

The previous example notes "32.4 MoA" whereas the example above is reading "60.9 MoA"

That's an increase of  $60.9 - 32.4 = 28.5$  MoA

How many inches EXACTLY is 28.5 MoA at 1000 yards? – 1MoA @1000 yards = 10.47" so  $10.47 \times 28.5 = 298.395$ "

$298.395/12 = 24 \frac{3}{4}$  FEET ABOVE WHERE YOU WANTED YOUR BULLET TO GO.....

You're going to potentially miss the sand and send one over the top. Always confirm the data from an app by a good, grounded alternate source like an elevation table.

## Can I legally own a Cannon?!

The answer is yes!

The following guidelines are issued by the Muzzle Loaders of Great Britain which we have copied with their kind permission:

### The Muzzle Loaders' Association of Great Britain

The Governing Body for Muzzle Loading Shooting in the United Kingdom



#### Protocol – Miniature Cannon only

1. This Protocol addresses the live firing of miniature cannons, smoothbore or rifled, and models thereof. The term cannon embraces all such guns, whether originally called such or by any other mode of address, name, weight or calibre.

Miniature cannons do not have to be exact replicas of the original, if it looks like a cannon then it is a cannon.

2. For the purpose of this Protocol, live firing involves the discharge of a projectile or projectiles, including ball, elongated shot, bolt, or any other missile or missiles. Blank firing involves a powder charge and wadding only.

3. Any such firing is restricted to guns that are legally held in accordance, if appropriate, with the 1968 Firearms Act, as amended. Live firing may only be conducted on ranges that are approved for the class of gun concerned.

4. Only barrels that are proved, and in proof, may be fired.

5. Only commercially produced gunpowder may be used.

6. Only projectiles made of lead, with or without an alloy may be fired.

7. Only target loads to be used, the over loading of cannon to generate excessive noise and smoke is not permitted.

#### **8. Hearing and eye protection is mandatory for all those who are involved in the firing of the cannon.**

9. Such steps as are necessary must be taken to restrict and restrain the recoil and barrel flip of any discharge, particularly when models with their lesser mass to projectile weight are fired. Reeving ropes, wheel and barrel chocks must be of sufficient robustness and fit to be effective.

10. One person (Gun Captain) must be nominated to be responsible overall for the safety, sighting, firing and discharge of any cannon.

11. Should more than one cannon be on the range at any time, a single person will be appointed Range Officer of them all. He or she will be in charge and responsible for the co-ordination of the safe handling and firing of all the guns on the line. This person must be in a safe position behind the gun line and able to see all the cannon and their crews. They must not be part of any gun crew.

12. Normal MLAGB safety procedures are to be followed for loading and firing. After firing, the Range Officer is to ensure that all cannons are cleared before any one goes down range and before the cannon are removed from the range.

Reference Material	Cannons
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- 13. Spectators must be restricted to areas where their safety is not compromised.
- 14. All sensible precautions must be taken to guard against accidental ignition of stored powder or ammunition. The use of a closed container such as a wooden lidded or plastic box is mandatory.
- 15. Cannon must only be loaded with the appropriate pre measured powder charge, these can be in phials or cartridges  
If paper cartridges are used to hold the charge of gun powder, the person loading the gun must ensure that the barrel is cleared after firing before inserting the next cartridge.
- 16. Loading direct from flasks is not permitted. Priming flasks must be removed from the area or covered before firing.
- 17. When match cord is used for ignition, a closed container must be to hand in which the lit end of the cord may be placed and held for safety whilst the gun is being loaded.  
The match cord must be secured in such a way that it does not fly about when the charge is ignited.
- 18. Fuse on the firing line must be stored in a closed container. Away from the firing line the fuse can be stored in its original packing
- 19. Brass or bronze cannon should be regarded with extra care as the barrel can become crystalline with age. Anyone wishing to use such a gun should consult the Proof House.
- 20. When shooting at Bisley or on MOD ranges a Certificate of Competence issued by the NRA or the firer's Association/Club will be required. The Certificate can be for either muzzle loading rifle or pistol, as both show that the person is safe and knowledgeable in the handling of muzzle loading firearms and gun powder
- 21. It is the firer's responsibility to ensure that their Association/Club's Insurance covers the firing of cannon. (The MLAGB insurance gives the correct cover.)

**RULES**

- 1. Range 10m, 20 yards, 25m and 50m.
- 2. Target PL7 (50m ISSF) or its equivalent or specially printed ones.
- 3. Shooting from tables.
- 4. Firing from the standing position, however dispensation is given to anyone with a disability to fire from the sitting position.
- 5. There is no distinction between originals and replicas.
- 6. Maximum calibre when shooting at the MLAGB range at Wedgcock or Bisley is 0.75"
- 7. To encourage junior, female or members with a disability to compete, the loading of the cannon can be done by their partner but the sighting and firing must be carried out by themselves. (Coaching is prohibited)

Reference Material	Cannons
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### Smoothbore

Without sights - barrel length 800mm (32") max, Calibre between 16mm (0.63") and 19mm (0.75")

Without sights - barrel length 400mm (16") max, Calibre between 11mm (0.43") and 19mm (0.75") The commonly used criteria for the postal league and Championship Competitions in the UK.

With sights - barrel length 800mm (32") max, Calibre between 16mm (0.63") and 19mm (0.75")

With sights - barrel length 400mm (16") max, Calibre between 11mm (0.43") and 19mm (0.75")

### Rifled

Without sights - barrel length 400mm (16") max, Calibre between 11mm (0.43") and 19mm (0.75")

### MLAGB Cannon Competition Rules

The intention of the cannon section is to provide an informal and fun way of shooting cannon without to many restrictions.

However one area of concern has been expressed by members and that is the use of some form of guide or guides to aim the cannon.

To get everybody onto the same playing field, the following will apply to all **MLAGB** competitions.

1. If there is a stop in front of the cannon then it must be at a minimum of 2" (50mm) in front of the wheels. The wheels must not be in contact with the stop when firing.
2. If there is a stop to the rear of the cannon then it must be a minimum of 6" (150mm) to the rear of the trail on artillery models or the wheels on ship models.
3. The cannon must be free to recoil without any restrictions of ropes or pulleys or guides.
4. There must be a clear flat area of a minimum of 4" (100mm) either side of the wheels and trail.
5. It is permitted to mark your table with guide lines.
6. Fuse must not be used as an aid to sighting. Fuse is only to be inserted into the vent after sighting has been completed.

Reference Material	Long Barrel Pistol Long Barrel Revolver
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## LBR's & LBP's (Long Barrelled Revolvers/Pistols)

### What are they?

Basically, an LBP/LBR is a handgun with a minimum 12" (30cm) barrel and a permanently fixed extension to the pistol grip that brings the firearm to an overall length of 24" (60cm). These two criteria meet the current specifications as laid out in the Firearms Amendment Act (Amended) of 1997 for a Section 1 firearm. Here are 2 examples of very popular firearms:



Grand Power K22 Semi Auto Pistol.  
This firearm is categorised as Section 5 in the UK. That means it is heavily restricted

This is also a Grand Power K22 but to make it legal in the UK, the barrel has been extended to 12" (it is under the fake moderator) and an extension has been permanently attached to the base of the pistol grip



Taurus M66 357 Mag revolver with a 6" barrel. As above, it is Section 5 and restricted



Same as above but the barrel has been increased to 12" and a similar appendage to the semi-auto has been permanently fitted to the base of the grip

The extension bar is usually welded to the grip frame and there is no way it can be removed which would obviously render the firearm Section 5. The penalties incurred if either the barrel or rod are shortened are a minimum of 5 years in prison, a whopping fine and being subsequently banned for life from ever owning a firearm, including air guns.

