

## **Ammunition for the Patrol Carbine**

## **ABSTRACT**

As law enforcement agencies increasingly begin to see the importance of patrol carbines in the hands of peace officers, the long argued point of ammunition choice is once again heard. That is, What is the right bullet for a patrol carbine? All of the usual arguments relating to handgun bullet choice, plus some new ones come up again when making this choice. By using a casual comparative approach to look at the available data on this subject, the answer to this problem becomes clear. Some key questions have been answered in this paper such as, How well does the bullet penetrate and effect a human target? How well does the bullet defeat intermediate barriers and What is the bullets proven one shot stop percentile. It was hypothesized that a jacketed hollow point (JHP) or even a jacketed soft point (JSP) rifle bullet would be the best choice. This is a logical conclusion because the JHP pistol bullet has served so well in law enforcement pistols. The results here indicate that the full metal jacket (FMJ) bullet best meets the needs of law enforcement when in patrol carbines. The recommendation here is that law enforcement agencies convert their shotguns to less than lethal use only and replace them with patrol carbines as the lethal force shoulder fired support weapon loaded with the 55grain FMJ 5.56X45mm bullet.

## TABLE OF CONTENT

Abstract.....	Page 2
Table of Contents.....	Page 3
Introduction .....	Page 4
Background and Significance.....	Page 5
Literature Review .....	Page 6
Procedures .....	Page 14
Results .....	Page 15
Discussion.....	Page 16
Recommendations .....	Page 17
Bibliography .....	Page 19
Appendices .....	Page 20

## **INTRODUCTION**

In recent years Law enforcement agencies across the United States have begun to see the value of the rifle and carbine in the hands of patrol officers. The use of rifles and carbines by police specialty units like SWAT has long been accepted and the type of ammunition used by SWAT officers has never been a point of contention due to the specific police mission they are assigned to. A SWAT officer would more likely than not have the opportunity to choose the type of ammunition that would be best suited for the mission at hand. A police officer on routine patrol duties with access to a patrol carbine or rifle would not have this luxury and would require a general purpose round that would be able to perform sufficiently in a variety of applications.

The problem then is: What would be the best ammunition type for a police officer to carry in his patrol carbine?

Conventional wisdom from a law enforcement perspective would say that like a handgun bullet, the jacketed hollow point carbine bullet would be the best rifle bullet to use in police applications. By comparing statistical information from ballistics tests conducted by the FBI and the Federal Ammunition Company in conjunction with data from studies on this topic the research presented here will provide law enforcement administrators with the information needed to make a sound decision in choosing the right type of ammunition for their police officers to use in their patrol rifles/carbines.

## **BACKGROUND & SIGNIFICANCE**

Law enforcement officers through out this countries past have utilized rifles and carbines as a shoulder fired support weapon for over a hundred years. By late the 1800's situations were additional firepower or range was needed, the law men of the day used the venerable lever action rifles by Winchester and Henry to complete the police mission at hand. The weapon systems used by law enforcement officers in the recent past were military surplus weapons in the .30cal range, mostly M-14 rifles and M-1 carbines. In the past twenty years this now includes the M-16 and all weapons systems in the M-16 family of rifles and carbines. Except in wide open and rural locals, recent law enforcement use of these weapons was restricted to SWAT type police units. Only as late as the 1990's was there a slow change in the thinking with in the law enforcement community regarding patrol officers routinely carrying rifles or carbines with them while on patrol. This thinking was reinforced in the mid 1990's by a number of high profile criminal incidents, most notably the bank robbery in North Hollywood California where two men wearing body armor and armed with automatic rifles engaged the responding patrol officers in a fierce gun battle.

Many forward thinking police agencies in America today have traded in their 12 gauge shotguns for patrol rifles and carbines chambered in the caliber 5.56mm/.223 cal. Both designations are for the same caliber of bullet and will be used interchangeably depending on the type of bullet being discussed. The only reason for the difference being semantics, the military uses the 5.56mm nomenclature and the civilian market the .223 cal. designation.

