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CARTRIDGES OF THE WORLD

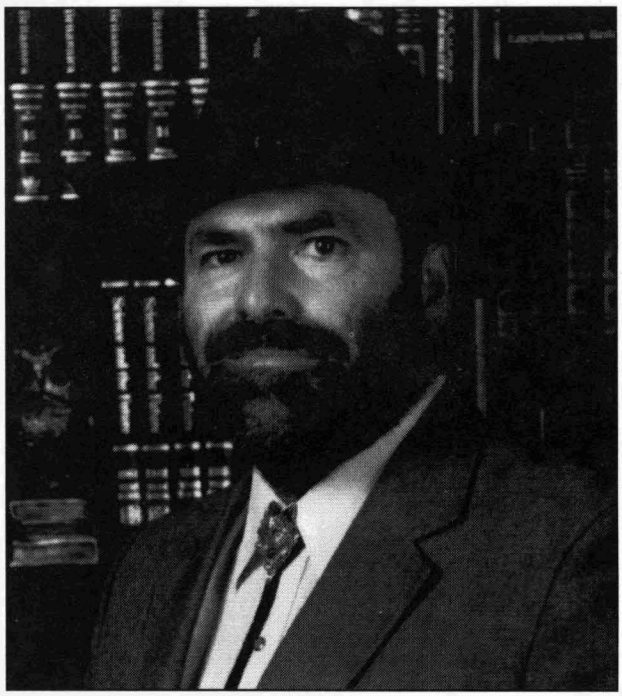
8TH EDITION, REVISED AND EXPANDED

A Complete and Illustrated Reference Source for Over 1500 of the World's Sporting Cartridges

- Rifle, handgun and shotshell
- Centerfire and rimfire
- Ballistics and load data
- European and American
- Military and commercial
- Current and obsolete
- Blackpowder and smokeless
- Wildcat and proprietary

By Frank C. Barnes/Edited by M.L. McPherson

ABOUT THE EDITOR



MICHAEL L. (MIC) McPherson, born and raised in the Western U.S., has been referred to as a "Renaissance Man," owing to his wide-ranging education, interests and abilities. His structured educational background includes a degree in geology and extensive training in electronics, engineering and physics.

McPherson's interest in cartridges began before he first attended kindergarten. As a youth, he spent countless hours scouring the local shooting ranges and hunting fields in search of spent cartridge casings. When twelve years of age, he discovered an exceedingly long 22 rimfire casing at a shooting range near Craig, Colorado. The range is long gone but the unusual casing is safe in his meager collection, although, to this day, it remains unidentified! Spurred by such finds, his curiosity has not abated.

His interests in handloading and hunting are tied directly to his fascination with the self-contained cartridge. His current work as an outdoor writer springs from that fascination. A recent article in the 1997 edition of *Handloader's Digest,* "The Old Ones," recounted his discovery of circa 1870, 45-70 Government and 45 Smith & Wesson cases at a long-abandoned military outpost. Not content with the simple act of discovery, McPherson then went on to reload those weather-worn cases using modern components and tools, just to see if it could be done. It could.

His keenest interests revolve around handloading and the perfection of that art. He is well represented in various shooting sports magazines and is editor of *Metallic Cartridge Reloading*, technical editor for *Handloader's Digest* and columnist for *Precision Shooting* magazine. His interest in ballistics has led to invitations from Oehler Labs, Accurate Arms and Norma Precision to visit those ballistic laboratories where insights in the volatile field of internal ballistics were gleaned. He has recently written a book on home gunsmithing for rifle accuracy.

McPherson's other interests include lost mine and treasure hunting. Recently, he was involved with Bob Corbin, former president of the NRA, on one such treasure hunt—no luck! However, in 1989, McPherson along with his friend and prospecting partner, Ron Feldman, identified the location of the fabled "Lost Adams Gold Diggin's"—an adventure that led to the co-authored, historical novel *Zigzag Canyon, the Legend of Gold Gulch*. Owing to that experience, Ron and Mic were featured in one of the most popular episodes of *Unsolved Mysteries*, originally aired in January 1992.

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About Our Covers

Seventy-five years ago, in 1922, Federal Cartridge Co. opened its doors in Anoka, Minnesota, with fewer than a dozen workers. At first, they produced only shotshells and quickly earned a reputation for making a good product at a fair price.

The company steadily grew, and by the 1930s Federal had built a strong reputation regionally. Later, during World War II, Federal's production capabilities and its workers' talents were turned to the manufacture of military ammunition for the war effort. And now some of the grandsons and granddaughters of workers who made 30- and 50-caliber rounds during the war years are making the superior ballistic products used today by marksmen and hunters. Today, the company is considered a world leader in ammunition technology.

We are extremely proud Federal is using the occasion of their 75th anniversary to feature their ammunition on the covers of CARTRIDGES OF THE WORLD, 8th Edition. What you see is just a very small selection of their current offerings.

Federal began making centerfire rifle ammunition in 1963 and has expanded its line considerably since then. Their specially designed Premium High Energy loads come with either the Trophy Bonded Bear Claw or Nosler Partition bullets, and reach velocities of up to 200 fps faster than conventional rounds. They are offered in 308 and 270 Winchester, 30-06, and 300 and 338 Winchester Magnum. For large, heavy and dangerous game, the Premium Safari line offers calibers from 300 Winchester Magnum to 470 Nitro Express with Nosler Partition, Trophy Bonded Bear Claw and Sledgehammer, and Woodleigh Weldcore SP bullets for optimum performance.

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In 1997, Federal celebrates seventy-five years of service to hunters, recreational shooters, law enforcement, soldiers and Olympians alike. It's a well-deserved celebration.

Photo by John Hanusin.

FOREWORD

SPORTSMEN and firearms enthusiasts in general are fond of indulging in a timeless, endless discussion that usually begins something like this: "If you had the opportunity to hunt all over the world, but due to space-weight limitations could carry only one gun, what would it be?" This simple assumption is good for hours or even days of lively debate. Also, on occasion, a few fist fights. This is mentioned, not to engage in any phase of this classic argument, but because it is apropos to a summary of this book. Let me put it this way: If you were traveling to Mars or some other planet by rocket ship, and due to space-weight limitations could only carry one book on cartridges, what would it be? We sincerely hope it would be this one, because it contains more usable information per pound than any other single book on the subject.

As of this writing there is no record of any copies of CARTRIDGES OF THE WORLD having been carried to other worlds, although the effort did get off the ground here on earth. The many letters received by the author and editors indicate that we certainly followed the right path in our treatment of the many known cartridges. The word used most often in describing the book is "useful." We consider this a high compliment because it describes our original objective—to publish a useful cartridge book. We sincerely believe the buyer of this seventh edition will also find it so.

F.C.B.

DEDICATION

To my parents, Clifford and Margaret Barnes—whose encouragement of my boyhood dreams and ambitions made all that came later possible—this book is wholeheartedly dedicated.