Reference Material	Long Barrel Pistol Long Barrel Revolver
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## Are they hard to acquire?

Not really, like all other firearms, you have to show good reason to get a slot on your FAC for one of these. Writing “because I need one!” in the appropriate box on your application will be at best laughed at but it could swing the microscope off officialdom over you and that, we think you’ll agree would be a bit silly.

## Do I need to do special training?

This really depends on your own capabilities and previous experience, coupled with what your local Force Area insist on prior to being granted a slot for one on your FAC. Due to the relatively compact size of a long barrelled firearm and that it is hand held as opposed to shoulder mounted, it is very easy to lose track of your muzzle awareness and wave it about by accident. This will almost certainly put you on a disciplinary course which is the last place you wish to be.

The NRA does offer a one-to-one training package for those wishing to shoot LBP/R’s. It involves using air pistols (due to legal restrictions) and a specially adapted Muzzle Loading Revolver. It covers all areas relevant to these firearms including the use of holsters, rapid shooting, magazine changes etc. and is a lot of fun. If you are interested in learning more, please contact **NRA Training** for more information.

## Revolver vs. Pistol

As you’ve seen from the previous pages, there are two formats in the “Long Barrelled” arena. Revolvers and Pistols.

In law, you can own a Long Barrelled Revolver (LBR) in any standard pistol calibre. Long Barrelled Pistols are semi-automatic so are only available in 22 LR.

**Revolvers:** are loaded by swinging out the cylinder, usually to the left side via a catch. Once open, you can load the cartridges into each chamber and then close the cylinder back into the frame of the revolver. To fire, you can pull on the trigger which rotates the cylinder round by one chamber and cocks the hammer till the full pull of the trigger is complete and the firearm discharges. This is known as **double action**. **Single action** is when you pull back on the hammer to manually cock the revolver with a thumb, pulling the trigger then fires the revolver.

**Pistols:** are loaded by the insertion of a magazine into the butt well of the firearm. The shooter then either racks the action by pulling back on the slide and releasing it or, if the action is open they can press down on the slide release lever, usually situated above the trigger on the left side. Either method will chamber a cartridge from the magazine and cocks the hammer/striker assembly via spring pressure. Pulling the trigger fires the pistol and the pressure generated is used to move the slide back, eject the fired case, cock the hammer/striker and chamber a fresh cartridge from the magazine. Some pistols also have the capability of double action but to utilise this, the firearm must first be cocked by chambering a cartridge, then the hammer can be manually lowered.

## Legal Issue

As you will recall from your Mod 4 training, LBP/R’s and Section 1 shotguns are restricted because of an omission in the law. That means that you can own one of these but you cannot let somebody else have a go, even if they have an authority to possess on their FAC. If you are caught letting a friend have a go on Bisley ranges, you’ll end up on the naughty step and that’s no way to start your shooting career!

Reference Material	Running a range
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## Range Officer Role

### Solo

So, you now find yourself on a range, on your own. What are the protocols?

Well, we’ve actually covered them all within this manual and you will have already experienced how ranges are meant to be run by the example laid down by all the Instructors you have encountered throughout the course. But how should you conduct yourself if you are alone on the range?

You already signed for the firing point assigned to you by the Range Office so the next task is to confirm you either have an individual radio assigned (if you are using a marker, you’ll obviously need communication) or if there is a radio issued to the range you are shooting on.

You’ll need to make your way to the range and if you have no marker, you’ll need to set up your target yourself. To do this, you’ll obviously need to make a trip to the butts. That means that you don’t want to have already placed all your kit, including firearm on the firing point – Bisley Camp is a big place and always remember to be vigilant for thieves!

Once you are ready to shoot, be ever mindful of your muzzle awareness. There is a good chance you are sharing the range with others, also shooting alone so don’t “let your hair down” and go and do something silly because the others will in all likelihood report your actions and somebody will come out to visit you.

If you maintain a high standard of conduct while on the range, others will naturally absorb and imitate you. That is a good thing as it will make us all much safer shooters.

### Group Shoot

In this case if you are shooting in a small group, somebody needs to be nominated the Range Officer. Note, we didn’t say Range Safety or Conducting Officer, just Range Officer (RO).

The role of RO is to ensure all participants are conducting themselves to the high standards of safety laid down in the training you’ve already received. Remember the NRA Safe Shooter System at the beginning of this manual and the 4 Safety Rules? Abide by them and everybody will enjoy a full and safe day’s shoot.

As the RO, you can also shoot but you need to transfer the duty of RO to another member of your party.

The initial setup is exactly the same as if you were shooting on your own.

There is a good chance you will have been allocated a radio so job number one is to make sure you have checked the frequency to ensure you don’t inadvertently start broadcasting on the Control frequency when you are attempting to get in touch with your allocated marker.

At time of writing, all NRA issued radios are 16 channel. As you will recall, channel one is paired with a radio that the marker has for private communication with you.

Channel 16 (highest channel) is the c=Control Channel and that is restricted to camp wide communications relating to safety

This radio is currently set to Channel 16





## Range Officer Role (continued)

### Powers & Duties of the RO

#### Powers

When the firing point is occupied, the RO is in sole charge of the range he or she has accepted responsibility for.

The RO may issue additional instructions as he/she deems necessary to ensure the range is run safely, in accordance with the range regulations and published rules which can be found in the Bisley Bible you were issued with on Day 1.

#### Duties

- The RO is only to permit live firing when satisfied that it is safe in all aspects to do so.
- The RO must stay sufficiently close to the firing point (FP) to observe, give instructions and respond to requests from all firers under their control.
- If the RO needs to leave the range for whatever reason, they must either:
  - Stop all firing and clear the FP of all firers and firearms
  - Appoint another person deemed competent to the standard required by the Range Operating Authority

If you are required to deal with any range occurrences, accidents or incidents – always change the frequency of the issued radio to 16 and contact the Range Office directly with notification of what has occurred

### What does all that mean?

Basically, if anybody on the range argues with you over how you are running the range and their point is not valid, you have the power to dismiss them from the range and if they don't go, you then stop all shooting on your range till they have gone.

There are many people who think that the RO is simply there to keep the NRA happy that somebody is in situ but it couldn't be further from the truth. You are there to ensure everybody is adhering to the same high standards of safety that you have been subjected to during your Probationary training.

If you are interested in the next level of training as regards range management, the course structure is as follows:

- Club Instructor

Then

- Range Safety Officer
  - If required to operate on Military Ranges, you will need the Range Conducting Officer bolt on to RSO



They are detailed in the section "Further Training", overleaf.

<b>Reference Material</b>	<b>Where to next? Further Training</b>
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## Where to next?

First off, congratulations on passing the Probationary course and we hope you enjoyed it.

The Probationary Course is designed to instill in you a good, safe grounding in firearms handling and basic skills. We do not teach you how to win at say reading and mapping the wind at 1000 yards to aid you in your Wind Coach qualification.