The 5.56mm rifle bullet in general has proven ballistic characteristics that make it the

best all round caliber of bullet for police carbine applications. Rifles and carbines chambered in the .30 caliber range (7.62mm/.308cal) tend to have an extremely high probability of over penetrating the intended targets and surrounding barriers in the event of a miss. Additionally bullets from the .30 cal M-1 carbine had similar over penetration characteristics of the 7.62mm but could not reliably penetrate a bullet proof vest at 75 yards. Some police administrators in an attempt to economize the situation have adopted carbine weapon systems that fire the same caliber bullet as the officers semi-automatic duty pistols. At first glance this may seem like a reasonable solution. The problem is that handgun ammunition does not perform well after 25 yards even when fired through a carbine with a barrel length of 16 inches. A handgun bullet cannot penetrate a ballistic vest and relies heavily on penetration to vital organs and expansion to rapidly incapacitate a person. Thus it is widely accepted that for police applications, patrol carbines should be chambered in the 5.56mm caliber. The 5.56mm bullet works well in a variety of weapon systems commonly chambered in that caliber and used by law enforcement. Regardless of the weapon system that any given law enforcement agency has chosen, putting the best 5.56mm bullet in the firearm is important to the individual officers survivability and confidence.

## **LITERATURE REVIEW**

### **Ballistics Testing and Scientific Research Justifies the 5.56mm for Police Use**

The field of wound ballistics is terribly complicated and not well understood. Comprehensive models do not exist for predicting the extent of the wounds produced by projectiles as a function of the full range of velocities, projectile diameters, projectile

terminal performance characteristics (which includes deformation, yawing of elongated non-deforming projectiles, and fragmentation) and finally the characteristics of the target in tissue/simulant. <sup>1</sup>

### **The 5.56x45mm (.223cal Rem.) bullet.**

The US armed force's first generation small caliber bullet was the US M193 5.56x45mm. This cartridge was designed for the M-16 weapon system still used by the US armed forces today. This bullet and its updated version the M855 both produce surprisingly large permanent wound cavities for the size of the bullet. See Appendix C. Originally the massive injuries caused by this bullet was not clear until the importance of bullet fragmentation was established. With FMJ (full metal jacket bullets) like the M193 and the M855 the bullet travels approx. 4.5 inches before the tip of the bullet begins to tumble or yaw approx. 90 degrees and begin to flatten. This is caused by the bullet trying to keep ballistic stability when the lighter point of the bullet slows faster than the heavier rear of the bullet. At some point in the yaw the bullet will then break in two at the mid section of the bullet. This break wither by design or not occurs at a grooved section of the bullet called the conelure. This groove is made into the circumference of the bullet by the crimping of the case to secure the bullet to the casing. When the top half of the bullet breaks off it maintains about 60 per cent of the bullets total weight. The bottom portion of the bullet then fragments. These fragments penetrate approx. 3 more inches and perforate through out the temporary wound cavity created by the stretching of the

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surrounding tissue. Even though the human body is remarkably elastic, the energy placed on a human body by a high velocity bullet causes more stretching than surrounding tissue can tolerate. This works in conjunction with the fragmenting bullet. These fragments perforate and tear away body tissue regardless of its elasticity. The result is a large permanent wound cavity which is a key element in causing rapid incapacitation of a suspect. The amount of fragmentation decreases as bullet velocities decrease, that is to say at greater shooting distances.

The above terminal ballistics characteristics are very consistent at shooting distances of 100 yards or less which is generally accepted as the maximum range for engagement of a suspect with a patrol carbine or rifle. Another factor effecting bullet velocity is the length of the weapon system's barrel. To achieve the needed velocity for a FMJ bullet to perform most effectively weapons with barrels no shorter than 16 inches should be used.

The rifling twist rate in the barrel of patrol rifles and carbines does not appreciably effect bullet velocity, but may effect the accuracy of the bullet fired. The weapon systems chambered for the .223 cal that would be used in patrol applications have twist rates from 1 in 7" to 1 in 12". 5.56mm bullets in the 55 grain weight work well in all of the common twist rates. Heavier bullets which tend to be longer should not be used in carbines or rifles with twist rates slower than 1 in 9". When fired through a barrel with a twist rate slower than 1 in 9" the heavier bullets will begin to yaw in flight in some cases up to 70 degrees, potentially effecting accuracy even at a distance of 100yards.