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We wish to give special thanks to the following people for their contributions to this the eighth edition of CARTRIDGES OF THE WORLD:

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INTRODUCTION

THE ORIGINAL PHILOSOPHY worked out by the author and the late John T. Amber (the original editor) was to assemble a practical and useful book that would appeal to as broad a spectrum of the shooting fraternity as possible. The sales record of the book over the years would indicate that this was the proper approach. The Eighth Edition carries on in the same tradition as the previous seven editions in offering both something new as well as retaining old data that is either useful or of general interest. There is not really much that can be done in the area of, say, obsolete cartridges because nothing changes except that from time to time one or two of the old-timers will be picked up and reintroduced. This requires moving such cartridges back into the chapter covering modern cartridges, or on the other hand, some commercially loaded number will be discontinued and relegated to the obsolete chapter. This happens between editions and is something that must be kept abreast of. We have retained the encyclopedic reference format and tried to continue presenting the information from the sporting/shooting point of view. Included is information covering handgun, rifle, shotgun, obsolete blackpowder, European, British, military, wildcat and proprietary cartridges along with data on the guns that shoot these cartridges. Something for everybody.

The information contained in CARTRIDGES OF THE WORLD was obtained from many sources, including textbooks, catalogs (old and new), periodicals and individuals. The late John T. Amber supplied many out of print and rare cartridge catalogs from his extensive library. Much information is from the author's and editor's files and other original sources and will not be found elsewhere. Practical experience also weighs heavily in the balance. The author had over 50 years of hunting, shooting, reloading and collecting experience. Former editor John Amber was a gun collector with extensive hunting experience in North America, Europe and Africa. Ken Warner, successor to John Amber and editor of *Gun Digest,* is also a collector, hunter and shooter with many years experience. The present editor, M.L. McPherson, has over 25 years experience in the manufacturing and marketing of all types of ammunition both domestic and international. This collective experience is reflected in the pages of this book. The book is divided into chapters based on each category of ammunition: Current American Rifle, Obsolete American Rifle, Handgun, Military, etc. Ballistics and basic loading data has been included with each individual cartridge where possible. Extensive dimensional charts and tables are to be found at the end of each chapter. Dimensional data is presented in this manner rather than with the individual cartridge in order to simplify the identification of unknown cartridges. Cartridges are listed in the order of increasing bullet diameter, or length or power, where caliber is the same. One of the more difficult bits of information to establish with any certainty is the date of origin of the older obsolete cartridges. This is a matter of some importance to historians and occasionally also to archaeologists digging into our recent past when they happen onto spent cases or cartridges in graves or old battlefields. It can also be useful when attempting to fix the caliber of certain guns or the relationship between between firearms, ammunition and historical events. Those who write western novels or make similar movies might be well served if they would peruse the pages of this book so that they would not constantly be placing the wrong guns in the wrong time period. It might surprise them to discover that the U.S. cavalry in the 1870s did not carry either Model 1892 or 1894 Winchester lever-action carbines. Not only were these guns unavailable, but in addition none of the cartridges they chambered were ever adopted by the military. The date of origin, insofar as can be determined, has been included with the historical notes. Many law enforcement agencies, military organizations and defense ordnance groups have found CARTRIDGES OF THE WORLD to be a very worthwhile reference source. It is also used as a basic text in colleges and universities for firearms identification courses. Firearms identification involves working with cartridges as much as working with firearms. CARTRIDGES OF THE WORLD even made it into television when it showed up in one episode of the popular cop show, "Miami Vice."

Under the heading, "General Comments," an effort has been made to rate the various cartridges for hunting purposes. Admittedly any such ratings are highly subjective since there is no quantitative formula for determining what cartridge is suitable for what game. Evidence (or

lack thereof), observations in the hunting field and personal opinion enter inevitably into this process. If the reader takes issue with the author or editor regarding the efficacy of a particular cartridge for some specific purpose, it doesn't necessarily follow that someone is wrong, but rather that the problem is evaluated from different points of view. I remember reading several years ago about the fellow in Africa who fired a 22 Long Rifle at an elephant in an effort to scare it away from his garden. Unfortunately, he hit the poor beast and dropped it in its tracks with a single misplaced round and then really had a hell of a time getting it out. I hardly think that this qualifies the 22 Long Rifle as an elephant gun, although some might think so. Also, many years ago I ran into an old-time trapper in the Yukon Territory of Canada who had a much used Savage Model 99 lever action chambered for the 303 Savage. He handloaded all his ammunition with hand cast 190-grain bullets at a muzzle velocity of about 1950 fps. He insisted that this 30-30 class combination was more than adequate for moose, grizzly bear or any thing else, and with his experience as a woodsman, trapper and hunter, it was. However, not many present-day gun writers would agree. So ideas as to what's good for what in the world of hunting cartridges depends a great deal on personal experience, skill and opinion. In any event the ratings of the various cartridges for hunting purposes is, in all cases, based on the assumption that the hunter uses the proper bullet type for whatever game is to be hunted.

Finally we come to the subject of what cartridges should or should not be included within the pages of CARTRIDGES OF THE WORLD. Obviously, the book does not include every known cartridge in the world. If it did it would have to be divided up into many volumes. From time to time certain readers write rather irate letters wondering why such and such a cartridge has not been included, or on the other hand, why we bothered to include certain cartridges. Admittedly, there must be several hundred cartridges and variations including obsolete, military, European, etc., that have been left out. There are several reasons for this, one being editorial constraints as to the number of pages and contents. There simply isn't sufficient room in one general volume for everything. The book has to be kept in balance to appeal to a general rather than specific audience. Secondly, while most gun nuts are casual cartridge collectors, only a very small percentage of the shooting public are what might be classed as avid collectors. In other words, not many people have even a remote interest in all the obsolete and little known cartridges that have been available at one time or another. There are already a large number of excellent books aimed specifically at the cartridge collector per se such as those written by Charles Suydam, Herschel Logan, Fred Datig and others. The criteria used to determine what cartridges to include is based largely on what the author and editor perceive as being of greatest general interest, what has historical significance or is of unusual interest. A survey has demonstrated, for example, that 98 percent of readers are interested in modern cartridges and many purchase the book for that information alone. That chapter (Chapter 2) is based on commercially loaded ammunition readily available through most gun stores. Obsolete cartridges (Chapter 3) includes all the better known smokeless and blackpowder cartridges no longer commercially loaded, but not every known obsolete cartridge. In other words, there has to be some sort of cut off or the whole thing could get out of hand. A number of currently popular wildcat cartridges have always been included, but we have greatly expanded the chapter on wildcats because of new developments and renewed interest in this area. The reader will note a considerable reorganization of Chapter 11: Shotgun Shells. As information, samples and illustrations become available we intend to further expand this chapter. In this edition we have created a separate and greatly expanded proprietary cartridge chapter. This reflects the growing popularity of this class of custom chamberings. Also, we have included a master dimensional table, Chapter 18, organized by bullet diameter and case length to ease identification of unknown cartridges or spent cartridge cases, through measurement. Finally, we have reorganized the Index at the back of the book to ease location of information on a cartridge, once its name is known. The author and the editor try to please as many potential readers as possible, but remember, as in the biblical parable of the man and his donkey, it is impossible to please everybody.

