FIREARM WEAPONS SPECIALIST

A BASIC COURSE

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Essential firearms safety video:

https://www.youtube.com/watch?v=7bShYB5K_jQ

History

The basic requirements that make a gun a gun are these: a barrel, a charge and a projectile. That being said, early firearms evolved from simple bambo – and later metal tubes – with powder and shot in them, to craftily made weapons of improved accuracy and lethality. The first designs of mass produced early firearms were the matchlocks.

The Matchlock

The first advancements to the method of firing a gun was an effort to find a way to integrate the charge into the weapon itself. To accomplish this, early firearms included a small bowl-shaped metal plate at the breach of the weapon called a “flashpan”. The flashpan had a small hole connecting it to the breach where the firing powder was contained. A small amount of powder would be placed into the flash pan and, when lit, would ignite the rest of the powder in the breach propelling the projectile out of the gun.

Initially, the powder in the flashpan was ignited using a handheld cloth or stick with a flame on the end – a match. The gun was held in one hand

and the match in the other. This made for difficulty in keeping a steady aim and was quickly improved upon.

In the effort to improve accuracy as well as to speed up the firing process, the act of igniting the powder in the flash pan was made simpler with the invention of the “matchlock”. The matchlock contained the first “mechanism” to expedite the firing process of hand-held firearms. With the matchlock, no longer did the shooter have to lower a lit match into the flashpan to ignite the powder – the mechanism did it automatically. This advancement freed up both hands to steady the weapon and, more importantly allowed the shooter to keep both eyes on the target.

Matchlock muskets were the most common early firearms. Introduced in the early 15th century, the matchlock consisted of a curved metal clamp alongside the gun known as a “serpantine”. The serpantine would hold a slow-burning match and, when a lever would be pulled, the serpantine would lower the match into the flashpan igniting the powder. As the design evolved, the serpantine would be fitted with a spring and pulled back (or cocked) and a trigger was used to release the spring sending the match forward into the flashpan. Pirate Fashions has a video showing the firing process here: https://www.youtube.com/watch?v=vPa7GJ5kDWM

Early firearm matchlock designs mostly were used to construct muskets – these were long, smooth barreled guns fired with both hands. Those who used these weapons were known as musketeers. There were very few matchlock designs made into pistol-sized guns. There were, however, some versions of the matchlock designed as shotguns. The

shotgun version had wider, shorter barrels and fired multiple, smaller projectiles with a single shot. Many of these earliest versions of shotguns were known as the “blunderbuss”.

The Flintlock

It would take nearly another 200 years before the matchlock would be improved upon. The very first true flintlock firearm was developed by Frenchman Marin le Bourgeoys who designed it for King Louis VIII. Flintlock muskets, pistols and rifles were the mainstay of every European and American army from 1660 to 1840.

The flintlock improved upon the matchlock in several ways. First of all, an open flame was no longer needed as it was replaced with a simple spark. The spark came courtesy of the serpantine being fitted with a piece of flint. The flashpan was replaced with a smaller “priming pan” that held a lesser amount of fine black powder. The priming pan, like the flashpan, contained an opening into the breach which contained the rest of the powder. A small piece of steel (called a “frizzen”) was mounted to the top of the priming pan and, when the trigger was pulled, the flint would strike the steel creating a spark igniting the powder in the breach.

Like the matchlock, the flintlock design was also initially a smooth bore long gun, or musket. However, the flintlock design allowed for more variations of weapons and so many short barreled pistol designs and shotgun designs were developed. Flintlock pistols were commonly used by officers on sailing ships and some armies as well. The blunderbuss shotgun

designs were more common with sailors and pirates. Some were even designed to fire ropes from one ship to the other. However, the most intuitive design during the flintlock period affected firearms in an incredibly revolutionary way. Pirate Fashions has a video for the Flintlock here: https://www.youtube.com/watch?v=stSzZ3miwI8

Rifling

Up until the late 15th century all flintlocks, and their matchlock predecessors, utilized smooth bore barrels. This means that the inside of the barrel was smooth providing little friction for the projectile allowing for maximum speed. The barrels were also a bit larger than the projectiles being shot from them to allow for some powder residue to build up before the barrel would need to be cleaned. While this allowed for more sustained firing without cleaning, the accuracy of these weapons suffered for it. Even with the long barrels of these firearms, maximum range was about 50-75 yards.

Before firearms, the precursor to the musketeer was the archer. For the average soldier, the bow and arrow was the only way of getting to a foe from a distance. Sometime in the early 15th century, archers discovered that they could get more accuracy over distance by curling the tail feathers of their arrows causing the arrow to spin while in flight. This spinning – much like a spiraling football – was an advancement that would find its way into firearms in the form of rifling. Here is a quick video on rifling: https://www.youtube.com/watch?v=M8ODXkYaJo8

Rifling is the spiraling grooves cut into a gun barrel that cause the bullet to spin thereby providing greater accuracy over longer distances. Muskets that utilized this technology were referred to as rifles. These early rifles increased the effective range of the weapon to 200-300 yards. Rifles were seen as early as the latter part of the 15th century, however they weren't widely adopted by most militaries of the day. While a bit of powder residue wasn't a problem for smooth bore muskets, it was a big issue for rifles requiring more frequent cleaning. This did not make them practical for repeated use in battle and therefore rifles were limited to mostly target shooting or hunting.

Because the practices of warfare at that time were to line up soldiers in parallel lines facing each other, the limited range and poor accuracy of muskets did not negatively affect their widespread use. However, an 18th century conflict in North America would change all that: The American Revolution.

In the early part of the war, both the Americans and British infantry primarily used muskets. For the British, it was the Brown Bess – described as the gun that built the British Empire. The Americans, however, were mostly supplied with Charleyville muskets provided by the French. The common style of warfare of the day was practiced with both sides lining up against each other – the officers in the back or up on a hill away from the battle – while both lines marched towards each other.

However, some time into the war, the Americans began changing tactics at smaller skirmishes and then in more widespread clashes. Using

the famous Kentucky Long Rifle, American marksmen began targeting British officers rather than just the infantry. Because of the range of these rifles, the Americans saw great success with this tactic – even though the British generals despised it. While perhaps deemed “unsportsmanlike”, this tactic was one of the reasons for the Americans’ victory in their war for independence.

After the American Revolution, early firearms continued to evolve and change, however, rifling would eventually become part of almost every firearm in existence. From howitzers to handguns, every firearm – with the exception of shotguns and musket recreations – utilize rifling.

With the exception of rifling and the upgrade to flintlocks, early firearms changed very little from the 1400’s to the end of the 1700’s. But, the 19th century would see incredible advancements that would lead to the birth of the modern firearm.

Beginning in around the 1820’s through the late stages of the 1800’s, three major developments were made that revolutionized the firearms industry and gave birth to the modern firearm. Individually, they are all significant steps in technology that changed the role and use of firearms throughout the world. The first started with a change to the age-old musketball.

The Minié Ball

The Minie Ball was the first major change to the projectile in firearms history

Since the dawn of firearms, other than shot, the only projectile fired from a gun was a round ball. Being fired by muskets for centuries, these were called musketballs. However, in the early part of the 19th century the musketball evolved into the “Minié ball” (pronounced “MI-nee” if you’re not French). The minié ball was the first effective bullet (or slug) design that was not round. Instead, the minié ball was elongated, had groves towards the back and had a concave bottom. What this design allowed the slug to do was, first, expand at the base which forced it to grab more firmly to the rifled barrel and then created a much more effective spin. The rounded, yet somewhat pointed nose of the slug gave it better aerodynamic capabilities increasing the effective range of firearms considerably. These are the earliest versions of today’s common bullet designs.

Percussion Caps

Shortly after the introduction of the minié ball, a great leap in firearms technology would improve the firing method for any type of gun. The next step in the evolution from the matchlock was the “percussion cap”. The percussion cap was developed around 1830 following the discovery of “fulminates” - chemical compounds that are friction sensitive explosives. Being “friction sensitive”, fulminates such as mercury and potassium will explode on impact. Thus, the flint and steel of the flintlock design was replaced by a chemical compound that would explode on contact proving to be incredibly more reliable than the flint and steel method.