Below is a list of the different types and styles of shooting conducted here in the UK with details of further training offered in the form of Skills Development Courses:

<b>Civilian Service Rifle</b>	This one day Skills Development Day will provide the fundamental skills for taking part in Civilian Service Rifle (CSR) events and competitions. The day comprises both classroom and practical range work, with expert coaching from national and international level shooters on topics including types of firearms, equipment and positional shooting techniques.
<b>Target Shotgun</b>	This one day Skills Development Day will provide the fundamental skills for taking part in Target Shotgun (TS) events and competitions. The day comprises both classroom and practical range work, with expert coaching from national and international level shooters on topics including types of firearms, equipment and positional shooting techniques
<b>Gallery Rifle &amp; Pistol</b>	This skills day will introduce you to specific techniques needed for Gallery Rifle and Pistol shooting at a Club level, as well as providing guidance to those wishing to progress into competitive shooting. The day will involve both classroom and practical range work with expert coaching from National and International level shooters.
<b>Target Rifle</b>	The Target Rifle (TR) Skills Development Course will provide those who have some experience of shooting TR with the fundamental skills to improve their scores and take part in TR events and competitions. The course will include individual coaching on shooting position and technique, zeroing, plotting as an aid to wind reading, coping with wet weather and the essentials of competition and team shooting.
<b>Handgun</b>	This course is designed to introduce the basic skillsets for accurate shooting with handguns. Due to UK law, we can only use air guns but thankfully there are a good number of suitable models that work. The course also covers how to safely draw a handgun from a holster WITHOUT breaking our safety rules (Rule no 4)

Reference Material	Where to next? Further Training
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## Further Training

In addition, the NRA offers training in other areas too:

<b>Club Instructor</b>	The Club Instructor course is designed to provide experienced club members with the qualification that they need to be able to instruct new and existing shooters, within their own clubs, to the standards of safety and competence required by the NRA Safe Shooting System. It also trains them to carry out the assessments required for individuals to gain the SCC for use on Military as well as Bisley Ranges.
<b>Range Safety Officer RSO</b>	The Range Safety Officer course is intended for club shooters of all levels of experience, who may not have had any formal training in the practical aspects of running ranges. The course is designed to enhance range safety by providing practical and relevant training and guidance and is not specific to any particular shooting discipline or type of range. It consists of written and oral tests, and on-range practical assessments. Other essential topics, such as the law, range regulations, and guest days are also covered.
<b>Range Conducting Officer RCO</b>	The two-day NRA Range Conducting Officer course is intended for suitable club members to gain the qualification necessary to allow them to sign for and run a Ministry of Defence (MoD) range. This course forms part of the <b>RSO</b> qualification
<b>Handloading Course</b>	The NRA Hand loading course is designed to familiarise the student with the basics of reloading metallic cartridges, with an emphasis on safety. It will run over 2 days and involves practical hands on reloading and testing.
<b>One-to-One bespoke training</b>	These courses are usually a one day event with an Instructor on a one to one basis. They are customised to the individual requirements of the shooter. Examples are: <ul style="list-style-type: none"> <li>- Handgun (for LBP/LBR ownership)</li> <li>- Long Range (800 to 1200 yards)</li> <li>- High Muzzle Energy &amp; other SCC inclusion courses</li> <li>- Black Powder</li> <li>- Bespoke Student driven refresher courses</li> <li>- Expedition Defensive Weapons Course</li> </ul>

Of these courses, the One-to-one style courses are uniquely tailored to the shooters individual requirements. For instance, reading and plotting the wind at long range, shooting steel plates at varying distances from 100 to 1100 yards or how to effectively draw a pistol from a holster in competition shooting are all bespoke training. The content is driven by the shooter and there is no specific syllabus due to their unique nature.

Our best advice to you is get out on the ranges and enjoy the sport of safe shooting. Talk to other shooters to get a clear picture of the types and styles of shooting disciplines, and when an event is taking place, come along and watch to get a good feel for the activity. You will find that shooters in the UK are predominantly a very friendly bunch who will be more than willing to encourage you in the participation of their chosen area of the sport.

Congratulations, you made it to the end of this manual - Safe Shooting!

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# Glossary

## A

**Action:** The physical mechanism that manipulates cartridges and/or seals the breech. The term refers to the method in which cartridges are loaded, locked, and extracted from the mechanism. Actions are generally categorized by the type of mechanism used. A firearm action is technically not present on muzzleloaders as all loading is done by hand. The mechanism that fires a muzzleloader is called the lock.

**Adjustable sight:** Iron sights that allow the user to change the markings, intended for firing at multiple possible ranges.

**Air gun:** A gun that uses compressed air or gas (carbon dioxide) to propel a projectile. Projectiles are normally .17" to .22" calibre and are either round, elongated, or shaped lead pellets. In some European member states, airsoft guns and paintball guns are classified as air weapons.

**Airsoft:** A device intended to closely replicate a 'real' commercial firearm for the purposes of recreational military simulation exercises, typically using 6mm calibre plastic balls.

**Ammunition or ammo:** The assembly of a projectile, primer, case and propellant in a single package, also referred to as a cartridge.

**Antique:** An antique firearm is accepted as one that chambers cartridges of an obsolete calibre or of an obsolete ignition design (e.g. pinfire, flintlock, wheel-lock). Exceptions exist in some member states, whereby some centrefire weapons may be classified as antiques depending on domestic firearms legislation.

**Automatic fire:** A firearm capable of automatic fire is one that will continually expend ammunition for as long as the trigger is held and will stop when released or when there is no more ammunition left to consume.

**B**

**Ball Ammunition:** Ammunition loaded with full metal jacketed (FMJ) bullets.

**Ballistic coefficient (BC):** A measure of a projectile's ability to overcome air resistance in flight. It is inversely proportional to the deceleration – a high number indicates a low deceleration. BC is usually given as either the older G1 form (0 - .999) or the more modern form G7.

**Ballistics:** a field of mechanics concerned with the launching, flight behaviour and impact effects of projectiles. Often broken down into internal ballistics, transitional ballistics, external ballistics and terminal ballistics.

**Barrel:** A tube, usually metal, through which a controlled explosion or rapid expansion of gases are released to propel a projectile out of the end at high velocity.

**BB:** This refers to the size of birdshot with a nominal diameter of 0.180" in shotgun cartridges. It is also used to refer to air weapon ammunition of steel projectiles with a diameter of 0.177" (4.5mm) and the plastic BBs used in airsoft or soft air weapons. This is despite the fact that these have a diameter of 6mm.

**Belt:** A device used to hold and control the feed of ammunition into the firearm.

**Belted magnum or belt:** Any calibre cartridge, generally rifles, using a shell casing with a pronounced "belt" around its base that continues 2 to 4 mm past the extractor groove.

**Bipod:** A support device that is similar to a tripod or monopod, but with two legs. On firearms, bipods are commonly used on rifles and machine guns to provide a forward rest and reduce motion. The bipod permits the operator to rest the firearm on the ground, a low wall, or other object, reducing fatigue and permitting increased accuracy.

**Black powder also called gunpowder:** A mixture of sulphur, charcoal, and potassium nitrate. It burns rapidly, producing a volume of hot gas made up of carbon dioxide, water, and nitrogen, and a solid residue of potassium sulphide. Because of its burning properties and the amount of heat and gas volume that it generates, gunpowder has been widely used as a propellant in firearms and as a pyrotechnic composition in fireworks. Since 1886, most firearms use smokeless powder.

**Black powder substitute:** A firearm propellant that is designed to reproduce the burning rate and propellant properties of black powder (making it safe for use in black-powder firearms), while providing advantages in one or more areas such as reduced smoke, reduced corrosion, reduced cost, or decreased sensitivity to unintentional ignition.