Chapter 1

CARTRIDGE NOMENCLATURE

IT IS DIFFICULT or impossible for the novice to follow the action without some knowledge of cartridge caliber designation. Even the individual experienced with standard American ammunition may be ignorant of British, European or even obsolete American cartridge nomenclature. The subject, regrettably, is full of inconsistencies and confusion.

With the majority of American, British or European (metric) cartridges, the caliber is the first figure given. However, there are exceptions that will be pointed out later. Caliber may be given in terms of bullet or bore diameter (land or groove), and is neither accurate nor consistent. For example, the 303 Savage cartridge, which often uses .308-inch diameter bullet as opposed to the 303 British with a .312-inch diameter bullet. Then there is the .458 Winchester Magnum and the 460 Weatherby Magnum, both of which are loaded with the same 458-inch diameter bullet. The Weatherby people didn't want anyone to get their round mixed up with the Winchester design so they changed the figures a little. That is why some cartridges do not follow in normal caliber designation in the dimensional tables.

The second figure, if there is one, is usually some distinguishing feature such as the case length or powder charge. Cartridges of European origin are, almost without exception, designated in metric units by caliber and case length. Obsolete American cartridges, or any that have a blackpowder origin, are designated by caliber and powder charge weight; or caliber-powder charge-bullet weight (the last two in grains weight). Smokeless powder charges vary so widely with the powder type and grain structure that this system is no longer used. However, there are again such exceptions as the 30-30 Winchester and 30-40 Krag. Here, the second figure represents the original smokeless powder charge although it no longer has anything to do with it. With blackpowder cartridges the designation 45-70 Springfield means a 45-caliber bullet with 70 grains of blackpowder; or 45-70-405 spells out the same cartridge with 405-grain bullet to distinguish it from such other bullet loadings as the 45-70-500.

The truth of the matter is that the American "system" of cartridge nomenclature really hasn't any system to it, and can only be learned through reading and experience. Otherwise, you simply never know what is meant. For example, take the 30-06, a very popular military and sporting round. Here, the first figure shows the caliber, the second last two numbers are the date of origin. In other words, a 30-caliber cartridge—model of 1906. Or again, the 250-3000 Savage. This translates out as a 25-caliber cartridge firing a bullet at 3000 fps muzzle velocity. The bullet diameter is actually .257-inch and muzzle velocity varies with bullet weight from 2800 to over 3000 fps. Some of the older blackpowder cartridges included the case length and type; thus the 44-90 Sharps $2^{5}/_{8}$-inch necked, or 45-120 Sharps $3^{1}/_{4}$-inch straight. This isn't a system at all, it's a code.

The British, to a large extent, follow the same "system" as we do. However, they add to the general confusion with such cartridges as the 577/450 or 500/465. Here, the second figure gives the actual caliber, and what is meant is the 577 case necked to 450-caliber and a 500 case necked to 465-caliber. They may also add the case length. At this point it is necessary to point out that some American wildcat (noncommercial) cartridges dreamed up by individual experimenters are designated by a similar but opposite system (?). Here, we have such cartridges as the 8mm-06, 30-338 and 25-06. These work out as an 8mm based on the 30-06 case, a 30-caliber based on the 338 Winchester case and a 25-caliber based on the 30-06 case. Confusing indeed!

The Europeans have evolved the only real system of cartridge designation that is consistent and meaningful. Dimensions are in millimeters, including bullet diameter, case length and type. The 7x57mm Mauser is a cartridge, for example, using a 7mm bullet in a 57mm rimless case. The 9.3x74Rmm is a 9.3mm caliber and a 74mm rimmed case. The R denotes the rimmed type, its absence a rimless case. The name of the originator or manufacturer may follow. This is a relatively simple and straightforward system, but unfortunately it isn't perfect

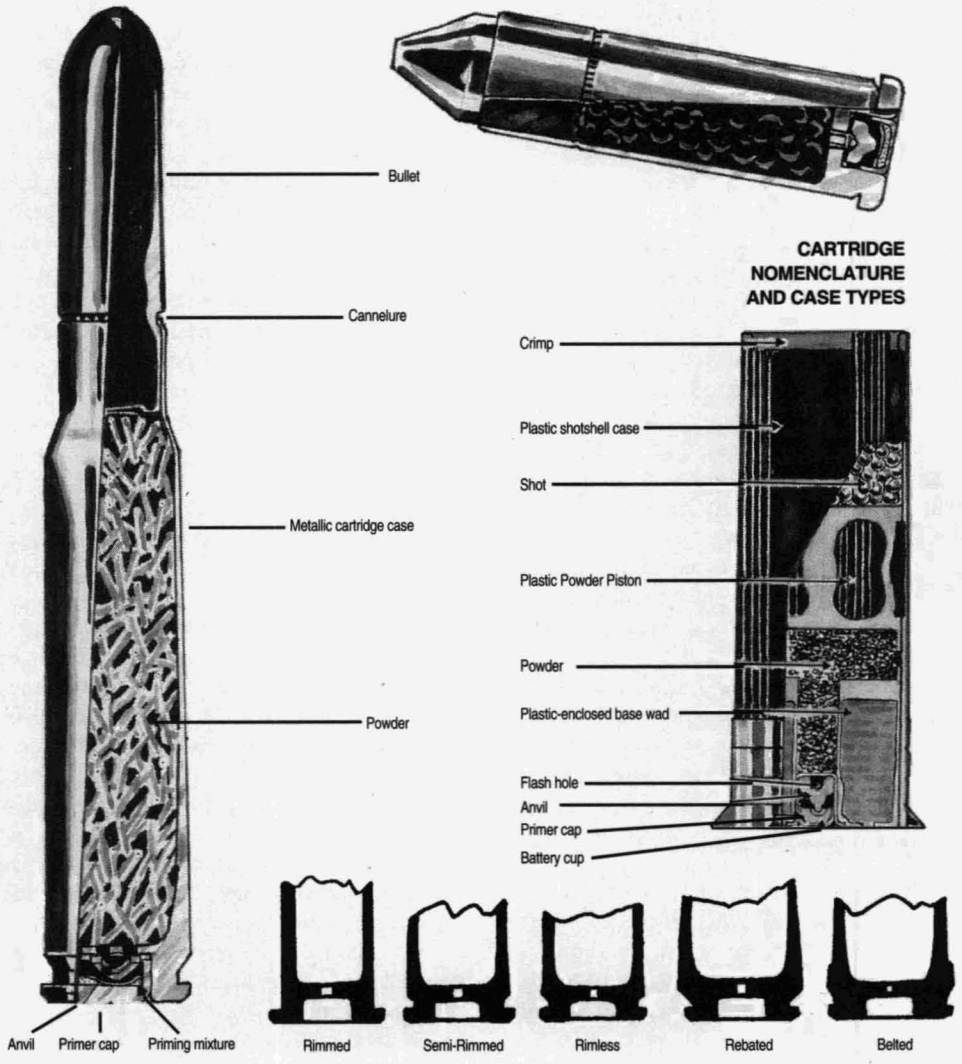
either. The Germans used two rim types in some of their older cartridges, and this resulted in duplicate designation of cartridges that differ only in the rim (9.05x36.4R, 10.85x24.9R, etc.), and there must be at least three 9.3x72mm cartridges that differ only in case configuration. It is all something of a mess and probably too late to change. The author, in an effort to straighten things out or perhaps add to the confusion, developed two wildcat cartridges which he designated as the 308x1.5-inch and 458x2-inch.