Percussion caps were small copper or brass cylinders with one open end and the other end filled with a fulminate compound. The serpantine

system used in both matchlocks and flintlocks was modified again as it was shaped into – and referred to as – a hammer. The priming pan on the weapon was removed and modified to incorporate a nipple on the end where the percussion cap would be affixed. The nipple end contained a small opening to allow the spark from the percussion cap to ignite the powder in the barrel. The hammer would be pulled back (or “cocked”), then, when the trigger is pulled, the hammer would spring forward smacking the percussion cap and causing the spark that would light the charge.

Percussion caps only saw widespread use for about 50 years. It was adopted by most armies around the globe as it was far more reliable, especially in wet weather, than the previously used flintlock design. Indeed, for the first time in firearms history, weather was no longer a factor for combat. While it was only used for a brief time, the percussion cap was the catalyst to the greatest advancement in ammunition technology: the “self contained cartridge”.

Like the long-standing musketball, the only way to fire a gun since their invention was three separate pieces being loaded down the barrel of a gun: powder, wadding and a projectile. An external spark was then needed to ignite the powder in the gun thereby firing it. It wasn’t until the early part of the 19th century that the first self-contained bullet cartridge was introduced – forever changing the firearms industry.

These early bullet cartridges used cloth or, more commonly, paper to wrap the powder and projectile into a single, self-contained unit. While extremely crude compared to their all metal successors, these early paper

cartridges completely changed firearms combat. Instead of carrying containers of powder, measuring it and pouring it down the barrel, one simply had to ram one of these cartridges down the barrel, put on a new percussion cap and he was ready to fire. It increased the rate of fire considerably, however, being paper, wet conditions were still a problem.

Paper bullet cartridges were used around the world from the early 1800's through the 1860's. It wasn't until 1847 when a Frenchman, M. Houiller, introduced the first fully contained all-metal bullet cartridge. This new design would take many forms over the next decade or so and standardization of metal bullet cartridges would not be refined and implemented until around the 1860's. The American Civil War was fought mainly with paper cartridges or lose powder and ball.

The metallic bullet cartridge was a major improvement over the paper versions in two ways: first the metallic cases meant these cartridges were waterproof. Rain or even dropping them in standing water would not cause a misfire. This was a huge advantage over paper cartridges as weather would have no effect in firearms effectiveness. Secondly, these metallic cases went one step further than their predecessors: they also included the charge into the case in the form of a primer. Percussion caps were no longer needed as the primer was now the method of igniting the powder in the cartridge with a simple strike of a hammer. This incarnation of the bullet is the primary form that bullet cartridges are made to this day. These cartridges fueled some major leaps in firearms technology in the decades that followed including the advent of the truly repeatable firearm.

Gun Components

In 99.9% of all cases, all guns include the following parts: muzzle, breach, hammer and trigger. These components often determine how a firearm operates and how it is classified.

Muzzle = Front. Or, more specifically, the muzzle is the opening on the front of a firearm. This is where the projectile comes out of.

Simply, the breech is the back. With early firearms, the technology limited how guns were loaded. For centuries, guns could only be loaded through the muzzle and they were known as “muzzle-loading” guns. Later, as technology improved, guns could be loaded through the breach and were referred to as “breech-loading”.

The hammer is the part of the firearm that makes contact with the bullet primer to ignite the powder and propel the bullet out of the muzzle. For most handguns and some rifles, the hammer is visible on the outside of the firearm. However, for most rifles and shotguns and some pistols, the hammer is internal.

With some guns, the hammer doesn’t even contact the primer directly at all. In those cases, a firing pin is used. The firing pin is struck by the hammer driving it forward into the bullet’s primer to fire the round.

The trigger is the part of a firearm that files the round. On certain guns, like single action revolvers, the hammer has to be “cocked” – or pulled back

into position – before the trigger can be pulled. In those cases, the pull of the trigger releases the hammer to fire the round. With most other guns, the trigger pull is considered double action in that pulling the trigger both cocks the hammer and releases it thereby firing the weapon.

REVOLVERS

In 1830, when he was only 16, Samuel Colt left home and took a job on a merchant ship bound for India. In his spare time, he toyed with designs for a new sort of gun - one that could be fired repeatedly without reloading. While a number of repeating weapons had already been developed, none of them had caught on with the public, mostly because they were too complicated and cumbersome.

Inspired by a capstan mechanism on the ship, Colt developed a simple revolving ammunition cylinder. Initially, people weren't particularly impressed with the new weapon; but by the 1850s, Colt's company was enjoying phenomenal success. In 1856, he had to churn out 150 guns a day just to keep up with the growing demand!

The extremely simple, highly reliable weapon had a profound effect on life in the United States and later in the rest of the world. Armed with a revolver, anybody could kill another person in a matter of seconds. War, crime, law enforcement and even everyday arguments were infused with a new deadly element.

The first revolvers used gunpowder, balls and caps like the earlier percussion-cap pistols. The shooter would load each of the six chambers in the cylinder with gunpowder and a projectile, and place separate percussion caps on corresponding nipples. While the loading procedure was tedious, a shooter could have six rounds fully prepared ahead of time.

In the 1870s, these models were replaced by revolvers that used bullet cartridges instead of gunpowder and caps. Cartridges are a combination of a projectile (the bullet), a propellant (gunpowder, for example) and a primer (the explosive cap), all contained in one metal package.

In a modern revolver, cartridges are loaded into six chambers, each of which can be positioned in front of the gun's barrel. A spring-loaded hammer is positioned on the other side of the cylinder, in line with the barrel. The basic idea of the gun is to cock the hammer back, line up a new cartridge in between the hammer and the barrel and then release the hammer by pulling a trigger. The spring throws the hammer forward so it hits the primer. The primer explodes, igniting the propellant, which drives the bullet down the barrel.

The inside of the barrel is lined with spiraling grooves, which spin the bullet to give it stability. A longer barrel improves stability, since it spins the bullet for longer. Extending the barrel also increases the speed of the bullet, since the gas pressure accelerates the bullet for a longer period of time.

In early revolvers, a shooter had to pull the hammer back before each shot and then pull the trigger to release the hammer. In modern revolvers,

simply pulling the trigger will force the hammer backward and then release it.

The sequence of events in each shot is very simple:

1. The trigger lever pushes the hammer backward.

2. As it moves backward, the hammer compresses a metal spring in the gun stock (the handle). The diagram above shows a coiled spring; uncoiled tension springs are also used in revolvers.

3. At the same time, a pawl attached to the trigger pushes on a ratchet to rotate the cylinder. This positions the next breech chamber in front of the gun barrel.

4. Another pawl lodges in a small depression on the cylinder. This stops the cylinder in a particular position so it is perfectly lined up with the barrel.

5. When the trigger lever is pushed all the way back, it releases the hammer.

6. The compressed spring drives the hammer forward. The firing pin on the hammer extends through the body of the gun and hits the primer. The primer explodes, igniting the propellant.

7. The propellant burns, releasing a large volume of gas. The gas pressure drives the bullet down the barrel. The gas pressure also causes the cartridge case to expand, temporarily sealing the breech. All of the expanding gas pushes forward rather than backward.

8. To reload the gun, the shooter swings the cylinder out and pushes on the ejector rod to operate the extractor in the middle of the cylinder. The extractor grabs the base of the spent shells and removes them from the cylinders.

9. To reload, the shooter can place individual cartridges into the chambers or load six at once with a speed loader (basically, a small metal holder with cartridges secured in the right position).

In double-action revolvers, the shooter can either pull the trigger to cock and fire or pull the hammer back ahead of time. The advantage of cocking the hammer first is that the trigger moves more easily when it is time to fire.