**Blank:** A type of cartridge for a firearm that contains gunpowder but no projectile. When fired, the blank makes a flash and an explosive sound (report). Blanks are often used for simulation (such as in historical re-enactments, theatre and movie special effects), training, and for signalling (see starting pistol).

**Blowback:** A system of operation for self-loading firearms that obtains power from the motion of the cartridge case as it is pushed to the rear by expanding gases created by the ignition of the powder charge.

**Bluing or blueing:** A passivation process in which steel is partially protected against rust, and is named after the blue-black appearance of the resulting protective finish. True gun bluing is an electrochemical conversion coating resulting from an oxidizing chemical reaction with iron on the surface selectively forming magnetite (Fe<sub>3</sub>O<sub>4</sub>), the black oxide of iron, which occupies the same volume as metallic iron. Bluing is most commonly used by gun manufacturers, gunsmiths and gun owners to improve the cosmetic appearance of, and provide a measure of corrosion resistance to, their firearms.

**Boat tail:** The tapered rear end of a bullet that is designed to increase ballistic efficiency at long range.

**Bolt:** The part of a repeating, breech-loading firearm that blocks the rear opening (breech) of the barrel chamber while the propellant burns, and moves back and forward to facilitate loading/unloading of cartridges from the magazine. The extractor and firing pin are often integral parts of the bolt. Usually operated by a bolt handle or guide rod assembly, dependent of the firearm design.

**Bolt Action:** A type of firearm action in which the firearm's bolt is operated manually by the opening and closing of the breech (barrel) with a small handle. As the handle is operated, the bolt is unlocked, the breech is opened, the spent shell casing is withdrawn and ejected, the firing pin is cocked, and a new round/shell (if available) is placed into the breech and the bolt closed.

**Bore Snake:** A tool used to clean the barrel of a gun.

**Boresight:** Crude adjustments made to an optical firearm sight, or iron sights, to align the firearm barrel and sights. This method is usually used to pre-align the sights, which makes zeroing (zero drop at XX distance) much faster.

**Bottleneck cartridge:** A cartridge case that has a main body diameter and a distinct angular shoulder stepping down to a smaller diameter at the neck portion of the case.

**Box magazine:** A standard magazine that is generally rectangular in shape, and used for loading ammunition.

**Brass:** The empty cartridge case.

**Breech:** This is the portion of a gun's barrel behind the bore. Depending on the model, a gun's breech may contain the chamber or just the back of the barrel.

**Breech pressure:** The amount of rearward force exerted by the propellant gases on the bolt or breech of a firearm action or breech when a projectile is fired. The applied force has both magnitude and direction, making it a vector quantity.

**Buckshot:** Shot with a diameter of greater than 0.24" or 6.1mm.

**Buckhorn Sight:** A rear barrel iron sight, normally used on rifles, where the open-topped viewport is formed by a pair of symmetrical crescents.

**Buffer:** A component that reduces the velocity of recoiling parts (such as the bolt).



**Bullet:** The small metal projectile that is part of a cartridge and is fired through the barrel. Sometimes, but incorrectly, used to refer to a cartridge.

**Bullet core:** The inner section of a jacketed bullet, usually lead.

**Bullet diameter:** The maximum dimension across the largest cylindrical section of a bullet.

**Bullet jacket:** A metallic cover over the core of the bullet.

**Bullet metal:** Metal forming the entire bullet or bullet core. Usually an alloy of lead, antimony and/or tin.

**Bullet mould:** A split block of metal having one or more cavities into which molten lead is poured to form a bullet.

**Bullpup:** A firearm configuration in which both the action and magazine are located behind the trigger.

**Button rifling:** Rifling that is formed by pulling a die made with reverse image of the rifling (the 'button') down the pre-drilled bore of a firearm barrel. See also cut rifling and hammer forging.

## C

**Calibre:** In small arms, the internal diameter of a firearm's barrel or a cartridge's bullet, usually expressed in millimetres or hundredths of an inch; in measuring rifled barrels this may be measured across the lands (such as .303) or grooves (such as .308 Winchester) or; a specific cartridge for which a firearm is chambered, such as

.44 Magnum. In artillery, the length of the barrel expressed in terms of the internal diameter.

**Cannelure:** A crimped or knurled groove, rolled onto a bullet or the neck of a cartridge case, to help retain a bullet in its case, and/or to provide a space for bullet lubricant.

**Carbine:** A shortened version of a service rifle, often chambered in a less potent cartridge or; a shortened version of the infantryman's musket or rifle suited for use by cavalry.

**Cartridge:** The assembly consisting of a bullet, gunpowder, case, and primer. When counting, it is referred to as a "round".

**Cartridge Case:** The main body of a round of ammunition that contains the components. Refers to centrefire and rimfire metallic cartridges and also to shotgun cartridges. The cartridge case is discarded after firing and will normally retain marks from the firearm from which it was discharged.

**Centrefire:** A cartridge in which the primer is located in the centre of the cartridge case head. Unlike rimfire cartridges, the primer is a separate and replaceable component. The centrefire cartridge has replaced the rimfire in all but the smallest cartridge sizes. Except for low-powered .22 and .17 calibre cartridges, and a handful of antiques, all modern pistol, rifle, and shotgun ammunition are centrefire.

**Chamber:** The portion of the barrel or firing cylinder in which the cartridge is inserted prior to being fired. Rifles and pistols generally have a single chamber in their barrels, while revolvers have multiple chambers in their cylinders and no chamber in their barrel.

**Chambering:** Inserting a round into the chamber, either manually or through the action of the firearm.

**Charger clip:** A speed loader that holds several cartridges together in a single unit for easier loading of a firearm's magazine.

**Charging handle:** Device on a firearm which, when operated, results in the hammer or striker being cocked or moved to the ready position.

**Choke:** A tapered constriction of a shotgun barrel's bore at the muzzle end. Chokes are almost always used with modern shotguns, to improve performance.

**CIP:** An acronym that stands for *Commission internationale permanente pour l'épreuve des armes à feu portatives* ("Permanent International Commission for the Proof of Small Arms"). An international organisation which sets out the standards for safety testing of firearms and ammunition. The C.I.P. safeguards that all firearms and ammunition sold to civilian purchasers in member states are safe for the users.

**Clip:** A device that is used to store multiple rounds of ammunition together as a unit, ready for insertion into the magazine of a repeating firearm. This speeds up the process of loading and reloading the firearm as several rounds can be loaded at once, rather than one round being loaded at a time.

**Cock:** The act of manually drawing back the hammer of a gun against its spring. This action arms the hammer to release when the trigger is pulled. Some firearms with internal hammers are cocked automatically when the shooter pulls the trigger.

**COL (cartridge overall length):** Factory ammunition is loaded to a standard, SAAMI/CIP specified, Cartridge Overall Length so that the ammunition will reliably function in all firearms and action types. This specified O.A.L. has nothing to do with optimizing accuracy, and is typically much shorter than the O.A.L. used by handloaders for the same cartridge. For the last several decades, the rule of thumb was the closer you seated the bullet to the lands, the better the accuracy. Currently, it is understood that this isn't always true. It is true that some bullets and some rifles perform best when bullets are seated out long enough to touch the lands, but other bullets perform best when they have a certain amount of "jump" to the lands.