To further elucidate, the reader needs to know that there are two major classifications of cartridges—centerfire and rimfire. The former is fired by a primer located in the center of the case head; the latter by the priming compound distributed around the entire inside of the rim's outer diameter. The modern centerfire cartridge primer is removable and replaceable so that the case can be reloaded after it is fired. It is possible, but not practicable to reload rimfire cases after they have been fired. Centerfire cartridges are subdivided into two types based on the primer, Berdan and Boxer. The Berdan primed case has the anvil as a separate protrusion or teat in the bottom of the primer pocket. The Boxer primer is completely self-contained and the anvil is a part of the primer. All American-made ammunition is normally Boxer primed, whereas much British and European ammunition is Berdan primed. Most foreign-made ammunition manufactured for the American market has the Boxer-type primer.

Rim Types

There are four common types of centerfire cartridge cases based on rim type. These are: rimmed, rimless, semi-rimmed and belted. The British equivalents are: flanged, rimless, semi-flanged and belted. There is a fifth type, not widely used, which is the rebated rimless in which the rim is of smaller diameter than the base of the case. Only one American rifle cartridge is of this type, the 284 Winchester. The new 41 Action Express pistol cartridge is also rebated. The purpose of the rebated rim is to allow the use of a standard diameter bolt with a larger diameter cartridge. In the past, there have been a few rimless cases without the usual extractor groove.

Both centerfire and rimfire cartridges may be of straight or necked type. Contrary to popular opinion, the necked case was not designed to provide greater velocity for smokeless powder cartridges. It evolved back in black-powder days as a means of getting the same powder charge in a shorter case, thus allowing the repeating actions of the day to handle cartridges of the same power as the single shots with their long, straight cartridges.



Some of the very early rimfire cartridges were of the necked type.

The latest fad in cartridges is the caseless, or combustible type, an idea not really very new that dates back to the early 1800s or before. The original used a nitrated paper or cloth container for the powder charge and sometimes also the bullet. The entire package was loaded into the gun, and the powder and its container consumed in firing. During WWII, the Germans began an intense research and development program to perfect caseless ammunition and design weapons to shoot it. The principal motivating factor at the time was the severe shortage of brass and other metal for cartridge cases. The Germans are known to have had at least partial success, and some insist complete success. United States military ordnance facilities as well as private industry have been working on the problem of caseless ammunition for the past 50 years or more. There has been considerable success in developing caseless and partially-caseless artillery rounds, but there are still many problems in the small arms field. Obturation is a big problem, as is ejecting a misfired round from the chamber of a repeating action. Modern caseless ammunition usually consists of compressed powder grains fastened to the base of the bullet, or the powder may be encased in a plastic case made of the same material as the propellant. Ignition may be percussion or electrical, and there is, in some types, a booster charge extending through the center of the powder charge.

Cartridge Collectors

Though this book is not a collectors' manual, it includes nonetheless considerable material of use and interest to collectors or any serious student of cartridges and related weapons. The tables of dimensions are organized to facilitate cartridge identification. The key to this is bullet diameter and case type. The reader must understand that in measuring cartridge dimensions, certain manufacturing tolerances must be allowed, and these can affect the last, or even the second, decimal figure. Dimensional tolerances can be rather considerable with old blackpowder cartridges. Also, the true diameter of the obsolete paper-patched bullet should include the patch, not just the lead slug protruding from it. Minor variations in dimensions should not be mistaken for errors or the existence of an unknown caliber. The dimensional tables can also be used to identify the caliber of a weapon if the chamber dimensions are known. This can best be determined by means of a chamber cast and the means of doing this is explained in Chapter 3. If you own an obsolete or foreign weapon for which ammunition is not available, the tables of dimensions will assist in determining if ammunition can be made by reforming some similar existing case.

Metallic Cartridge Development

The self-contained metallic cartridge is a fairly modern development, "perfected" only within the last 150 years or so. The use of blackpowder as a propellant in guns in the western world goes back something like 650 years, and the knowledge of gunpowder over 700 years. The Chinese knew about gunpowder 500 or 600 years before it was introduced to Europeans, although they used it as fireworks and not as a propellant any earlier than the Europeans. The centerfire cartridge, a necessary prerequisite to our modern ammunition, evolved during the 1860s and 1870s. Smokeless powder and high-velocity cartridges date back only to the 1890s. Improvements since the turn of the century have been more in the area of improved ignition, powder chemistry and bullet construction rather than cartridge design. Charles Newton designed cartridges back around 1910 that, had modern powders been available, would have equaled the performance of present-day high-velocity developments of similar caliber and type. Smokeless powder military cartridges designed between 1888 and 1915 were so good that improvement was possible only after more advanced types of powder were available, and many of these cartridges were still in use through WWII. As the result of this situation, many modern innovations in the gun and cartridge field turn out, after a little investigation, to be a reintroduction of something really quite old.

A few examples of the not-really-very-new among modern cartridges are worth pointing out. The 244 Remington (6mm) makes a good case to start out with. Introduced in 1955, it is based on the 257 Roberts case, necked down, which in turn is the 7x57mm Mauser, slightly modified. Back in 1895, or thereabout, the Germans had a 6x57mm, made by necking-down the 7x57mm Mauser. With the exception of the shoulder angle, the 244 Remington is a carbon copy of this much- older cartridge.

The 7mm Remington Magnum is another brilliant "design" that is really just a modification of a much-older cartridge. It is very similar to the 275 Holland & Holland Magnum introduced around 1912 or 1913. However, the H&H round didn't have a good American smokeless powder of later development to bring out its full potential. On the other hand, there are a number of wildcat 7mm short-belted magnums practically identical to the 7mm Remington Magnum that pre-date it by quite a few years and are identical in performance.

Yet another Remington innovation is the 280 Remington, a rimless cartridge based on the 30-06 case, necked-down. This is a dead ringer for the 7x64mm Brenneke introduced in 1917. It is also practically identical to the wildcat 7mm-06 developed around 1928, so there is nothing very original here. However, none of these cartridges are interchangeable.