Obviously, a revolver is easier to use than a flintlock or a percussion-cap weapon. A shooter can load six shots at a time and only needs to pull the trigger to fire. But revolvers seem very limited next to newer technologies: The shooter must pull the trigger for every shot and stop to reload regularly.

The enduring popularity of revolvers is due to the simplicity of their design. Everything fits together so well that the guns very rarely jam. And since they are made with a relatively small number of parts, they are

relatively inexpensive to manufacture. For the home defender and criminals alike, it is an ideal, affordable weapon. Here is a video animation showing how a revolver works: https://www.youtube.com/watch?v=TXlilJ_66FQ

PISTOLS

Semi-Auto Components and Operations

Semi-automatic pistols utilize the pressure generated from the ignition of the gun powder in the cartridge to perform a series of events, which include loading the cartridge, preparing the firearm for discharge, and expelling spent ammunition.

Semi-automatic pistols have a frame where a slide is mounted on a set of rails (which are a part of the frame) and can freely move in a backwards and forward motion on a horizontal plane. The barrel can be attached to the frame, in which case the slide is located to the rear of the barrel while others will mount the barrel within the slide. Regardless of the design, a vertical face, known as the breech face, butts up against the rear end of the barrel. In a locked-breech design, the barrel locks to the slide using lugs that are present in the recesses of the slide design, leveraging the physical interference of a shoulder on the barrel with the rear edge of the ejection port of the slide or other method. The slide houses the firing pin and the extractor which discards used cartridges after they have been fired. Some extractors can be adjusted for pitch and angle of discarded cartridges while others are "fixed" and cannot be adjusted. This is important when purchasing a semi-

automatic pistol because if the shells are discarded inappropriately, such as towards your face and body, if the extractor is "fixed", there's little resolution to the problem. An ejection port provides a means in which the extractor may dispense the spent cartridges from the chamber. Semi-automatic pistols may utilize an external hammer, internal hammer, or a spring-loaded striker or firing pin.

Blowback, Recoil, and Gas Semi-Automatic Pistol Mechanisms

Blowback Action Pistols

Blowback semi-automatic pistols utilize a heavy slide and a strong recoil spring to keep the action closed when not in use. When fired, the gasses which build up in the chamber escape towards the rear which pushes the slide backwards, compressing the recoil spring while the ejector dispenses the spent shell. As pressure subsides, the recoil spring moves the slide forward, closing the action while loading a fresh round of ammunition into the chamber for the next firing sequence. Since the barrel is not mechanically locked by the slide, semi-automatic pistols that use the blowback action are usually limited to smaller calibers, such as .22LP, .25 ACP, .32 ACP and .380 Auto.

Recoil Action Pistols

The recoil-operated semi-automatic pistol, the barrel is locked to the slide. When the gun is fired, the pressure from the gasses escape towards

the rear of the barrel, causing the slide to be pushed backwards, but unlike the blowback action pistol, the barrel is locked into a horizontal position until the very furthest point of the rearward slide is reached. When this point is reached, the barrel tips up slightly to accommodate a new round from the magazine to be placed into the chamber. The slide begins to move forward lowering the barrel into a ready position for the next firing sequence. Recoil-operated pistols can withstand higher pressure ammunition and are generally found on larger 9mm, .45, and higher calibers.

Gas-Operated Actions

Gas-operated actions allow the high-pressure propellant gas to bleed through a small hole in the barrel. The released gas exerts pressure on to a piston or other mechanism driving the slide rearward to unlock the breech and load a new round into the chamber.

Magazine Components

Semi-automatic pistols are most famous for their delivery of fresh ammunition during the firing process. A component known as the magazine is a detachable metal container which holds the ammunition in the frame, stacked on top one another just below the barrel. A tension spring applies pressure to the ammunition in an upwards direction towards the barrel ready to slide the next available cartridge into the chamber when the slide is pulled or the gun is fired. Magazines are easily ejected and replaced in one sweeping action, making the semi-automatic a popular self-defense weapon.

Trigger Mechanisms

There are three types of trigger mechanisms available for the semi-automatic pistol: Single-Action, Double-Action, and Double-Action Only. Semi-automatic pistols come in a variety of shooting styles, which include: An external hammer, and internal hammer, a spring-powered striker, or a spring-powered firing pin. Unlike a revolver, the firing process for a semi-automatic pistol would continue to occur as long as there is ammunition in the magazine and the trigger is pulled back in a permanent hold position. For this reason, semi-automatic pistols as a mechanism which disconnects and cancels the firing sequence until the trigger "reset" to a pre-determined position. This prevents the semi-automatic pistol from being a completely automatic, machine gun style pistol.

Single-Action Semi-Automatic Pistol

The single-action semi-automatic pistol works on the same principle as the single-action revolver discussed earlier. The single-action pistol requires the hammer be cocked before firing with no benefit of the automatic features you would expect.

Double-Action Automatic Pistol

The double-action automatic pistol works on the same principle as the double-action revolver discussed earlier. Most double-action semi-automatic

pistols will operate as both a single-action pistol and as a double-action pistol. The double-action trigger pull is longer and requires more pressure to fire the gun. This is because during the pull, the trigger cocking the hammer from a closed position to a battery ready position and then releasing the hammer when the trigger is completely pulled, Provided a round of ammunition is present in the chamber, the slide mechanism will cock the hammer automatically, allowing for the pistol to be fired when the trigger is pulled again. This second pull will require much less pressure as the hammer is already in position for firing.

Double-Action Only Pistols

Double-action only pistols are exactly what the name implies--they are pistols that will only fire in double-action mode, which work on the same principle as the double-action pistol described earlier. This means each shot requires the long pull and the additional pressure on the trigger to commence firing a round. These pistols are considered less-likely to have an unintended discharge do to the extra effort required to fire the weapon. While many feel this type of gun is safer, others feel it slows the reaction time down considerably, especially during a life threatening encounter.

Semi-Automatic Pistol Safety Mechanisms

Safety features take on a variety of options depending on the manufacturer. For simplicity sake, we will discuss the major safety features that are most common for the semi-automatic pistol.

Pivoting thumb safety mechanisms are the most common safety. These safety switches are located, typically on the left side of the gun however modern manufacturers are now locating them on both sides of the gun for both left and right handed shooters. In general, if the switch is in the up position, it is typically engaged, preventing the firearm form discharging whereas in the down position the safety is off, allowing the firearm to be discharged. Unfortunately, this is the general rule, there are exceptions; be sure to check your owner's manual for a complete explanation of the safety switch should your gun have one.

Other types of safety mechanisms can include those that work to block the sear or the slide while others prevent the hammer from contacting the firing pin. The hammer drop safety, a special form of safety switch, allows gun owners to safely decock their gun when it contains a live round in the chamber. When this is engaged, the hammer falls into the lowered position. Other safety mechanisms include the trigger safety, the grip safety, and the magazine disconnect which prevents firing a round if the magazine is removed.

Order of Operations

When the pistol is first loaded there are no rounds in the chamber.

1. To load a round the slide is quickly pulled back allowing the ammunition in the spring loaded magazine to load into the chamber in the firing position. This action also locks the trigger or striker bar into the ready position.

2. When the trigger is pulled, the firing pin is struck by the hammer (or the striker pin is released) which strikes the primer cap on the cartridge. The primer ignites the gunpowder which then causes the bullet to escape from the barrel of the gun at a high velocity.

3. After the bullet has left the barrel, the released gasses from the gunpowder forces the slide rearward, which cocks the hammer for the next round. During this process, the ejector pin grabs the spent shell and ejects it via the ejection port.

4. The magazine replaces the spent cartridge with a fresh round as the slide is returning to its original resting state. The trigger is reset to the firing position, allowing the shooter to continue firing rounds.

Loading Ammunition into a Semi-Automatic Pistol Magazine

When you first begin to load a semi-automatic pistol magazine, the process is fairly simple. As you add ammunition, you'll discover the process to be a bit more difficult as the magazine loads and the magazine spring becomes more and more condensed.