### **Expanding Rifle Bullets.**

Hollow point and soft point rifle bullets have far more energy available than pistol rounds so mushrooming tends to be more reliable. The large quantities of energy that can



be transferred into a target by rifle bullets often causes the stretch cavity to cause permanent damage.<sup>2</sup>

Jacketed Hollow Points (JHP) and Jacketed Soft Points (JSP) are also bullets to be considered in Choosing the proper 5.56mm bullet for police use in patrol carbines. JHP and JSP bullets create similar looking wounds in ballistic gelatin as the FMJ bullets do. The JHP and the JSP bullets cause injury through high velocity energy and bullet expansion. Both bullets fragment to some degree, stretch tissue beyond its elasticity and thus create tissue fragmentation resulting in a large permanent wound cavity. Unlike a FMJ bullet the JHP and JSP bullets do not penetrate as deeply into a target. As such, JHP and JSP bullets have a very low chance of over penetrating a suspect who has been shot with such a bullet.

### **Incapacitation.**

When it comes to the application of lethal force by a police officer the main factor to be considered is incapacitation, that is to say quickly stopping a suspect from doing what ever it was that made the officer shoot him in the first place. There are five factors that effect a bullets ability to incapacitate a person.

**Placement.** This means more than just hitting your intended target at center mass. The target must be hit in a vital organ and damage or injure that vital organ to such an extent that rapid incapacitation is the result. The best target for incapacitating a human target would be a shot to the central nervous system (CNS). Primarily shots that injure

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<sup>2</sup> [anglefire.com](http://anglefire.com)

the brain or the spinal column will result in immediate incapacitation. Shots to the CNS are generally speaking not dependant on the caliber or type of bullet so long as there is sufficient penetration to reach and damage the CNS. Injury to other vital organs or blood vessels such as the heart, lung or liver may be fatal but may not have been sufficiently damaged or penetrated to cause rapid incapacitation.

**Penetration.** In order to reach the CNS or any other vital organ a bullet must have sufficient penetration to pas through bone and tissue. Other than being shot in the CNS the main reason for people to lay down after they have been shot is that they do not feel good anymore. In order for this to happen quickly the bullet must cause sufficient injury to a vital organ or blood vessel to cause a sudden drop in blood pressure. The average human torso is approx. 9 inches thick. Shots fired at a person in combat may have to penetrate the persons arm before reaching the torso. Thus the depth of penetration that is generally excepted as being sufficient to reach vital organs and blood vessels is 12 to 15 inches.

**Physical Injury.** Penetration alone can only be counted for quick incapacitation in CNS hits. Many violent suspects have been fatally shot, but were not quickly incapacitated because the bullet that penetrated to the vital organ or blood vessel did not sufficiently damage the organ and cause rapid loss of blood. The key here is creating a permanent wound channel at the vital organ or blood vessel. This is created by the fragmenting, mushrooming, and tumbling of the bullet as it crushes and tears the tissue it passes through.

**Power/Energy.** The final thing that a bullet must do once it has hit a person to cause

rapid incapacitation is utilize the energy that it brings with it efficiently. This energy is what causes the bullet to mushroom, tumble and fragment. As is the case with rifle bullets they generally have sufficient energy to overcome the incredible elasticity of the human body.

**Psychology.** The final factor in a bullets ability to incapacitate a person has nothing to do with the bullet at all. A suspects mental state of mind maybe such that a minor wound produces incapacitation without serious injury. While another suspect may maybe fatally wounded but so enraged that they keep fighting longer than would logically be expected.

### **Rifle Ammunition for Law Enforcement**

.223 Remington Caliber: (5.56 x 45 mm NATO)  
One Shot Stopping Success: 93-100% (Actual)  
Recommended Cartridges:

Remington	JHP	60 grains	100%
Winchester "Match"	JHP-BT	69 grains	100%
Federal	JHP	40 grains	99%
Winchester	JSP	55 grains	96%
Winchester	FMJ	55 grains	96%
Federal	JHP	55 grains	95%
Remington	FMJ	55 grains	95%
Federal	JHP	62 grains	94%
Remington	JSP	55 grains	94%
Federal	FMJ-BT	55 grains	93%

The .223 caliber cartridge is the standard NATO rifle round. It is also the best choice for self defense. Essentially all configurations of the .223 bullet provide excellent one shot stopping ability.<sup>3</sup>

Similar results were found in a study conducted by Evan P. Marshall and published in a April 2001 Gun World article titled: “One Shot Stops II: Rifles, Shotguns and Compacts. In Marshall’s study five factors were taken into account. Barring in mind that the criteria used by Marshall in his study are arguably too broad or too narrow the test as published showed the results from 15 different 5.56mm bullets. In Marshall’s study he only considered hits in torso area, and disregarded multiple hits. His definition of a “stop” was more or less what any police officer would consider a “stop”. In his study Marshall included only bullets that were involved in a minimum of ten shootings. Finally Marshall compiled his data from information in police, evidence technician and medical examiner reports, as well as interviews with police officers, witnesses, and victims. Marshall’s study was very consistent with that reported at internetarmory.com.