The commercial manufacturers are not alone in their design duplication; many individuals have inadvertently done the same thing. One of the most popular wildcat cartridges anyone has thought up is the 35 Whelen, introduced about 1922 and adopted as a commercial standard by Remington in 1987. This is simply the 30-06 case necked-up to 35-caliber and was originated by the late Col. Townsend Whelen. It is a very close copy of the German 9x63mm, which dates back to about 1905. As a matter of fact, a number of wildcat cartridges are nothing more than a duplication of some much older British or European designs. In fairness, it must be stated that the originator of the wildcat version probably was completely unaware of the existence of a parallel cartridge at the time of his bright idea.

Some companies and wildcatters go to considerable trouble to complete the circle, often coming up with something that duplicates a long- forgotten cartridge. If they were more familiar with the history of cartridge development, they could save a lot of time. The 444 Marlin, introduced during 1964, is a good case in point. To begin with, it is a poorly disguised copy of the wildcat 44 Van Houten Super that pre-dates it by at least 3 years. According to Parker Ackley, in his *Handbook for Shooters and Reloaders*, the 44 VHS is made by necking up the 30-40 Krag case, trimming it to 2 inches, and turning down the rim. When this is done, we end up with a near carbon copy of the 10.3x65Rmm Swiss cartridge (DWM 237A) that originated around 1900 or earlier. The only difference is in the fact that the 10.3mm case is 0.3-inch longer than the 44 VHS or 0.2-inch longer than the 444 Marlin. However, that's not all there is to the story because the 10.3x65Rmm cartridge is based on the brass 410 shotgun shell loaded with a conical bullet and fired in a rifled barrel. It is possible to make the 444 Marlin from brass 410 cases and the new originators could have done the same thing in the beginning.

Cartridges don't just happen, they evolve in response to some need or use requirement. Our Western frontier dictated American cartridge development for 50 years or more. Its influence is still an important factor in directing the imagination of the modern hunter. British rifle cartridges, in the main, were designed for conditions existing in other parts of the world such as Africa and India rather than the home island. European cartridges were developed on one hand because of hunting conditions and available game on the European continent, and on the other to compete with American and British innovations. Since the end of WWII, there has been considerable blending and standardization of the various worldwide cartridge designs. More British and European rifles and cartridges are used by American gun buffs than ever before, and they, in turn, have adopted many of our ideas.

Modern Ammunition

The most important factor influencing the ammunition available at any given time is economics. The ammunition manufacturers are willing to produce anything that will sell, but, obviously, are most reluctant to tool up and turn out something for which there is little or no demand. Military developments, as illustrated by the 30 Carbine, 30-06, 7.62mm NATO (308 Winchester), 5.56mm (223 Remington), 45 ACP and that old standby, the 45-70, have almost always provided a good long-term sales record when introduced in sporting version. For this reason the ammunition companies have usually been quick to adopt these. They have not been quite so enthusiastic in their attitude toward cartridges developed by individuals or wildcatters. However, Remington has been the leader in introducing commercial versions of what were originally wildcat cartridges. They initiated the trend with the 257 Roberts back in 1934, and since 1945 have added a number of others including the 17 Remington, 22-250 Remington, 6mm Remington, 25-06 Remington, 7mm-08, 7mm Remington Magnum and the 8mm Remington Magnum, to name most of them. Actually, we must recognize that Winchester adopted the 22 Hornet (an original wildcat development) in 1930. Also the 300 Winchester Magnum and possibly the 358 Winchester were around in wildcat versions before the company decided to develop something similar. The 444 Marlin is another cartridge based on an original wildcat innovation. Since most of these have had good sales records, it would not be surprising to see some of the other more popular wildcats introduced in commercial version as time goes on. This is a healthy trend, and I hope it will continue.

Nostalgia is another factor that is now exerting considerable influence on ammunition and firearms trends. Shooting muzzle-loading and blackpowder cartridge guns of all types is a solidly-established facet of the shooting game. Although there have always been a few muzzle-loading clubs and a small core of blackpowder devotees, the current popularity of this sport has given birth to a whole new industry specializing in the manufacture of replica arms. Muzzle-loading clubs with several hundred members are now common and most states have special muzzle-loading big game hunting seasons. As an example of the magnitude of this development, Colt Firearms once again sold their cap and ball revolvers, Harrington & Richardson offered replicas of the U.S. 1873 "Trapdoor" cavalry carbine, Shiloh Rifle Mfg. will sell you 1863 Sharps carbines and rifles and one can buy any number of Hawken-type muzzle-loading replicas. What is mentioned here is only a very small portion of what is available to blackpowder shooters. If you are interested in the full extent of the offerings in this field, I suggest you buy the latest edition of *Gun Digest* (DBI Books, Inc.) and look in the catalog section in the back of the book.

How does all this affect modern cartridges? The nostalgia syndrome is responsible for the reappearance of a number of long obsolete cartridges, or at least new reloadable cases, although admittedly this is as yet on a rather limited or custom basis for most of the old-timers. Dixie Gun Works, for example, is offering new, reloadable cases in the old 50-70 Government caliber and has recently brought in the 41 Rimfire. The development of modern cartridges is a dynamic rather than a static process, although it does move in a series of starts and stops, depending on fads and trends at any given time. These, then, are the factors that shape our modern ammunition and this includes some very exciting innovations (some old and some new) since the First Edition of CARTRIDGES OF THE WORLD came off the press.

Cartridge Loading Data

Basic loading data has been furnished as part of the general information on each cartridge, except in those cases where such information was unavailable and test rifles or cartridges unobtainable. Insofar as possible, the loads listed are for those powders that provide the most efficient velocity and energy for the caliber and bullet weight involved. With old blackpowder cartridges or obsolete smokeless powder numbers, the objective has been to supply data that more or less duplicates the original factory performance figures. The cartridge loading data has been

gathered from various published sources and the author's very extensive experience. The data selected for inclusion in COTW provides a good starting point for the handloader, but there are many more good powders available for loading each cartridge than can possibly be presented here. It is therefore recommended that the serious reloader obtain one or more of the very fine reloading manuals published by DBI Books, (*Metallic Cartridge Reloading, 3rd Edition*) Lyman, Speer, Hornady, Hodgdon, Sierra, Nosler, P.O. Ackley and others. Loading data listed here does not necessarily agree with that published elsewhere as to the velocity obtainable with a given charge of powder because the test conditions and equipment are not the same. There is no such thing as absolute loading data and all published loads reflect the conditions of testfiring, which includes a number of important variables such as barrel length, chamber configuration, temperature, components used, test equipment, etc. Test firings conducted by the author some years ago with different makes and models of 30-06 rifles demonstrated that there can be a variation of over 300 fps between different rifles firing the same, very carefully-loaded ammunition.

All loading data, wherever published, should be used with caution and common sense. If you are not sure or don't know what you are doing, DON'T DO IT!!! Since neither the author, editor or publisher has any control over the components, assembly of the ammunition, arms it is to be fired in, the degree of knowledge involved or how the resulting ammunition may be used, no responsibility, either implied or expressed, is assumed for the use of any of the cartridge loading data in this 8th edition of COTW.