The magazine should be in an upright position, with the back of the magazine resting against the thumb and fingers of the weak (non-shooting) hand. The front of the magazine should be facing the strong (firing) hand. The firing hand places a cartridge into the magazine at roughly a 30% angle, pushing it downwards and towards the back of the magazine. When the

cartridge is fully inserted, the lip of the magazine will retain the ammunition in place, ready for another round to be inserted. With the following rounds, use the case rim to create tension between the two cartridges combined with pressure from your weak hand thumb to drive the bullet into the magazine. When the magazine if loaded to capacity, it is best practice to slap the back of the magazine to ensure the ammunition is seated properly against the back of the magazine.

Loading the Semi-Automatic Pistol with the Magazine

It is "best practice" to practice loading the magazine into the pistol often, to the point you can do so automatically without looking, in the dark. Oftentimes the only difference in winning a violent confrontation is the amount of time it takes for you to perform an action.

The pistol should be held in your strong (shooting) hand. Note: ALWAYS keep your finger off the trigger until you're ready to shoot! With the pistol pointing in a safe direction (away from your body and away from anything you could potentially damage during a discharge), pick up the magazine with your weak hand. Your weak hand forefinger should be extended and touching the first round in the magazine; this ensures the magazine is orientated in the correct direction, with the bullets facing forward, for insertion into the magazine well.

With one continuous action, you should be able to align the magazine to the magazine well, remove your forefinger as the guide, turning your palm upwards as to press the magazine the remaining distance. You should feel

and hear a clicking sound as the process completes. As a "best practice", you should slap the bottom of the magazine to ensure it has, in fact, been securely and properly seated within the magazine well.

At this point, you have a loaded pistol but it is not ready to be fired. If you intend to carry, be sure to check with a local attorney to see if you can carry with "one in the chamber". If you are ready to practice shooting, you'll need to load your first round into the chamber. This is a three step process:

1. ALWAYS keep your finger off the trigger! Your finger should be resting comfortably in a forward fashion against the frame of the gun.

2. ALWAYS keep the gun pointed in a safe direction. Be sure you know where your firearm is pointed and if there are any objects that need to be avoided should the pistol discharge. SAFETY is the gun-owners responsibility!

3. Grab the end of the slide with your weak (non-shooting) hand, using a strong grip combination of your fingers and thumb. With one quick pull rearward pull the slide, continue your pull until it reaches the end of the slides capacity; immediately release the slide so the magazine can load a live round into the chamber.

It is important the slide action is completed in one swift action, mimicking the blowback action of the slide during a discharge. You will never be able to pull the slide with the same amount of force a blowback creates, however, that amount of force is not required for the loading mechanisms to

work. A quick pull of the slide and a complete extension and release will do the job. If you hesitate or cause the slide to operate correctly, you stand the chance of a bullet being loaded into the chamber but not properly seated.

Once the firearm is properly loaded and ready to shoot, the user can commence firing.

If there is a delay in firing, the bullet does not leave the gun, or there is not a loud "bang" as expected, the user should keep the firearm pointed down range for at least 30 seconds!

The reason you want to wait is due to several miss-fire scenarios which will be discussed in the near future. At this point, if your firearm did not expel a projectile, you should hold position down range, raise your hand, and ask for assistance.

Firing a Semi-Automatic Pistol

Firing a semi-automatic pistol after it has been "racked and loaded" is an extremely easy proposition.

With less than 5 pounds of pressure on the trigger, the firearm will discharge a projectile in any direction you point the muzzle; assuming you're using a cocked single-action pistol or a cocked double-action pistol - discharging the weapon is comparatively the same.

This is an excellent opportunity to remind students of the three major safety rules followed by the two major firing rules:

1. ALWAYS keep your finger off the trigger until ready to fire.

2. ALWAYS keep the gun pointed in a safe direction.

3. ALWAYS keep your gun unloaded until it is ready for use.

4. ALWAYS know your target and what is beyond.

5. ALWAYS know how to use your gun safely.

With your finger off the trigger and resting on the side of the pistol and with the pistol pointed in a safe direction, visually identify your target. With the shooting finger resting on the frame, point your pistol towards the target switch the firearm safety from the engaged, safety position to the unlocked, firing position.

While focusing on your target, scan the area to the left and the right and look beyond the target to ensure you will not hit an unintended target. With the target acquired, after all safety checks, after ensuring there are no other targets that can be inadvertently hit, you can continue with your target practice. The shooter may continue to shoot until the determined rounds are fired, or continue to shoot until the magazine is emptied.

Here is a video animation of a pistol firing: https://www.youtube.com/watch?v=rJMXXuGhINE

RIFLES

Rifle, a shoulder weapon having grooves (called rifling) inside its barrel to improve accuracy; or an artillery piece or naval gun with a grooved barrel. The grooves are cut spirally to give the bullet or shell a rotary motion. This improves accuracy because spinning tends to cause a moving object to maintain a straight course.

A carbine was originally a short rifle for use by mounted troops, but the term was later applied to any short, lightweight rifle. An automatic rifle is similar to a machine gun; the principal distinction is weight and accuracy—an automatic rifle is lighter and, when firing in the automatic mode, less accurate. An assault rifle is a lightweight automatic rifle firing a cartridge with somewhat less power than the type of cartridge used by a full-size military rifle. The submachine gun is similar to an assault rifle but has a shorter range and fires a larger bullet.

How A Rifle Works

A rifle consists of a steel rifled barrel mounted on a wooden or plastic stock. The end from which the bullet leaves the barrel is the muzzle. The other end is known as the breech, or receiver. Here the cartridge is inserted into the firing chamber for firing. With a single-shot rifle, each cartridge is inserted into the firing chamber by hand; with a magazine-fed, rifle, successive cartridges are fed into the chamber from a container holding a number of cartridges.

A rifle is aimed by means of sights on or above the barrel. The front sight (over the muzzle) is a steel blade or bead. The rear sight may be circular (an aperture, or peep, sight) or V-shaped or half-circular (an open sight). For high accuracy, a telescopic sight—a telescope with cross-hairs-may be mounted over the barrel.

A rifle is fired by pulling the trigger with a gently squeezing motion. In a typical rifle, this action disengages a catch, or sear, that holds a hammer cocked against a spring. The spring thrusts the hammer against a firing pin, which in turn strikes the primer in the cartridge case, causing it to ignite the powder charge. The explosion of the powder sends the bullet out of the muzzle and forces the rifle to recoil, or “kick,” against the shooter's shoulder.

After the rifle is fired, the spent cartridge is removed from the firing chamber by a manually operated or automatic mechanism. In magazine-fed rifles, the operation of this mechanism also loads the next cartridge into the firing chamber; in most models, it also cocks the rifle for the next shot.

Manually operated magazine-fed rifles are called repeaters. They are classified into three chief types according to the mechanism they use. A lever-action mechanism is operated by lowering and raising a lever in the form of an enlarged trigger guard. A pump-action, or slide-action, mechanism is operated by pulling back and then pushing forward a part called the fore-end, located under the barrel. In a bolt-action rifle, the most common type, a cylinder called a bolt slides back and forth over the receiver. The bolt is moved by a handle near one end. (Most single-shot rifles also have bolts.)

Rifles that have an automatic loading mechanism use a bolt that is moved by the force of the recoil of the barrel or, more commonly, by a piston pushed by the gases generated by the explosion of the powder in the cartridge. In a semiautomatic, or self-loading, rifle the sear engages the hammer after each shot, and the trigger must be pulled for each shot. In an automatic rifle, the sear remains disengaged for more than one shot; it will either continue firing for as long as the finger maintains pressure on the trigger (until the ammunition is exhausted) or, in the case of a rifle equipped with a burst-control device, until a predetermined number of rounds have been fired. An automatic rifle usually has a switch that makes it possible to select either semiautomatic or automatic operation.

Kinds and Uses of Rifles

Rifles are generally classified as military, sporting, or target. Rifles are also classified by caliber. Caliber can refer either to the diameter of the bullet or to the diameter of the bore (inside) of the barrel. Calibers are expressed in hundredths (or thousandths) of an inch or in millimeters. Common calibers have ranged from .22 to .69 inches (5.59 to 17.5 mm).