**Collimator sight:** A type of optical "blind" sight that allows the user looking into it to see an illuminated aiming point aligned with the device the sight is attached to regardless of eye position (parallax free). The user cannot see through the sight so it is used with both eyes open while one looks into the sight, with one eye open and moving the head to alternately see the sight and then at the target, or using one eye to partially see the sight and target at the same time.

**Combination gun:** A shoulder-held firearm that has two barrels; one rifle barrel and one shotgun barrel. Most combination guns are of an over-under design (O/U), in which the two barrels are stacked vertically on top of each other, but side-by-side (S/S) combination guns are also made.

**Cook off:** The premature explosion of ammunition, for example when a gun is hot from sustained firing the heat can ignite the propellant and make the firearm fire. Generally, this phenomenon is rare in rifles.

**Crown:** The angled cut made at the muzzle end of a barrel to eliminate burrs, improve accuracy, and protect the rifling.

**Cylinder:** Part of a revolver, typically holding six rounds in separate chambers. The chambers are sequentially rotated in line with the barrel prior to each round being discharged.

## D

**Disassembly:** The removal of parts of a firearm, usually as part of a field strip.

**Discharge:** Firing a firearm.

**Double action revolver:** A revolver whose trigger performs two actions, firing the round, and cocking the hammer.

**Double barrelled shotgun:** A shotgun with two barrels, usually of the same gauge or bore. The two types of double barrelled shotguns are over/under (O/U), in which the two barrels are stacked on top of each other, and side-by-side (S/S), in which the two barrels sit beside each other. For double barrelled guns that use one shotgun barrel and one rifle barrel, see combination gun.

**Drum magazine:** A type of firearm magazine that is cylindrical in shape, similar to a drum.

**Dry fire:** the practice of "firing" a firearm without ammunition. That is, to pull the trigger and allow the hammer or striker to drop on an empty chamber.

**Dummy:** A round of ammunition that is completely inert, i.e., contains no primer, propellant, or explosive charge. It is used to check weapon function, and for training. Unlike a blank, it contains no charge at all.

**Dust cover:** a seal for the ejection port (which allows spent brass to exit the upper receiver after firing) from allowing contaminants such as sand, dirt, or other debris from entering the mechanism.

## E

**Ear protection:** Devices used to help reduce the sound of a firearm, to prevent hearing damage. Most commonly earplugs or ear defenders.

**Effective range:** The maximum range at which a particular firearm can accurately hit a target.

**Ejection port:** An opening in the slide or receiver for expelling the cartridge case.

**Ejector:** A component which causes the spent cartridge case to be expelled following the discharge of a self-loading firearm. Shotguns are also often equipped with ejectors that serves as both extractor and ejector.

**Energy:** Capability to perform work. As measured in foot-pounds, the amount of force it takes to lift and object weighing one pound, one foot. To calculate the energy, in foot-pounds, of a bullet in flight at any point on its trajectory:

$$E = \frac{WV^2}{450436} \quad W = \text{Weight of Bullet in Grains (Gr)}, V = \text{Velocity in feet per second (fps)}$$

**Erosion:** Deterioration of the inner surface of a firearm's barrel due to the intense heat of a cartridge's discharge. High-velocity rifles are particularly susceptible to this wear, especially near the throat.

**Expanding bullet:** An expanding bullet is a bullet designed to expand on impact, increasing in diameter to limit penetration and/or produce a larger diameter wound. The two typical designs are the hollow-point bullet and the soft-point bullet.

**Extractor:** Part of a firearm that extracts the fired cartridge case from the chamber when the action is opened.

**Eye relief:** For optics such as binoculars or a rifle scope, eye relief is the distance from the eyepiece to the viewer's eye that matches the eyepiece exit pupil to the eye's entrance pupil. Short eye relief requires the observer to press their eye close to the eyepiece in order to see an un-vignetted image. For a shooter, eye relief is an important safety consideration. An optic with too short an eye relief can cut skin at the contact point between the optic and the shooter's eyebrow due to recoil.

## F

**Fail-to-fire:** A firearm malfunction in which a firearm is incapable of discharging a round.

**Feed ramp:** A detail which leads the cartridge from the magazine into the chamber.

**Field strip:** Disassembling a firearm for the purpose of repair or cleaning, without tools. When using tools, this is called a detail strip.

**Fire forming:** The process of reshaping a metallic cartridge case to fit a new chamber by firing it within that chamber.

**Firearm:** A weapon that fires bullets, and of such a size that is designed for usage by one individual.

**Firing pin:** The part of a firearm that strikes the primer, discharging the round.

**Flash suppressor or flash hider:** A device that is attached to the muzzle of a firearm that lowers the temperature at which gases disperse upon firing.

**Fluted barrel:** Removal of material from a cylindrical surface, usually creating grooves. This is most often the barrel of a rifle, though it may also refer to the cylinder of a revolver or the bolt of a bolt action rifle. In contrast to rifle barrels and revolver cylinders, rifle bolts are normally helically fluted, though helical fluting is sometimes also applied to rifle barrels.

**Forcing cone:** The tapered section at the rear of the barrel of a revolver that eases the entry of the bullet into the bore.

**Forend:** This is the front part of the firearm under the barrel and is where your weak hand goes to support the firearm.

**Fouling:** The accumulation of unwanted material on solid surfaces. The fouling material can consist of either powder, lubrication residue, or bullet material such as lead or copper.

**Fouling shot:** A fouling shot is a shot fired through a clean bore, intended to leave some residue of firing and prepare the bore for more consistent performance in subsequent shots. The first shot through a clean bore behaves differently from subsequent shots through a bore with traces of powder residue, resulting in a different point of impact.

**Frangible:** A bullet that is designed to disintegrate into tiny particles upon impact to minimize their penetration for reasons of range safety, to limit environmental impact, or to limit the danger behind the intended target. Examples are the Glaser Safety Slug and the breaching round.

**Frizzen:** An "L" shaped piece of steel hinged at the rear used in flintlock firearms. The flint scraping the steel throws a shower of sparks into the flash pan.

**Full metal jacket (FMJ):** A projectile in which the bullet jacket encloses most of the core, with the exception of the base. Other terminology includes full jacketed, full patch, full metal case.

## G

**Gas bleed:** A device used on a firearm for various purposes. One example found on bolt action rifles to prevent ruptured cartridges. The other used on gas operated firearms, usually a small hole on the barrel/gas block that is used to push back a gas piston to unlock the bolt.

**Gas check:** A device used in some types of firearms ammunition when non-jacketed bullets are used in high pressure cartridges, to prevent the build-up of lead in the barrel and aid in accuracy.

**Gauge:** The gauge of a firearm is a unit of measurement used to express the diameter of the barrel. Usually used as part of the definition of a shotgun's calibre.

**Grain:** Is a unit of measurement of mass that is based upon the mass of a single seed of a typical cereal. Used in firearms to denote the amount of powder in a cartridge or the weight of a bullet. Traditionally it was based on the weight of a grain of wheat or barley, but since 1958, the grain (gr) measure has been redefined using the International System of Units as precisely 64.79891 mg. There are 7,000 grains per pound in Imperial units.

**Grip safety:** A safety mechanism, usually a lever on the rear of a pistol grip, that automatically unlocks the trigger mechanism of a firearm as pressure is applied by the shooter's hand.

**Grooves:** The spiral cuts in the barrel which create the rifling.

**Gun:** The common term for a portable weapon that fires ammunition, for example, a handgun or rifle, but can also include realistic imitations.