Cartridge Dimensional Data

The reader should understand that the tables of cartridge dimensional data at the end of each chapter are based on actual cartridge measurements and not derived from SAAMI or other drawings. In some instances, data is based on measurement of a single specimen; in others, it may be an average taken from several cartridges of different manufacture. The tables are intended primarily to assist the reader in identifying cartridges, and their use for the purpose of chambering rifles is not recommended unless checked carefully against manufacturers' chamber dimensions. The reason for this is that there are far greater differences in cartridge dimensions between different makes and lots than most people realize. There are differences in the third decimal place even within most 20-round boxes, in fact.

This brings up another point. From time to time, the author or editor will receive letters from readers complaining that their measurement of some cartridge dimension does not agree with ours, and therefore we must be wrong. I have, for example, two letters before me—one claiming that a certain figure is too high, the other stating that the very same figure is too low. The differences are all in the third decimal place. This is not a matter of anyone being wrong, but rather variances in manufacturing tolerance.

As a more specific example of the tolerance factor, I acquired a box of 10mm pistol ammunition for the Bren 10 and other semi-autos and in measuring several rounds, found some discrepancy in the rim diameters. Just to see what the minimum and maximum figures were, I measured the entire 20-round box. It turned out that the minimum rim diameter was .419-inch and the maximum was .426-inch or a difference of .007-inch. Is that a sufficient range to cause the pistol to misfunction? I hardly think so, but people have written letters over a difference of .002-inch or even .001-inch between their measurements and mine.

All of this is just to get the subject of cartridge dimensions into proper perspective. In any event, if your measurements don't match someone else's by a few thousandths of an inch, don't get excited and don't get the idea you may have discovered a new and heretofore unknown cartridge. You may be dealing with maximum and the other guy with minimum dimensions.

Frank C. Barnes

Chapter 2

CURRENT AMERICAN RIFLE CARTRIDGES

(Centerfire Sporting)

THE CRITERION used to determine which cartridges should be included in Chapter 2 is the requirement that the cartridge be currently manufactured and available to the American sportsman through local dealers either on an over-the-counter basis, or by special order, since no gun store carries every single item of ammunition that is manufactured.

The cartridges listed here include not only the most modern developments, but also some that are ancient and obsolete by any standard. The characteristic they share is that they are manufactured on a commercial basis, still used, and rifles are available chambered for the round, although perhaps not made by the major American arms companies. Two of the oldest American centerfire cartridges are included in this group, the 44-40 Winchester and the 45-70 Government, both of which originated in 1873 and have been in continuous use since. Several replica rifles are now chambered for the 44-40, and the 45-70 has staged a remarkable comeback as a short-range brush or woods cartridge. Both modern and replica rifles are being chambered for the 45-70. Today the popularity of this grand old military and sporting cartridge is once again increasing.

One thing that can be said about many cartridges in Chapter 2 is that they have stood the test of time and include among their number the best and most useful designs available to the American shooter. Those that ended up in second place, often for good reasons but sometimes for no reason anyone could reasonably understand or explain, will be found in Chapter 3: Obsolete American Rifle Cartridges. Interestingly, nostalgia is in the process of moving a few of these back into Chapter 2.

For many years, the new trend in cartridge and rifle design has been toward high velocity and flat trajectory, often at the expense of almost any other consideration. It appears to be the fashionable thing in some circles to show up on a big game hunt with the largest caliber or most powerful rifle in the crowd. This odd psychosis is partly responsible for the success of the Weatherby line of rifles and cartridges, although prestige and owning a perceived superior product also enter into this. The major gun manufacturers in the United States were slow in recognizing this as a fact of life, but have since closed the gap. Modern high-velocity magnum cartridges can cancel out some small measure of poor judgment in estimating range or lead if the shooter can handle the added recoil and muzzle blast without flinching. (*Editor's Note: Recently this trend has slowed with many new chamberings now middle-of-the-road offerings.*)

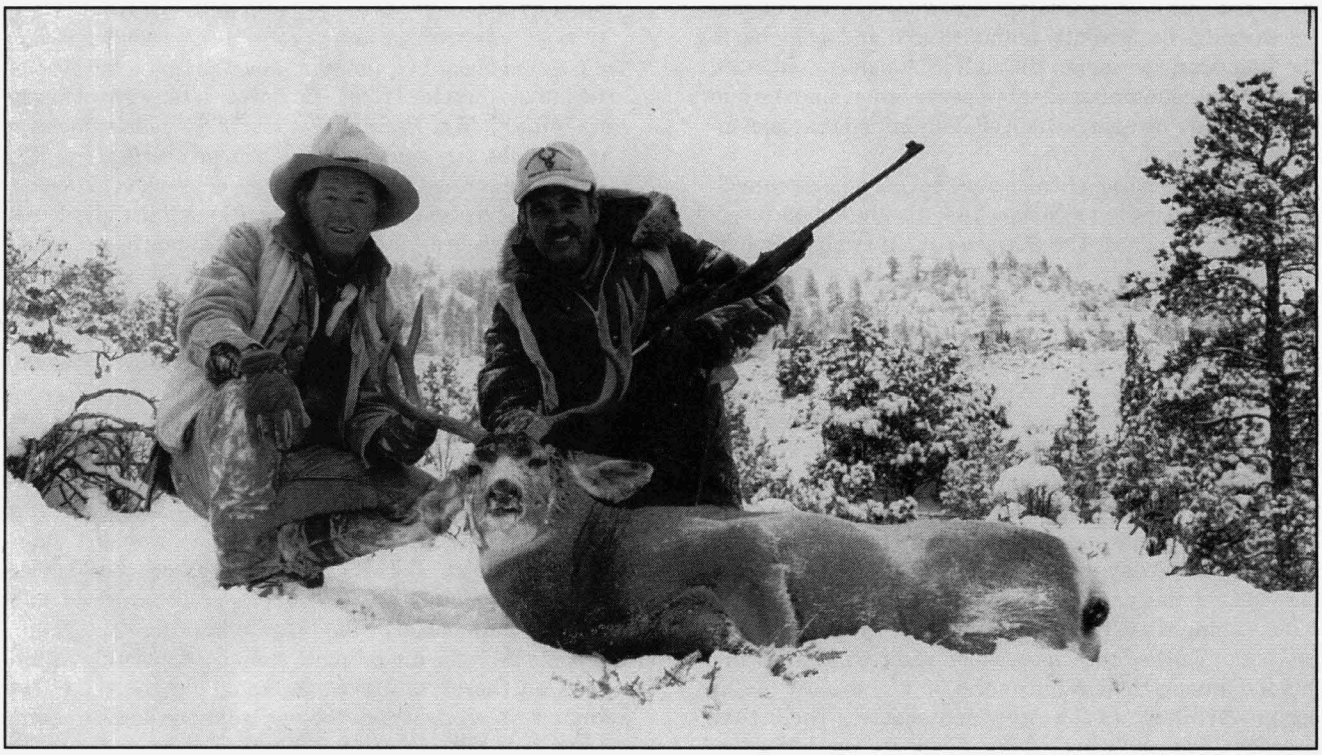
The author has, at various times, owned and shot most of the modern magnum rifles and handguns and has a very high regard for their capabilities, but has reservations as to any real need for the larger calibers under normal North American hunting conditions. A great deal depends, of course, on what is to be hunted and under what conditions. Is there any actual advantage, for example, in owning a 300 Magnum if your hunting area is confined to, say, southern California? What game would one encounter there so large or so dangerous that would require all this extra power? Yes, I understand the magnum might provide an extra 100-yard sure-hit range. But with a little practice in range estimation, wouldn't something like the 257 Roberts, 270 Winchester or the 30-06 do just as well? However, one should never disparage a man's wife, his automobile or his favorite hunting rifle. Therefore, far be it for me to make enemies by casting aspersions on those who favor the magnum cartridges for whatever reason. My only point is that one doesn't need a magnum to kill a mouse, not that there is anything wrong with doing so. In any event, if you are looking for the latest and the most powerful, it will be found in Chapter 2.