Military Rifles

A military rifle must be of sufficiently large caliber to stop an enemy in his tracks, at the same time being light enough to be carried for long periods of time. The military rifle must be sturdy, contain few parts, and be easily

repaired under adverse conditions. Most military rifles today are automatic rifles.

The basic rifle of the U.S. Army is the M-16A2 / M4, an assault rifle, with an effective range of about 550 yards (500 m). The M-16A2 weighs slightly more than eight pounds (3.6 kg) and is about 40 inches (1 m) long. It holds a 30-round magazine and fires 5.56-mm ammunition. The weapon has a burst-control device that limits the number of rounds fired to three for each pull of the trigger. The standard assault rifle in the Russian army is the 5.45-mm AK-74. It has about the same range as the M-16A2 / M4 series.

Here's a video animation explaining the M16/M4 functions: https://www.youtube.com/watch?v=eemyE2JQ5W4

Here's a video showing the subtle differences between an AK47 & AK74: https://www.youtube.com/watch?v=3QxNnELT_Ic

Sporting Rifles

Sporting rifles come in wide variety, from long-range rifles used in big-game hunting to the light types used for hunting rabbits and squirrels. While a few "elephant guns" have been made in very large calibers, most big-game rifles are similar to, or modifications of, military rifles. Winchester, Remington, and Savage bolt-action rifles are in this class, as are such lever-action rifles as the Winchester Model 1893, made in calibers as large as .348 (8.8 mm). Most lever-action and pump-action rifles, however, come in smaller sizes. Semiautomatic and single-shot rifles are also used in hunting.

Target Rifles

Target shooting may be done to improve accuracy for military or hunting purposes, but it is also a sport in itself. Related sports are trapshooting and skeet shooting, done with shotguns. Any rifle can be used for target shooting, but the best results are obtained with rifles designed especially for that purpose. Such rifles are designed with many refinements, such as stocks personally fitted to the user and special sights. Many target shooters use .22 rifles, which are preferred because of their light recoil and inexpensive ammunition.

Contests in target shooting are included in the Olympic Games. The largest of the many target shooting and rifle organizations in the United States is the National Rifle Association of America (NRA), or, more commonly, National Rifle Association. It consists of hunters, marksmen, and collectors of firearms. Membership is about 2,500,000. The NRA publishes American Hunter and American Rifleman. Headquarters are in Washington, D.C.

Early Rifles

German gunmakers in the 16th century first developed guns with rifling. Like all early guns, the rifle was loaded through the muzzle, into which powder and ball were inserted and tamped into place with a ramrod. The rifle was slower to load than the smoothbore, because it required tighter-fitting ammunition, either in the form of a larger-size ball or a ball wrapped in a greased patch. Sportsmen began using rifles, but armies, whose tactics in

those days depended more on rapid rate of fire than on accuracy, found them unsuitable.

In the 1730's German gunmakers in Pennsylvania began producing the Kentucky rifle, so called because it was designed to be used on the Kentucky frontier. Its extra-long barrel (51 to 77 inches [130 to 196 cm]) and relatively small caliber (about .45, or 11 mm) made it the most accurate rifle of its day. The gunpowder was ignited by sparks that were struck when the hammer, containing a piece of flint, was released. Such a weapon was called a flintlock. The Kentucky rifle was used in the French and Indian War and the American Revolutionary War by militia and irregular troops.

Gunmakers worked to find a way to speed the loading of rifles, and during the 18th and early 19th centuries various armies experimented with breechloaders. During the American Revolution, the British briefly tried out the breechloaders invented by Patrick Ferguson. John H. Hall perfected a breechloader that was adopted by some U.S. Army troops in 1819. A Hall rifle carbine was one of the first in which the flintlock system of ignition was replaced by the percussion system, which used a chemical-filled cap that exploded upon being struck.

In 1841 the Prussian army adopted a breechloader, invented by Johann Dreyse and known as the “needlegun” for the long slender pin used to strike its percussion cap. Defects in the early breechloaders prevented their complete acceptance.

In 1849 Claude tienne Mini invented an elongated bullet (the Minie) – as mentioned earlier in this course - whose base would expand (through the force of the explosion) to fit the rifling. The loose-fitting bullet allowed fast loading, and most armies switched to rifles. In the United States, the standard infantry weapon of the Civil War was the musket-rifle, a muzzle-loading percussion weapon that used the Minie.

Modern Rifles

Meanwhile, in 1848 Christian Sharps had perfected a breechloader. It was used in limited numbers in the Civil War and was a popular buffalo gun on the frontier. The Colt, Spencer, Henry, and other breech-loading repeater rifles were used by Civil War cavalry troops. At the close of the war, the U.S. Army adopted as its standard infantry weapon a single-shot breechloader. Gradually the breechloader replaced muzzleloaders in all armies.

The repeating rifle, including Winchester's 1873 and the Remington, was popular among sportsmen and on the American frontier. Rifles designed especially for sportsmen began to appear in the late 1800's; many were refinements of military rifle designs. The U.S. Army first adopted a repeater as the standard infantry weapon in 1894. It was the .30-caliber (7.62-mm) bolt-action Krag-jgensen, invented in Norway, and used in the Spanish-American War. This was superseded by the United States Magazine Rifle, Model of 1903 (commonly called the “Springfield” or the “ '03”), which was modified in 1906 to take a slightly different cartridge. Sporting guns using this cartridge are said to be of caliber .30-06. After World War I the Springfield

and the German infantry rifle, the Mauser M-98, formed the basis of many sporting and target rifles.

In 1936 the U.S. Army adopted the semiautomatic .30-caliber M-1 rifle developed by J. C. Garand at the Springfield Armory. It was the standard infantry weapon of World War II and the Korean War. The 7.62-mm (.308-caliber) automatic M-14 rifle was adopted by the United States in 1957.

Meanwhile, in World War II, the Germans developed a new kind of rifle, the Sturmgewehr StG-44 ("assault rifle"), which had a short range, but had the advantage of using short, lightweight bullets and having fully automatic fire. After the war, other countries began developing similar rifles. In 1947, the Soviet Union introduced the 7.62-mm AK-47, which eventually was adopted by more armies than any other rifle. In the late 1970's the Soviets replaced the AK-47 with the 5.45-mm AK-74. In 1964, the United States replaced the M-14 with the 5.56-mm M-16.

Armies also began developing new sniper rifles, because snipers found automatic-loading rifles less suitable than the earlier bolt-action rifles. Bolt-action sniper rifles introduced since the mid-1980's include the United States armed forces' 7.62-mm M-24 and .50 caliber M-82A1A.

SHOTGUNS

Shotguns first came into use in the early 1600s. The first two-barrel shotgun appeared in 1873, and the first modern, hammerless, pump-action shotgun was produced in 1904. By the turn of the century, they were immensely popular. Many military officers loved their personal shotguns so much that they brought them along instead of sidearms to World War I, earning them the nickname "trench guns." Since then, they have become a permanent part of the military arsenal and a part of the everyday lives of many civilians as well.

Here's a fun video of a 1902 coach gun in action: https://www.youtube.com/watch?v=f9ZkxekdMo4

Why a shotgun instead of, say, a rifle? Well, to do its job, a projectile must (1) make contact with the target and (2) hit the target in a critical spot.

With a wider stream of potentially deadly projectiles, a shotgun is like using a can of spray paint if a rifle is like using a felt-tip pen. As long as the target is within its effective range, a shotgun will give you a much better chance of making critical contact with one pull of the trigger.

The shotgun is the Swiss-army knife of guns. It is an indispensable tool - on the farm, in combat and on the hunt. They are just as useful in non-lethal situations, like for scaring away pests or for opening locked doors in a police or military situation, as they are for big game hunting.