In June 2002 article for Law an Order Magazine entitled: “Ballistic Testing Justifies the .223 Caliber Carbine” David Sparks points out the effectiveness of the 5.56mm bullet in law enforcement use. In his article David Sparks utilizes test results conducted by ballistics expert Clarence Kropp conducted in 1999. In Kropp’s tests he fired two types of .223 caliber bullets and two types of .40cal S&W bullets into barriers that law

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<sup>3</sup> internetarmory.com

enforcement officers may commonly encounter. These tests were similar to the tests that the FBI had conducted in the 1990's.

The results of the testing proved that the .223 caliber cartridge is the most suitable cartridge for law enforcement carbine deployment in an urban/suburban environment. The Remington UMC .223 caliber 55-grain FMJ cartridge had the least chance of over penetration compared to the .40 caliber JHP and FMJ bullets, the .223 caliber bonded JSP bullets and the 12 gauge rifled slugs.<sup>4</sup> From 1993 to 1996 the Federal Bureau of Investigation conducted tests on several types of .223cal bullets to determine a suitable round for law enforcement use. The results of these tests are provided in Appendix A. Similar results were shown in a more recent set of test published by Federal Ammunition Co. See Appendix B.

When choosing a .223 cal bullet for patrol carbine use the variety of intermediate barriers that police officer may encounter should be considered. The first and most important barrier that any 5.56mm bullet should be able to penetrate is soft body armor. All 5.56mm bullets available to law enforcement are able to defeat soft body armor up to threat level III. As with any barrier be it soft body armor, window glass, or a car door once the bullet has penetrated the barrier is should still be able to inflict sufficient injury to the suspect to stop him. All of the 5.56mm bullets looked at in this paper have strengths and weaknesses in police applications. The Idea is to find the bullet that best fits an individual agencies needs. This would be a general purpose bullet that does all of

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<sup>4</sup> David Sparks

the things needed reasonably well.

In the Fall of 2000, The Woodhaven Police Department was preparing to train its patrol officers with M-16/AR-15 patrol carbines and rifles. Sgt. Graham of the Woodhaven Police Department had the opportunity to speak by telephone with Clarence Kropp regarding rifle ammunition for duty use by the Woodhaven Police Department. Kropp was informed that the City of Woodhaven is a sub-urban bedroom community with single and multi-family dwellings and a mixture of heavy and light industry. In the conversation Kropp recommended the 55gr .223cal FMJ bullet as the best general purpose bullet for the Woodhaven Police Department's patrol carbines and rifles. He mentioned that bonded tactical bullets offered by Federal Ammunition were ideal for penetrating heavy barriers such as car doors and thick window glass. These bullets however did not tumble or fragment like other 5.56mm bullets in ballistic gelatin. This in Kropp's opinion would mean a greater likelihood of extreme over penetration of a human target. Though not mentioned, it could also be assumed that such a bullet would not create a large permanent wound channel as other 5.56mm bullets have been shown to do. Kropp also indicated that JHP and JSP bullets in .223cal cannot consistently create incapacitating wounds after penetrating common barriers.

## **PROCEDURES**

In compiling the data for this paper several sources were referenced. The reputation of any one of the sources could arguably be challenged. Taken as a whole, however the information contained in the sources used directly or indirectly supported each other in many ways contributing to the validity of all of the sources.

Sources of data were obtained from three areas. Official tests conducted by the Federal Bureau of Investigation were obtained from a neighboring agency. Another source was magazine articles, including the reputable law enforcement magazine Law and Order. Finally the internet provided valuable information from related web sites. This information was reviewed and compared extensively. In the reviewing process it was deemed important to identify consistent information from all of the sources. This consistency is what allows for result that can be backed up from the data.