The reader who is trying to determine which of the current American rifle cartridges best suits his hunting needs should first determine what game animals he intends to hunt. Secondly, he should decide which type of rifle action is preferred: bolt-, lever-, semi-auto, slide- or single shot action. Next, sit down with a copy of *Gun Digest* or a variety of gun catalogs to see what calibers are available for the different actions. Next, give some careful and realistic thought as to how the gun is to be used, type of cover, average range and the variety of game animals to be legally hunted. Once you have all of these factors in hand,

check through the cartridges listed in this chapter and pick the one that matches your particular needs and situation. Don't select the most powerful or the one with the highest velocity in the ballistics tables unless this actually offers some real advantage to you. Bear in mind that high velocity and flat trajectory offer no advantage if the bulk of your hunting is confined to brush or heavy timber with ranges that average only 50 yards or so. On the other hand, a big, heavy, slow bullet won't put meat in the freezer if you are shooting antelope at 300 yards and beyond. Always bear in mind that the 20 foot pounds of recoil energy produced by cartridges in the 30-06 class is about all the average person can stand without flinching badly. In other words, use a little common sense and be realistic in your choice of hunting calibers. All the velocity, energy and killing power in the world is of no value if you can't hit anything with it.

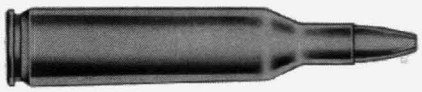
From time to time, readers write and ask the author what his favorite hunting calibers are or what type rifle action he prefers. I happen to be very partial to the 257 Roberts and the 30-06 for the simple reason that I have always had extremely good results with both, and they will (if you reload) allow great flexibility in the variety of game or pests that can be hunted. If you handload, the 30-06 can be adapted to shoot anything from varmints right on up to moose and brown bear under most hunting situations. However, I also happen to like the 45-70 and have been shooting rifles of this caliber since I was 14 years old when an uncle gave me an 1873 Trapdoor Springfield rifle as a birthday present. Actually, I have fired, at one time or another, nearly every cartridge listed in Chapter 2. I don't really have anything against any of them for their intended purpose. As for rifle actions, I prefer the bolt action, single shot and lever action, in about that order. One thing about cartridges, there is certainly sufficient variety to please just about anyone. As the saying goes, "Whatever turns you on."

(Editor's Note: Being of the 11 percent who are left-handed, I learned early to appreciate Remington's almost ambidexterous pump-action rifle. Left-handed bolt actions have long been available but are seldom seen in gun stores or pawn shops. If one wants to handle such a rifle, one is welcome to order and pay for it and when it arrives at the dealer's store, one can then see if he likes it. It is a small miracle any ever sold. I have long since tried all manner of rifle actions and I now, more than ever, prefer the pump.)



Matching the caliber to the job at hand is a most important factor for the hunter, and it doesn't make sense to be over-gunned. This hunter wisely chose the 270 Win. to take this nice mule deer.

17 Remington



Historical Notes The 17 Remington was introduced in 1971 as a new caliber for Remington's 700 series bolt-action rifles. It is the smallest caliber centerfire rifle cartridge offered on a commercial basis to date. The case is based on the 223 Remington necked-down to 17-caliber, with the shoulder moved back .087-inch to lengthen the neck while retaining the same shoulder angle. The 17 Remington is similar to, but not identical with, the 17-223 wildcat developed about 1965. Experiments with 17-caliber rifles go back to 1944 when P.O. Ackley, the well-known gunsmith and experimenter, developed the 17 Ackley Bee based on necking-down the improved 218 Bee case. There are a number of other 17-caliber wildcat cartridges made by necking-down 22-caliber centerfire cases such as the 221 Remington Fireball, 222 Remington, etc. Remington, Ultra Light Arms, Wichita, and Sako offer rifles in this caliber.

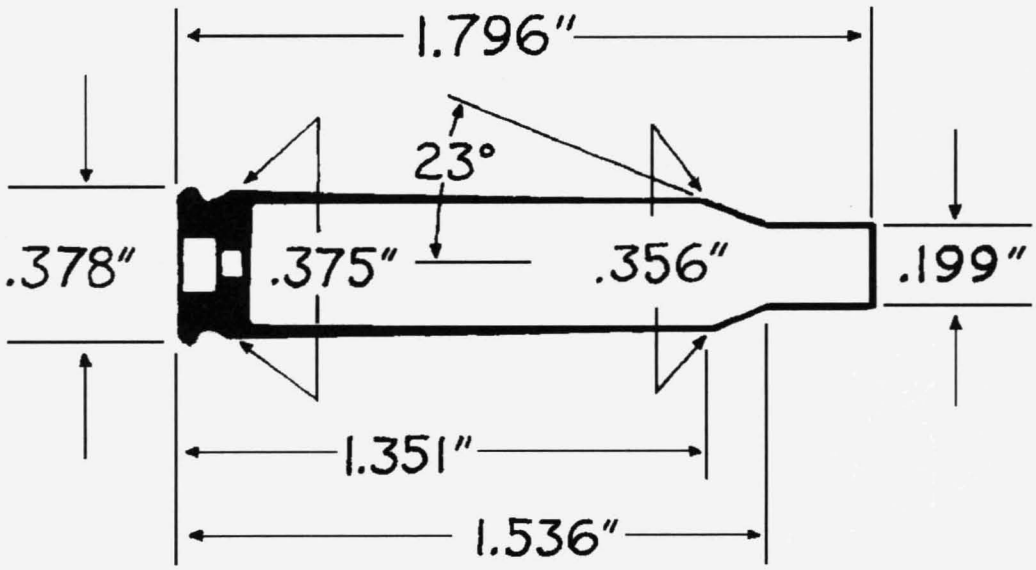
General Comments The 17 Remington has had a steady, though unspectacular, sales record since its introduction. Its greatest drawback is that it is a special-purpose cartridge suited almost exclusively for varmint shooting. For the sportsman who wants a rifle only for that purpose, this is not a disadvantage, however those requiring a rifle for both varmint and deer hunting would be better served with some other caliber.