The Basics

Whether you're talking about a handgun, a rifle or a shotgun, all modern guns have to do some of the same things. They have to send ammunition flying out of a long cylinder called a barrel, and they have to allow for the loading and unloading of new and spent ammunition. When you pull the trigger, a hammer or firing pin strikes an explosive charge on the back of a cartridge or bullet. This causes a small explosion that changes the air pressure in the barrel, forcing whatever was in front of the explosion (such as a bullet or metal pellets) out the other side at an extremely fast speed.

Target Practice

Shotguns are designed to fire batches of small projectiles instead of single bullets with each pull of the trigger. These projectiles themselves don't have to be aerodynamic like bullets and aren't expected to travel long distances. They are designed to cause their worst damage at closer ranges. Shotgun ammo comes in varying shapes and sizes and includes lead, steel and bismuth pellets, bean bags, rock salt and rocket-like sabots. Shotguns can also fire individual metal slugs.

Shotgun Parts

All shotguns have some of the same basic components. Starting from the end nearest to the shooter, there's often a stock that allows you to steady it against your shoulder muscles. Some manufacturers put a recoil pad at the

end of the stock to help dampen the kick you feel when you fire it. There are some shotguns, usually "assault" style, that have foldaway stocks or no stock at all. Moving forward from the stock, you'll find all of the parts associated with firing. This includes the trigger that connects to the sear and hammer. Some shotguns have a pistol grip that extends downward below the trigger.

The hammer activates the bolt assembly and firing pin, which rests against the cartridge to be fired. Now we're at the chamber, where the loading, unloading and firing happens. The chamber can be accessible from the side or the top. Connecting to the chamber is the barrel, which is the long tube that the ammo travels through as it leaves the gun. Some shotguns have a magazine connected to the chamber - this may take the form of a second, shorter tube below the barrel or else a drum or rectangular cartridge that snaps into the barrel. There may also be a fore-end (a sliding handle colloquially known as a pump) attached to the shorter tube, which is used to partially automate the loading and unloading process. On the top of the barrel, you'll often find a bump that's used as a crude sight.

Gauge vs. Caliber

Shotgun sizes have always been measured in a somewhat roundabout way. You would think that the "12" in a 12-gauge shotgun corresponds to some linear measurement -- maybe inches or centimeters. But that's not the case. "12-gauge" means you can make 12 lead balls, each of equal diameter to the gun barrel, out of 1 pound of lead. This originated in the days when

you would buy lead by the pound to make your own ammo. The gauge told you how many rounds you could make for the gun from 1 pound of lead.

The smaller the gauge number, the wider the barrel. The largest shotgun is a 4-gauge. The .410 shotgun, the smallest, is an exception to the rule: It's actually a .410-caliber -- it has a .41-inch barrel diameter.

In general, the smaller the barrel diameter, the less "kick" or recoil the shooter feels from the gun. Many experts say that a 20-gauge shotgun is a good beginner's gun because it has relatively little recoil but fires more shot per shell than the smaller-diameter .410-caliber.

Action and Barrel Types

Besides firing, another thing shotguns have to do is set a new cartridge in the chamber and get rid of what's left over from a cartridge that has just been fired. Over time, shotgun manufacturers have developed several different technologies to accomplish this. As new innovations have come along, most of the old designs have stuck around, though. Some of the simplest ways to accomplish the task are still the most effective and dependable.

One way individual shotguns differ in loading and unloading is in their anatomy. The vast majority of shotguns are either single-barrel, double-barrel side-by-side or double-barrel over-under.

The action, or method a shotgun uses for loading and disposing of cartridges, can be:

1. autoloading
2. pump action
3. break action
4. bolt action

Break, Bolt and Pump Actions

Break Action

Break-action shotguns are the most straightforward and the safest, and they're commonly used in shooting competitions. The gun has a hinged opening where the chamber meets the barrel. By opening the gun, it is easy to see if it's loaded or not.

To load a new cartridge, the shooter breaks open the barrel on its hinge, physically places a cartridge into the chamber and then closes it. In older model shotguns, the shooter would have to manually cock the hammer and pull the trigger. In most modern shotguns, there's no need to cock the hammer before pulling the trigger. In most cases after firing the gun, the shooter then manually removes spent cartridges from the chamber and repeats the process to fire again. There are both single-barrel and double-barrel shotguns that are break-action. On modern double-barrel shotguns, there's only one trigger and an automatic or manual barrel selector (the selector picks which barrel fires).

Bolt Action

Bolt-action shotguns are not all that common, but they work just like bolt-action rifles. The bolt is a rod attached to a spring, and there's a handle sticking out of it. To load a bolt-action, the shooter twists the bolt handle up and then pulls it back. This both exposes the chamber and cocks the firing mechanism. The shooter then loads a magazine into the chamber and pulls the bolt forward into place. This strips the top cartridge from the magazine, blocks it off from the magazine and prepares it for firing. After firing the first shot, each time the shooter pulls the action back and then forward it ejects the spent cartridge, strips the next cartridge from the magazine and prepares it for firing.

Pump Action

Pump-action shotguns also have a moving bolt; but instead of a handle, their bolt system is operated by a wooden or composite slide called the fore-end. In this case, the magazine is a shorter tube under the barrel. First, the shooter fills the magazine with three or more cartridges. There's tension in the magazine from a spring, It's a bit like putting D-cell batteries into an old flashlight. He or she then pulls the fore-end to the rear of the gun. This ejects anything that's in the chamber, cocks the hammer, and loads a shell in the chamber. Next, the shooter pushes the slide forward, which pushes the block and firing pin into the firing position against the cartridge. After each fired shot, the shooter repeats this motion to reload the gun and eject used cartridges.

Autoloading

Autoloaders and semi-automatic shotguns take the pump-action idea one step further, using similar mechanisms to those employed by machine guns. As the designs get more complex and have more moving parts, the chances for operator error, misfire and jamming increase dramatically. Autoloaders are considered less reliable than pump-action and break-action guns.

Recoil-operated autoloaders use the force naturally generated by recoil from the firing process to eject the spent cartridge, get a new one from the magazine and ready it in the chamber. In this case, the explosion from the cartridge forces both the barrel and the bolt to travel a couple of inches backwards. This ejects the spent cartridge. The barrel and bolt hit springs that send them forward again, and the bolt strips a new cartridge into place on the way. The barrel and bolt lock back into place and are ready to fire again. There are also short-recoil systems that work similarly but with a greater separation between the movement of the barrel and the movement of the bolt.

Automatic Shotguns

There are automatic shotguns in limited use in the military, including the USAS-12 and the Franchi SPAS-15. These are rapid-fire, high-impact weapons, allowing the shooter to fire up to four shots per second with one

pull of the trigger. The USAS-12 uses a drum magazine, and the SPAS-15 uses a box magazine.

Even more powerful is the Pancor Jackhammer, as this course was put together, it's just a concept and prototype weapon. It's an automatic, drum-loaded shotgun made out of plastic. The Jackhammer is extremely light and has a remarkably small recoil. Most of the recoil energy is captured and used in loading and firing the next round. As an interesting additional feature, it is possible to take the drum magazine off the gun, attach a detonator and use it as an anti-personnel mine that fires all of the cartridges at once when tripped.

The Difference Between a Shotgun and a Rifle

Handguns and rifles have rifled barrels, meaning that there are grooves cut lengthwise into the inside of the barrel. The grooves cause a bullet to spin, which makes it shoot out straighter and travel faster.

Most shotguns are not rifled inside. With standard ammo like lead or steel shot, a rifled barrel would cause the pieces of shot to bunch up into a tighter pattern, which would defeat the purpose of using a shotgun.

For shooters who to more tightly control the spread and impact point of their shot, there are chokes. These are tubes that use a cone or bumpy shape to taper the angle at which ammo leaves the barrel and the distance it travels. Some of them are rifled, and some are not. Some are even

adjustable on the fly, meaning you can change the effect without removing the choke.