## **RESULTS**

It was hypothesized that as with jacketed hollow point pistol bullets, the JHP.223 caliber rifle bullet would be the best choice for law enforcement use in a patrol carbine. Clearly this was proven incorrect by the data when taken as a whole. The terminal ballistics of a rifle bullet are completely different than those of a handgun bullet. Because a handgun bullet travels at such a lower speed than a rifle bullet, the pistol bullet uses its slower speed and greater mass to expand and mushroom in order to create a needed permanent wound channel. All of the .223 cal bullets studied showed that the contributing factor in their wounding ability was the tearing of tissue as a result of being hit by a high velocity bullet. This tearing was not a function of the bullet mushrooming as with a handgun bullet, but of the effected tissues inability to stretch with out tearing when exposed to the high energy and fragmentation of the rifle bullet. This is what creates the permanent wound cavity that is so crucial to quickly incapacitating a person.

JHP and JSP rifle bullets however do not reliably penetrate deeply enough to vital

organs, blood vessels or the central nervous system. This penetration issue is further complicated when barriers such as soft body armor, window glass and car doors is included. This was demonstrated in the tests provided by the FBI and Federal Ammunition Inc. The FMJ .223 cal rifle bullets appeared to have a better all round performance with a better than 90 % one shot stop history. These points are confirmed in studies conducted by Clarence Kropp. With all of this information taken as a whole the results of this study point to the 55gr 5.56mm FMJ bullet as the best general purpose bullet to be used in patrol carbines for law enforcement.

## **DISCUSSION**

When a law enforcement agency considers issuing patrol carbines to its police officers for routine patrol use the concept of firing a military style bullet through a military style weapon does not sit well with department heads. But, times have changed and with it the cultural and criminal environment that peace officers must work in have changed with the times. Legally police departments are much more responsible for every shot fired by its officers than in the past. This change is slowly working against the venerable 12gauge shotgun in favor of the patrol carbine for law enforcement use. The inherent randomness of nine projectiles fired with one shot from a shotgun compared to the control of one projectile per shot from a carbine is beginning to look good to forward thinking police administrators. Criminals too have become more sophisticated, primarily in the use of body armor, weapons and tactics. Once again, this consideration leads to the adaptation of the patrol carbine to everyday use by police officers as their primary shoulder fired support weapon. A patrol carbine weapon system in the tried and proven



caliber of 5.56mm allows first responding patrol officers the ability to engage this new breed of very dangerous criminal from a safer distance.

With the establishment of a need for the patrol carbine having been made, the appropriate round of ammunition for that weapon system is vital. This paper has shown that a military style bullet is the best all round bullet for law enforcement use in patrol carbines. Generally speaking this means any of the FMJ bullets in .223 cal and particularly the 55grain FMJ 5.56X45mm bullet. Studies by the FBI, and Federal Ammunition Co. show that the 55grain FMJ bullet achieves the best results over a wide range of variables. Other studies have shown that the .223cal FMJ bullet consistently produces one shot stops in the mid 90% range, a very desirable thing in law enforcement applications. Finally, the work from a reputable ballistics expert such as Clarence Kropp replicates these results, or confirms them. The research in this paper then concludes that for agencies either using, or considering the use of patrol carbines they would best be served by the 55grain FMJ .223 cal bullet in their carbines and rifles.

## **RECOMMENDATIONS**

My recommendation for police departments would be to convert their 12gauge shotguns to less than lethal ammunition use only. A reliable patrol carbine weapon system chambered in the 5.56X45mm should then be used to replace the shotgun as the primary shoulder fired support weapon for lethal force.

The best ammunition for the patrol carbine has been discussed here in this paper. In deciding what would be the best bullet for the patrol carbine data from the FBI and the Federal Ammunition company was reviewed along with a recommendation from a noted

ballistics expert. Based on this research, I would recommend that the best 5.56X45mm/.223 cal bullet for law enforcement use in patrol carbines is the 55 grain FMJ bullet.

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# **APPENDIX A**

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# **APPENDIX B**

**BALLISTICS TESTS**  
**PUBLISHED BY**  
**FEDERAL AMMUNITION CO.**  
**LAW ENFORCEMENT**

# **APPENDIX C**

## **TERMINAL BALLISTICS TESTS**

**IN BALLISTIC GELATIN**

**FOR**

**5.56MM RIFLE BULLETS**

**55GR FMJ M193**

**62GR FMJ M855**

**50GR JSP .223 CAL**