**Gunpowder:** Also called black powder, is a mixture of sulfur, charcoal, and potassium nitrate. It burns rapidly, producing a volume of hot gas made up of carbon dioxide, water, and nitrogen, and a solid residue of potassium sulfide. Because of its burning properties and the amount of heat and gas volume that it generates, gunpowder has been widely used as a propellant in firearms and as a pyrotechnic composition in fireworks.

The term gunpowder also refers broadly to any propellant powder. Modern firearms do not use the traditional gunpowder (black powder) described here, but instead use smokeless powder (see Nitrocellulose).

**Gunshot residue (GSR):** Residues from the powder, primer and projectile, as well as from the metallic components of the cartridge case and firearm's barrel, which partly are expelled from the firearm during firing and partly remain in the firearm (mainly in the bore).

## H

**Half-cock:** The position of the hammer where the hammer is partially but not completely cocked. Many firearms, particularly older firearms, had a notch cut into the hammer allowing half-cock, as this position would neither allow the gun to fire nor permit the hammer-mounted firing pin to rest on a live percussion cap or cartridge. The purpose of the half-cock position has variously been used both for loading a firearm, and as a safety-mechanism.

**Hammer:** The function of the hammer is to strike the firing pin in a firearm, which in turn detonates the impact-sensitive primer. The hammer of a firearm was given its name for both resemblance and functional similarity to the common tool.

**Handgun:** A type of firearm that is compact enough that it can be held and used with a single hand

**Handloading:** The process of manually reassembling a fired cartridge case with a new primer, propellant and bullet or wads and shot.

**Hang fire:** An unexpected delay between the triggering of a firearm and the ignition of the propellant. This failure was common in firearm actions that relied on open primer pans, due to the poor or inconsistent quality of the powder. Modern weapons are susceptible, particularly if the ammunition has been stored in an environment outside of the design specifications.

**Head:** The end of the cartridge case in which the primer or priming is inserted and the surface upon which the headstamp identification is imprinted. The head impacts against the breech during firing.

**Headspace:** The distance measured from the part of the chamber that stops forward motion of the cartridge (the datum reference) to the face of the bolt. Used as a verb, headspace refers to the interference created between this part of the chamber and the feature of the cartridge that achieves the correct positioning.

**Headstamp:** A headstamp is the markings on the bottom (base) of a cartridge case designed for a firearm. It usually tells who manufactured the case. If it is a civilian case it often also tells the calibre, if it is military, the year of manufacture is often added.

**Heavy machine gun:** A machine gun firing rifle cartridges, considerably larger than a medium or light machine gun. Most heavy machine guns fire larger rounds, such as the .50 BMG or 12.7×108mm.

**Heel:** The rear portion of a bullet.

**Hollow Point:** A bullet type with a concavity at its tip, designed to either promote accuracy in target ammunition or in the case of hunting ammunition, expansion upon hitting a solid target. The design of bullet is different though.

**Holographic weapon sight:** a non-magnifying gun sight that allows the user to look through a glass optical window and see a cross hair reticle image superimposed at a distance on the field of view. The hologram of the reticle is built into the window and is illuminated by a laser diode.



**I**

**In Battery:** A condition of a firearm where it is loaded, with the action closed, cocked and (with the possible exception of an engaged safety catch) ready to fire.

**Internal ballistics:** A subfield of ballistics, that is the study of a projectile's behaviour from the time its propellant's igniter is initiated until it exits the gun barrel.

**Iron sights:** A system of aligned markers used to assist in aiming. Iron sights are typically composed of two component sights, formed by metal blades: a rear sight mounted perpendicular to the line of sight and consisting of some form of notch (open sight) or aperture (closed sight); and a front sight that is a post, bead, or ring.

**J**

**Jacket:** A metal, usually copper, wrapped around a lead core to form a bullet. Generally found in high velocity bullets when the use of a lead bullet would lead to excessive fouling.

**Jam:** A type of firearm malfunction, in which a bullet does not load properly and gets stuck as opposed to what you might spread on some toast.

**K**

**Kentucky Windage:** A form of sighting and aiming usually employed when a firearm has non-adjustable sights or when the shooter does not have the time to make sight adjustments. Usually includes guessing elevation or windage and holding off the target as needed.

**Keyhole or keyholing:** Refers to the end-over-end tumbling of the bullet which will often leave an elongated or keyhole shaped hole in a paper target. This occurs when the bullet is insufficiently stabilised by the firearm's rifling, either because the rifling is too slow or long for a given bullet, also meaning that the bullet is too long or tail heavy for said rifling. Or else due to poor fit of an undersized bullet in the gun barrel. In these cases the bullet has a natural tendency to wobble, and may start to tumble end-over-end just encountering the resistance of the air. When using a bullet/rifling combination which is just sufficiently stabilised for normal flight though free air, keyholing may occur quite easily in flight if any obstacle is encountered, be it a twig, leaf, even a blade of grass or a large rain-drop.

**Kick:** The recoil or backward momentum of a firearm when it is discharged.

## L

**Lands:** The area between the grooves in the rifling.

**Laser sight:** An attachment that projects a laser beam onto the target, providing a rough point of impact.

**Lead bullet:** A compact bullet formed by a lead alloy.

**Leading:** The act of aiming a firearm in front of a moving target, to compensate for the bullet's travel time.

**Length of pull:** The distance between the trigger and the butt end of the stock of a rifle or shotgun.

**Lever action:** A type of firearm action with a lever that encircles the trigger guard area, (often including the trigger guard itself) to load fresh cartridges into the chamber of the barrel when the lever is worked.

**Lifter or Loading ramp:** The platform in the receiver behind the chamber which guides the cartridges into the chamber.

**Loading Gate:** A sprung trapdoor, often seen on the side of the receiver of a lever-action repeating rifle having a tubular magazine.

## M

**Magazine:** A magazine is an ammunition storage and feeding device within or attached to a repeating firearm. Magazines may be integral to the firearm (fixed) or removable (detachable). The magazine functions by moving the cartridges stored in the magazine into a position where they may be loaded into the chamber by the action of the firearm.

**Minute of Angle or MoA:** A 1/60th part of a degree, a unit of measure used in adjusting rifle sights. As it turns out conveniently, a minute of angle translates almost exactly to one inch at 100 yards (actually 1.047 inches), two inches at 200 yards and three inches at 300 yards etc.

**Misfire:** This term envelops the failure of a firearm to fire when it was expected. It can be when the primer in a cartridge fails to fire, when there is no ammunition present in the chamber or when the firearm itself has malfunctioned.

**Muzzle:** The part of a firearm at the end of the barrel from which the projectile exits.

**Muzzle brake:** Devices that are fitted to the muzzle of a firearm to redirect propellant gases with the effect of countering both recoil of the gun and unwanted rising of the barrel during rapid fire.

**Muzzle energy:** the kinetic energy of a bullet as it is expelled from the muzzle of a firearm. It is often used as a rough indication of the destructive potential of a given firearm or load. The heavier the bullet and the faster it moves, the higher its muzzle energy and the more damage it does.

**Muzzle velocity:** The speed at which a projectile leaves the muzzle of the gun. Muzzle velocities range from approximately 800 ft/s (240 m/s) for some pistols and older cartridges to more than 4,000 ft/s (1,200 m/s) in modern cartridges such as the .22-250 Remington, .220 Swift and .204 Ruger. In conventional guns, muzzle velocity is determined by the quantity and burn rate of the propellant, the mass of the projectile, and the length of the barrel.