Choke manufacturers express their expected effects by listing the amount that a choke constricts the barrel and the percentage of shot that will hit a target area at 40 (or, in some cases, 25) yards. In general, the more the barrel is constricted, the higher the percentage of shot hitting the target at 40 yards. But this is all relative to the size and type of shot. Because of this and all of the variables involved (weather, wind conditions, individual barrel, etc.), it's not easy to say precisely how a particular choke will affect the shot pattern, and most shooters have to learn by trial and error.

Extreme Choking: Sawed-off / Sawn-off

Depending on which side of the pond you hail from, you might have heard of "sawed-off" or "sawn-off" shotguns. These are guns whose barrels have been physically shortened with a hacksaw or similar tool to less than 18 inches (46 cm). There are generally two reasons why people make sawed-off shotguns: concealment and spread.

Since they are much shorter, they are easy to hide in a long jacket or down the side of a very long boot. Shortening the barrel also reduces the recoil of a shotgun, which makes it a little easier to use as a one-handed weapon.

Since the ammo travels a much shorter distance before dispersing, the shot pattern of a sawed-off is much more spread out. This gives the shooter a much better chance of hitting the target, even if his aim is way off.

Sawed-offs are not illegal to own if licensed properly. They require a special registration.

Types of Ammo / Shot

Cartridges filled with shot are the most common type of shotgun ammo. Shot are little balls made of any number of metals, including lead, steel, bismuth, tin and zinc.

Each metal behaves a little differently. Lead has some properties that make it one of the most effective materials for shooting game and targets. It is relatively heavy and therefore maintains its explosive force well. It is also somewhat soft, so it changes its shape as it leaves the barrel. This gives it a more spread-out shot pattern than other materials but still delivers a great deal of energy. There is some evidence that because steel pellets do not deform -- they maintain their round shape throughout their flight -- they wound animals without killing them more often than lead.

Until the early 1990s, most shot was made of lead. As environmentalists studied its effect on the ecosphere, they found that the spent lead shot hunters left in waterways and forests had harmful effects on wildlife and risked contamination of drinking water. Lead shot has been

banned from waterfowl hunting in the United States since 1992, and various types of steel and alloy shot have taken its place.

The rule of thumb for shot size is the higher the number, the smaller the diameter of the shot. There is a consistent standard in the United States, but worldwide the numbers don't correspond to any specific measurement across the board. In hunting, smaller ammo is used for smaller game, and larger ammo is used for larger game. Buckshot is large-sized shot that got its name because it is used to hunt deer. Because different materials have different weights and characteristics, shot size alone does not tell the whole story. For example, if you are shooting with steel, you'd have to use larger shot than you would if you were doing the same type of hunting with lead.

Types of Ammo / Slugs

Slugs are molded chunks of metal, nylon or plastic. In effect, they turn a shotgun into a crude rifle. Slugs are fired individually, like bullets, instead of in bunches like buckshot and birdshot. They can come in a variety of shapes, but they are often tapered into a bullet shape. They can be solid or filled with substances like explosives or incendiary powder.

Shotgun slugs can be rifled - this is supposed to make them spin in the air and thus improve their flight length and accuracy.

One reason hunters use slugs is to hunt deer in states that ban the use of rifles and/or buckshot ammo. The shotgun/slug combination provides a

legal, if shorter range alternative. In the USA, there are at least 20 states that have restrictions of this kind.

Non-explosive slugs are also used for crowd control. When deployed properly, they can act as a non-lethal deterrent in these situations. They are used in organized shooting competitions as well.

Types of Ammo / Sabots

A sabot is a specially shaped, two-stage cartridge. It has an outer jacket that helps it travel longer distances, and it has an inner slug or payload. The jacket is designed to fall away in flight after it reaches a certain distance. Several hunting sources suggest that sabot ammunition is only effective at longer distances when shot through a rifled barrel. For a shotgun hunter, this usually means adding on a rifled choke tube.

Sabot can also describe an arrow-like shape of material that fits in a standard shell. One particularly frightening sabot-style payload is the flechette. A flechette round contains hundreds of small, needle- or razor-like projectiles designed to penetrate armor and inflict painful wounds. They are banned by the Geneva Convention but do still see use in combat and counter-terrorism from time to time.

Miscellaneous Ammo

Breaching rounds - Shotguns are commonly used in the military to "unlock" doors when troops don't know what lies on the other side. Because

traditional ammo tends to ricochet and may end up hitting the shooter or someone inside the room, breakable "breaching rounds" are often used. These shells contain a metallic powder that disperses on contact.

Bean bags - Bean bags are used as shotgun ammo in crowd control situations, as in most cases they stun the victim but do not inflict lasting damage.

CS gas grenades - Combat shotguns can be used to disperse tear gas and similar chemicals.

Rock salt - Rock salt is a popular home defense ammunition because it reportedly causes severe pain but usually no permanent damage. See DesMoinesRegister.com: Suspect shot with rock salt is caught to read about a case where rock-salt-filled shells were used to disable a burglar.

Here's a video discussing pump action vs semi-auto shotguns: https://www.youtube.com/watch?v=24jBpMKRaGI

MACHINE GUNS

Historians count the machine gun among the most important technologies of the past 100 years. As much as any other factor, it set the brutal, unrelenting tone of World War I and World War II, as well as most of the wars since that time. Unlike earlier guns, which had to be manually loaded and fired, with this machine, one soldier could fire hundreds of bullets

every minute, mowing down an entire platoon with only a few passes. The gun would continue to fire until the operator stopped pressing the trigger or the gun finally ran out of ammunition.

Military forces had to develop heavy battle equipment like tanks just to withstand this sort of barrage. This single weapon had a profound effect on the way we wage war. The machine gun gave small numbers of troops the fighting capabilities of large battalions. It also increased the potential for mass casualties.

In light of their monumental role in history, it's somewhat surprising how simple machine guns really are. These weapons are remarkable feats of precision engineering, but they work on some very basic concepts.

Machine Guns and Gun Systems

In the 1800s, gun manufacturers designed a number of mechanisms to address the problems associated with limited firing ability. A lot of these early machine guns combined several barrels and firing hammers into a single unit. Among the most popular designs was the Gatling gun, named after its inventor Richard Jordan Gatling. Here's a video of a 1874 Gatling gun: https://www.youtube.com/watch?v=hqFJ2SuRAPw

This weapon - the first machine gun to gain widespread popularity - consists of six to 10 gun barrels positioned in a cylinder. Each barrel has its own breech and firing pin system. To operate the gun, you turn a crank, which revolves the barrels inside the cylinder. Each barrel passes under an

ammunition hopper, or carousel magazine, as it reaches the top of the cylinder. A new cartridge falls into the breech and the barrel is loaded.

Each firing pin has a small cam head that catches hold of a slanted groove in the gun's body. As each barrel revolves around the cylinder, the groove pulls the pin backward, pushing in on a tight spring. Just after a new cartridge is loaded into the breech, the firing-pin cam slides out of the groove and the spring propels it forward. The pin hits the cartridge, firing the bullet down the barrel. When each barrel revolves around to the bottom of the cylinder, the spent cartridge shell falls out of an ejection port.

The Gatling gun played an important role in several 19th century battles, but it wasn't until the early 20th century that the machine gun really established itself as a weapon to be reckoned with.

The Gatling gun is often considered a machine gun because it shoots a large number of bullets in a short amount of time. But unlike modern machine guns, it isn't fully automatic: You have to keep cranking if you want to keep shooting. The first fully automatic machine gun is actually credited to an American named Hiram Maxim. Maxim's remarkable gun could shoot more than 500 rounds per minute, giving it the firepower of about 100 rifles.

The basic idea behind Maxim's gun, as well as the hundreds of machine gun designs that followed, was to use the power of the cartridge explosion to reload and re-cock the gun after each shot. There are three basic mechanisms for harnessing this power:

1. Recoil systems
2. Blowback systems
3. Gas mechanisms

Machine Gun Recoil Systems

The first automatic machine guns had recoil-based systems. When you propel a bullet down the barrel, the forward force of the bullet has an opposite force that pushes the gun backward. In a gun built like a revolver, this recoil force just pushes the gun back at the shooter. But in a recoil-based machine gun, moving mechanisms inside the gun absorb some of this recoil force.