## N

**Neck:** The part of a cartridge case that holds the bullet securely in place

**Necking down or necking up:** Shrinking or expanding the neck of an existing cartridge to make it use a bullet of a different calibre. A typical process used in the creation of wildcat cartridges.

**Nitrocellulose:** A highly flammable compound that forms the main part of what is known as shooters powder, commonly referred to as propellant. It is the source of the force that propels a bullet down the bore of a firearm.

**Nitroglycerine:** A chemical compound that can be used as an explosive. It is found as an additive in shooters powder which is designated "high energy"

## O

**Obturation:** An ordnance word; to close (a hole or cavity) so as to prevent a flow of gas through it, especially the escape of explosive gas from a gun tube during firing. The process of obturation is where a recess in the base of a bullet allows for expanding gases to press against the base and inside skirt of the bullet creating a gas tight seal to the bore. See also swage.

**Offset mount:** A situation wherein it may not be practical to mount a telescopic sight directly above the receiver and barrel of a firearm. This was noted with many military and service arms where new ammunition was fed from above along a similar path, in reverse, to the spent cartridge cases being ejected clear. Not often seen or used today, although complete or partial sets of offset mounts attract keen interest from restorers and collectors.

**Open sight:** A type of iron sight that has an open notch.

**Operating handle:** Handle of a semi- or full automatic firearm used to cycle the firearm without firing. Also called charging handle, cocking handle, and cocking knob.

**Out of battery:** The status of a weapon before the action has returned to the normal firing position. The term originates from artillery, referring to a gun that fires before it has been pulled back into its firing position in a gun battery. In firearms where there is an automatic loading mechanism, a condition in which a live round is at least partially in the firing chamber and capable of being fired, but is not properly secured by the usual mechanism of that particular weapon can occur.

**Over and Under (O/U):** A configuration for double-barrelled shotguns, in which the barrels are arranged vertically.

**P**

**Parallax:** Is a displacement or difference in the apparent position of an object viewed along two different lines of sight and is measured by the angle or half-angle of inclination between those two lines. Due to foreshortening, nearby objects show a larger parallax than farther objects, so parallax can be used to determine distances. When looking through a telescopic sight, when a movement of the eye, up, down or sideways, changes the position of the reticle with respect to the target. This condition is caused by the reticle not being in proper focus with the objective lens.

**Parkerizing:** A method of protecting a steel surface from corrosion and increasing its resistance to wear through the application of an electrochemical phosphate conversion coating. Also called phosphating and phosphatizing.

**Pellet:** A common name for the small spherical projectiles loaded in shot shells. It also refers to a non-spherical projectile used in some air rifles.

**Percussion cap:** A small cup of copper or brass containing a small amount of a shock-sensitive explosive material such as fulminate of mercury.

**Picatinny rail:** A bracket used on some firearms to provide a standardized mounting platform.

**Pistol:** A type of firearm that can be held and fired with one hand. The word pistol is usually used to refer specifically to a semi-automatic pistol.

**Pistol grip:** A feature on some firearms that gives the user a slightly curved area to grip, just rear of the trigger.

**POA:** Point of aim or where the sights of a firearm are aligned on a target but not necessarily where the fired round will strike.

**Point of Impact:** The exact place at which a bullet hits its target.

**Powder:** Modern shooters powder (also known as smokeless powder) is a combination of nitrocellulose, occasionally nitro-glycerine and various other trace chemicals plus a coating of inhibitor to control and regulate the burn rate and ensure safe ignition within specified pressure parameters for the calibre, dictated by SAAMI or CIP

**Primer:** The part of a metallic cartridge that initiates the cartridge when struck by a firing pin.

**Proof mark:** A stamp applied at or near the breech or other stressed component of a firearm after it has passed a proof test.

**Propellant:** The substance in a cartridge that burns to create pressure that propels the projectile.

**Pump-action:** A rifle or shotgun in which the handgrip can be pumped back and forth to eject a spent round of ammunition and to chamber a fresh one. It is much faster than a bolt-action and somewhat faster than a lever-action, as it does not require that the shooter remove their trigger hand during reloading.

## R

**Rate of fire:** The frequency at which a firearm can fire its projectiles. Usually measured in RPM (rounds per minute).

**Receiver:** the part of a firearm that houses the operating parts.

**Recoil:** The backward momentum of a gun when it is discharged. In technical terms, the recoil caused by the gun exactly balances the forward momentum of the projectile, according to Newton's third law. (often called kick).

**Recoil operation:** An operating mechanism used in locked-breech, autoloading firearms. As the name implies, these actions use the force of recoil to provide energy to cycle the action.

**Red dot magnifier:** An optical telescope that can be paired with a non-magnifying optical sight turning the combination into a telescopic sight.

**Red dot sight:** A type of reflector (reflex) sight for firearms that gives the user a red light-emitting diode as a reticle to create an aim point.

**Reflex Sight:** A generally non-magnifying optical device that has an optically collimated reticle, allowing the user to look through a partially reflecting glass element and see a parallax free cross hair or other projected aiming point superimposed on the field of view. Invented in 1900 but not generally used on firearms until reliably illuminated versions were invented in the late 1970s.

**Reloading:** The process of manually reassembling a fired cartridge case with a new primer, propellant and bullet or wads and shot.

**Revolver:** A repeating firearm that has a cylinder containing multiple chambers and at least one barrel for firing.

**Ricochet:** A rebound, bounce or skip off a surface, particularly in the case of a projectile.

**Rifle bedding:** A process of filling gaps between the action and the stock of a rifle with an epoxy based material in order to increase the inherent accuracy of the rifle through increased stability of the union between the receiver and stock.

**Rifling:** Helical or spiral lands and grooves in the barrel of a firearm, which imparts a spin to a projectile around its long axis. This spin serves to gyroscopically stabilize the projectile, improving its aerodynamic stability and accuracy.

**Rimfire:** A type of firearm cartridge that used a firing pin to strike the base's rim, instead of striking the primer cap at the centre of the base of the cartridge to ignite it (as in a centrefire cartridge). The rim of the rimfire cartridge is essentially an extended and widened percussion cap that contains the priming compound, while the cartridge case itself contains the propellant powder and the projectile (bullet).

**Round:** A single cartridge or unit of live ammunition.

## S

**SAAMI:** This acronym stands for the Sporting Arms and Ammunition Manufacturers Institute, an accreditor that dictates the standards of development to provide safety and reliability for commercial manufacturers of firearms, ammunition and components.

**Safety:** A mechanism used to help prevent the accidental discharge of a firearm in case of unsafe handling. Safeties can generally be divided into sub-types such as internal safeties (which typically do not receive input from the user) and external safeties (which typically allow the user to give input, for example, toggling a lever from "on" to "off" or something similar). Sometimes these are called "passive" and "active" safeties (or "automatic" and "manual"), respectively.

**Sear:** A part which retains the hammer or striker in the cocked position. When released, it permits firing.

**Selective fire:** A firearm that fires semi-automatically and at least one automatic mode by means of a selector depending on the weapon's design. Some selective fire weapons utilize burst fire mechanisms to limit the maximum or total number of shots fired automatically in this mode. The most common limits are two or three rounds per pull of the trigger.

**Selector:** The part of a selective fire weapon that allows the user to choose their desired mode of firing.

**Semi-automatic:** Firing a single bullet each time the trigger is pulled, the fired cartridge case is then ejected and a fresh cartridge loaded into the chamber. The trigger must be released and pulled again to fire another shot. Also known as self-loading or auto-loading.

**Semi-automatic pistol:** A pistol that has a single chamber, and is capable of semi-automatic fire.

**Semi-wadcutter (SWC):** A type of all-purpose bullet commonly used in revolvers that combines features of the wadcutter target bullet and traditional round nosed revolver bullets, and is used in both revolver and pistol cartridges for hunting, target shooting, and plinking. The basic SWC design consists of a roughly conical nose, truncated with a flat point, sitting on a cylinder. The flat nose punches a clean hole in the target, rather than tearing it like a round nose bullet would, and the sharp shoulder enlarges the hole neatly, allowing easy and accurate scoring of the target. The SWC design offers better external ballistics than the wadcutter, as its conical nose produces less drag than the flat cylinder.

**Serial number:** A unique identifier given to a specific firearm. Typically, a firearm has 3 pressure bearing component parts and the receiver usually carries the serial number but sometimes the manufacturer will serialise all 3.

**Shooting range:** Specialised facility designed for firearms usage.

**Shooting sticks:** Portable mounting system designed to brace the firearm on the ground via a number of legs. They offer the shooter a stable shooting position by supporting the forend.

**Shotgun:** A type of firearm designed to fire shotshell ('shot'), which releases a large number of small projectiles upon firing. The vast majority of shotguns have smooth bores (i.e. – no rifling)

**Side by side (S/S):** A configuration for double barrelled shotguns, in which the barrels are arranged horizontally

**Single-action:** Usually referring to a pistol or revolver, single-action is when the hammer is pulled back manually by the shooter (cocking it), after which the trigger is operated to fire the shot. See also double-action.

**Single-shot:** A firearm that holds only a single round of ammunition, and must be reloaded after each shot.

**Slam fire:** A premature, unintended discharge of a firearm that occurs as a round is being loaded into the chamber.

**Sleeving:** A method of using new tubes to replace a worn-out gun barrel.

**Sling:** A device designed to steady a Target Rifle. The sling attaches to the opposite arm to the shooter's trigger hand and clips onto the forend of the Target Rifle via a special clip, not to be confused with a type of strap or harness designed to allow an operator carry a firearm (usually a rifle, carbine or shotgun) on his/her person.

**Smokeless powder:** Propellant containing mainly nitrocellulose (single base) or both nitrocellulose and nitroglycerine (double base).

**Smooth bore:** A firearm with a barrel with no internal rifling, typically a shotgun.

**Sound moderator:** Also known as a sound suppressor or a silencer – a device that attaches to, or is fixed to, the barrel of a firearm and reduces the noise (report) produced by a cartridge discharging in a firearm.

**Speed loader:** A device used for loading a firearm or firearm magazine with loose ammunition very quickly. Generally, speed loaders are used for loading all chambers of a revolver simultaneously, although speed loaders of different designs are also used for the loading of fixed tubular magazines of shotguns and rifles, or the loading of box or drum magazines. Revolver speed loaders are used for revolvers having either swing-out cylinders or top-break cylinders.

**Spitzer bullet:** A superior aerodynamic bullet design incorporating a pointed tip.

**Squib load:** Also known as squib round or just squib: A firearms malfunction in which a fired projectile does not have enough force behind it to exit the barrel, and thus becomes stuck. Squib loads make the firearm unsafe to shoot, unless the projectile can be removed. Accidentally firing another round behind a squib load will almost certainly result in a destroyed barrel and/or firearm.

**Stock:** The part of a rifle or other firearm, to which the barrel and firing mechanism are attached, that is held against one's shoulder when firing the gun. The stock provides a means for the shooter to firmly support the device and easily aim it.

**Swage:** To reduce an item in size by forcing through a die. In internal ballistics, swaging refers to the process where bullets are swaged into the rifling of the barrel by the force of the expanding powder gases.

**Swaged bullet:** A bullet that is formed by forcing the bullet into a die to assume its final form. A typical example would be a .22 LR bullet.

## T

**Telescoping stock or collapsing stock:** A stock on a firearm that can telescope or fold in on itself to become more compact. Telescoping stocks are useful for storing a rifle or weapon in a space that it would not normally fit in or when a smaller length of pull is desired.

**Terminal ballistics:** A sub-field of ballistics, the study of the behaviour of a projectile when it hits its target.

**Throat Erosion:** The wearing of the portion of the barrel where the gas pressure and heat is highest as the projectile leaves the chamber. The greater the chamber pressure, the more rapid throat erosion occurs. This is compounded by rapid firing, which heats and weakens the steel.

**Trajectory:** This describes the arc of the bullet as it exits a firearm's muzzle to impact the target.

**Trigger:** A mechanism that actuates the firing sequence of a firearm. Triggers almost universally consist of levers or buttons actuated by the index finger. The trigger is always housed in the trigger guard for protection from accidental discharge.

**Trigger guard:** A rigid loop which partially surrounds the trigger to reduce the possibility of accidental discharge.

**Twist Rate:** For best performance, the barrel should have a twist rate sufficient to spin stabilize any bullet that it would reasonably be expected to fire, but not significantly more. Large diameter bullets provide more stability, as the larger radius provides more gyroscopic inertia, while long bullets are harder to stabilize, as they tend to be very back heavy and the aerodynamic pressures have a longer arm ("lever") to act on. Twist rate is measured in inches for 1 complete revolution of the bullet. An example would be "1 in 8" which describes one complete revolution in 8 inches of barrel travel.

## U

**Under lug:** The locking lugs on a break-action firearm that extend from the bottom of the barrels under the chamber(s) and connect into the receiver bottom [29] 2. The metal shroud underneath the barrel of a revolver that surrounds and protects the extractor rod. The two types of underlugs include half-lug, meaning the shroud does not run the entire length of the barrel but instead is only as long as the extractor rod, and full-lug, meaning the shroud runs the full length of the barrel.

## V

**Velocity:** The speed at which a projectile travels.



## W

**Wadcutter:** A special-purpose bullet specially designed for shooting paper targets, usually at close range and at subsonic velocities typically under 800 ft/s (240 m/s). They are often used in handgun and airgun competitions. A wadcutter has a flat or nearly flat front that cuts a very clean hole through the paper target, making it easier to score and ideally reducing errors in scoring the target to the favour of the shooter.

**Wadding:** Plastic or fibre filler loaded in shotgun cartridges to contain the gases and protect shot pellets.

**Wildcat cartridge or wildcat:** A custom cartridge for which ammunition and firearms are not mass-produced. These cartridges are often created to optimize a certain performance characteristic (such as the power, size or efficiency) of an existing commercial cartridge.

**Windage:** The side-to-side adjustment of a sight, used to change the horizontal component of the aiming point. See also Kentucky windage.

## X

**X-ring:** A circle in the middle of a shooting target bullseye used to determine winners in event of a tie. Usually written on a scorecard as "5.1", the ".1" denoting the X-Ring was struck.

## Y

**Yaw:** The heading of a bullet, used in external ballistics that refers to how the Magnus effect causes bullets to move out of a straight line based on their spin.

## Z

**Zero stop:** A stopping mechanism found on some scope sights letting the user easily dial back their sight to the zeroing distance after having adjusted their sight to shoot at other distances.

**Zeroing:** The act of setting up a telescopic or other sighting system so that the point of impact of a bullet matches the sights at a specified distance.





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