Here's the process: To prepare this gun to fire, you pull the breech bolt (1) back, so it pushes in the rear spring (2). The trigger sear (3) catches onto the bolt and holds it in place. The feed system runs an ammunition belt through the gun, loading a cartridge into the breech (more on this later). When you pull the trigger, it releases the bolt, and the spring drives the bolt forward. The bolt pushes the cartridge from the breech into the chamber. The impact of the bolt firing pin on the cartridge ignites the primer, which explodes the propellant, which drives the bullet down the barrel.

The barrel and the bolt have a locking mechanism that fastens them together on impact. In this gun, both the bolt and the barrel can move freely in the gun housing. The force of the moving bullet applies an opposite force on the barrel, pushing it and the bolt backward. As the bolt and barrel slide backward, they move past a metal piece that unlocks them. When the pieces

separate, the barrel spring (4) pushes the barrel forward, while the bolt keeps moving backward.

The bolt is connected to an extractor, which removes the spent shell from the barrel. In a typical system, the extractor has a small lip that grips onto a narrow rim at the base of the shell. As the bolt recoils, the extractor slides with it, pulling the empty shell backward.

The backward motion of the bolt also activates the ejection system. The ejector's job is to remove the spent shell from the extractor and drive it out of an ejection port.

When the spent shell is extracted, the feeding system can load a new cartridge into the breech. If you keep the trigger depressed, the rear spring will drive the bolt against the new cartridge, starting the whole cycle over again. If you release the trigger, the sear will catch hold of the bolt and keep it from swinging forward.

Machine Gun Blowback Systems

A blowback system is something like a recoil system, except that the barrel is fixed in the gun housing, and the barrel and bolt don't lock together.

This gun has a sliding bolt held in place by a spring-driven cartridge magazine, and a trigger mechanism. When you slide the bolt back, the trigger sear holds it in place. When you pull the trigger, the sear releases the

bolt, and the spring drives it forward. After the bolt chambers the cartridge, the firing pin sets off the primer, which ignites the propellant.

The explosive gas from the cartridge drives the bullet down the barrel. At the same time, the gas pressure pushes in the opposite direction, forcing the bolt backward. As in the recoil system, an extractor pulls the shell out of the barrel, and the ejector forces it out of the gun. A new cartridge lines up in front of the bolt just before the spring pushes the bolt forward, starting the process all over again. This continues as long as you hold the trigger down and there's ammunition feeding into the system.

Machine Gun Gas Systems

The gas system is similar to the blowback system, but it has some additional pieces. The main addition is a narrow piston attached to the bolt, which slides back and forth in a cylinder positioned above the gun barrel.

This gun is basically the same as one using the blowback system, but the rear force of the explosion doesn't propel the bolt backward. Instead, the forward gas pressure pushes the bolt back. When the bolt swings forward to fire a cartridge, it locks onto the barrel. Once the bullet makes its way down the barrel, the expanding gases can bleed into the cylinder above the barrel. This gas pressure pushes the piston backward, moving it along the bottom of the bolt. The sliding piston first unlocks the bolt from the barrel, and then pushes the bolt back so a new cartridge can enter the breech.

Machine Gun Feeding: Spring and Hopper System

One of the main differences between different machine gun models is the loading mechanism. The early manual machine guns, such as the Gatling gun, used a device called the ammunition hopper. Hoppers are just metal boxes containing loose individual cartridges that fit on top of the machine gun mechanism. One by one, the cartridges fall out of the hopper and into the breech. Hoppers can hold a good amount of ammunition and they're easy to reload even while the gun is firing, but they are fairly cumbersome and only work if the gun is positioned right side up.

The hopper system was replaced by the belt-fed system, which helps control the ammunition's movement into the gun. Ammunition is contained on a long belt, which the operator holds, or is contained in a bag or box. After a round is fired, it moves out of the way, and a new round slips into place.

Another system is the spring-operated magazine. In this system, a spring pushes cartridges in a magazine casing up into the breech. The main advantages of this mechanism are that it's reliable, lightweight and easy to use. The main disadvantage is that it can only hold a relatively small amount of ammunition.

Machine Gun Feeding: Belt System

For sheer volume of ammunition, the belt system is usually the best option. Ammunition belts consist of a long string of cartridges fastened together with pieces of canvas or, more often, attached by small metal links.

Guns that use this sort of ammo have a feed mechanism driven by the recoil motion of the bolt.

The bolt in this gun has a small cam roller on top of it. As the bolt moves, the cam roller slides back and forth in a long, grooved feed cam piece. When the cam roller slides forward, it pushes the feed cam to the right against a return spring. When the cam roller slides backward, the spring pushes the cam back to the left. The feed cam lever is attached to a spring-loaded pawl, a curved gripper that rests on top of the ammunition belt. As the cam and lever move, the pawl moves out, grabs onto a cartridge and pulls the belt through the gun. When the bolt moves forward, it pushes the next cartridge into the chamber.

The feed system drives the ammunition belt through cartridge guides just above the breech. As the bolt slides forward, the top of it pushes on the next cartridge in line. This drives the cartridge out of the belt, against the chambering ramp. The chambering ramp forces the cartridge down in front of the bolt. The bolt has a small extractor, which grips the base of the cartridge shell when the cartridge slides into place. As the cartridge slides in front of the bolt, it depresses the spring-loaded ejector.

When the firing pin hits the primer, propelling the bullet down the barrel, the explosive force drives the operating rod and attached bolt backward. When the shell clears the chamber wall, the ejector springs forward, popping the shell out of the gun through the ejection port. This system lets you fire continuously without reloading.

The basic mechanism of the machine gun has remained the same for more than a hundred years, but gun manufacturers are continually adding new modifications. One modern design transforms from a box to a gun with the single push of a button. In addition, new lightweight small arms technologies (LSAT) are made of lighter materials that could reduce the weight of machine guns and their ammunition by 40 percent.

Whether or not you've ever held a machine gun or even seen one, this powerful device has had a profound effect on your life. Machine guns have had a hand in dissolving nations, repressing revolutions, overthrowing governments and ending wars. In no uncertain terms, the machine gun is one of the most important military developments in the history of man.

Here's is an OLD video showing how WWII machine guns worked: https://www.youtube.com/watch?v=KVYhZYYehys

Here is an animation of the M240 Bravo cycle of operations: https://www.youtube.com/watch?v=tuWG7Na6zs4

SILENCERS / SUPPRESSORS

It is amazing that anything is able to silence a gun, but gun silencers actually work on a very simple principle.

Imagine a balloon. If you pop a balloon with a pin, it will make a loud noise. But if you were to untie the end of the balloon and let the air out slowly, you could pop it making very little noise. That is the basic idea behind a gun silencer.

To fire a bullet from a gun, gunpowder is ignited behind the bullet. The gunpowder creates a high-pressure pulse of hot gas. The pressure of the gas forces the bullet down the barrel of the gun. When the bullet exits the end of the barrel, it is like uncorking a bottle. The pressure behind the bullet is immense, however - on the order of 3,000 pounds per square inch (psi) - so the POP that the gun makes as it is uncorked - is extremely loud.

A silencer screws on to the end of the barrel and has a huge volume compared to the barrel (20 or 30 times greater). With the silencer in place, the pressurized gas behind the bullet has a big space to expand into. So the pressure of the hot gas falls significantly. When the bullet finally exits through the hole in the silencer, the pressure being uncorked is much, much lower - perhaps 60 psi. Therefore, the sound of the gun firing is much softer.

Remember that, a bullet that travels at supersonic speeds cannot be silenced 100%, because the bullet creates its own little sonic boom as it travels. Many high-powered loads travel at supersonic speeds. The silencer can remove the "uncorking" sound, but not the sound of the bullet's flight.

Here’s an older yet informative video covering suppressors: https://www.youtube.com/watch?v=-keuXw5xfRs

- END OF COURSE -