With the 25-grain hollowpoint bullet loaded by Remington and similar bullets available for handloading by Hornady, the 17 Remington must be rated as a short-range varmint cartridge. On the other hand, it has certain advantages such as minimal recoil, ricochet probability, and a very flat trajectory due to the high initial velocity of over 4000 fps. Disadvantages include: rapid barrel fouling, extreme sensitivity to slight charge weight variation and limited component availability. Factory loaded ammunition is available only from Remington.

17 Remington Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
25 HP	IMR-4064	22.5	3800	801	Hornady
25 HP	IMR-4320	24.7	4000	888	Hornady
25 HP	IMR-4895	23.8	3900	845	Hornady
25 HP	IMR-3031	21.6	3800	801	Hornady
25 HP	IMR-4198	19.1	4040	906	Hornady
25 HP	N135	22.8	4040	906	Vihtavuori
25 HP	FL		4020	900	Remington factory load.

Note: Remington cases and Remington 7½ primers used in all loads.



22 Hornet (5.6 x 35Rmm)

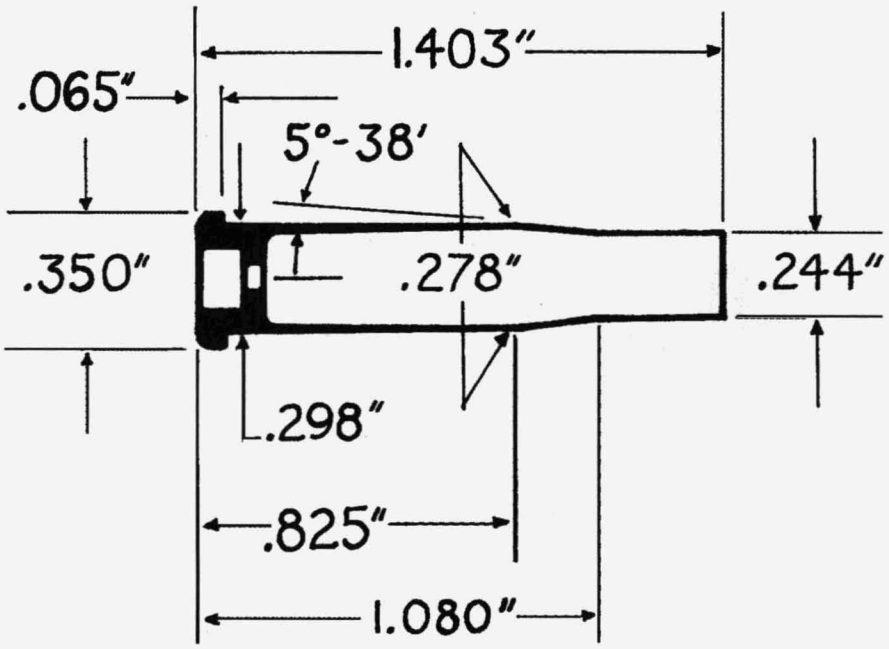
Historical Notes The 22 Hornet, based on the blackpowder 22 WCF, was developed during the late 1920s by a group of experimenters at Springfield Armory—Col. Townsend Whelen, Captain G. L. Wotkyns, and others. Winchester produced the first commercial ammunition in 1930. Within a few years the Hornet had been standardized by all American manufacturers. The original rifles were based on Springfield M1903 military and Martini single shot actions. Winchester announced its Model 54 bolt action in 22 Hornet caliber in 1932, but rifles did not actually reach the market until early 1933. Savage Model 23-D bolt-action rifles were available in 22 Hornet by August, 1932. The Stevens single shot Model 417 "Walnut Hill" target and 417½ sporting rifles were advertised in 22 Hornet caliber in 1933. During WWII, military survival rifles were made for the Hornet. At the present time, Anschutz, Ruger and Ultra Light Arms chamber rifles for the Hornet and Thompson/Center has their TCR and Contender in the caliber. In Europe, the Hornet is known by the metric designation 5.6x35Rmm.

General Comments The 22 Hornet was the pioneer small-bore, high-velocity cartridge marketed in the United States primarily for varmint and small game shooting. It has never been commercially available in anything but bolt-action and single shot rifles. For this reason, it quickly established a reputation for superb accuracy. No other cartridge of this type has ever caught on so fast or achieved such wide popularity.

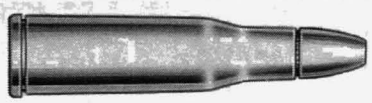
Although not quite as powerful as the 218 Bee, it is a perfectly adequate small game and varmint cartridge. It remains popular, but suffers in comparison with the 223 Remington and the 22-250. It remains a fine choice for economical shooting at ranges between 100 and 150 yards. Due to its reduced powder capacity, the Hornet won't do as well with heavier bullets of 50 or 55 grains as will the 218 Bee. It is a good cartridge for use in settled areas because of the light report and low incidence of ricochet. Early rifles had bores requiring bullets of .223-inch diameter. Sierra still offers such bullets. Later rifles had normal bores for .224-inch diameter bullets. Most bullet manufacturers offer special bullets for loading the Hornet. The improved "K" Hornet is among the best known wildcats based on the Hornet and most common of all Improved chamberings. Loaded ammunition is available from Remington, Winchester and Norma.

22 Hornet Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
40 SP	2400	10	2700	648	Sierra
40 SP	IMR 4227	11.4	2700	648	Speer, Sierra
45 SP	2400	9.2	2500	725	Hornady, Sierra
45 SP	IMR 4227	11	2600	678	Nosler, Hornady, Sierra
50 SP	2400	9	2400	640	Sierra, Hornady, Nosler
50 SP	IMR 4227	11	2550	694	Hornady, Nosler, Sierra
55 SP	IMR 4227	10.8	2400	704	Sierra, Hornady
55 SP	IMR 4198	12	2400	704	Sierra
45 SP	FL		2690	723	Factory load.



218 Bee



Historical Notes The 218 Bee, introduced by Winchester in 1938, was originally chambered in the Model 65 lever-action rifle, a modernized version of the Model 1892. Considerable enthusiasm greeted the announcement of this cartridge, and many magazine articles were devoted to comparing its superior killing power and range to the 22 Hornet. Although criticized as inaccurate, some Model 65s were capable of minute-of-angle accuracy. After WWII, Winchester brought out the Model 43 bolt-action rifle in 218 Bee. Mechanical troubles developed in some early models, and the rifle was discontinued. For a time, one or two European manufacturers, such as Sako and Krico, furnished small Mauser-type rifles in 218 Bee. At the present time, Ruger, Marlin, Thompson/Center and Browning chamber guns for the 218 Bee. The 218 Bee is based on the 32-20 case necked-down to 22-caliber. Cases can be made by necking-down 25-20 or 32-20 brass, then fire forming.

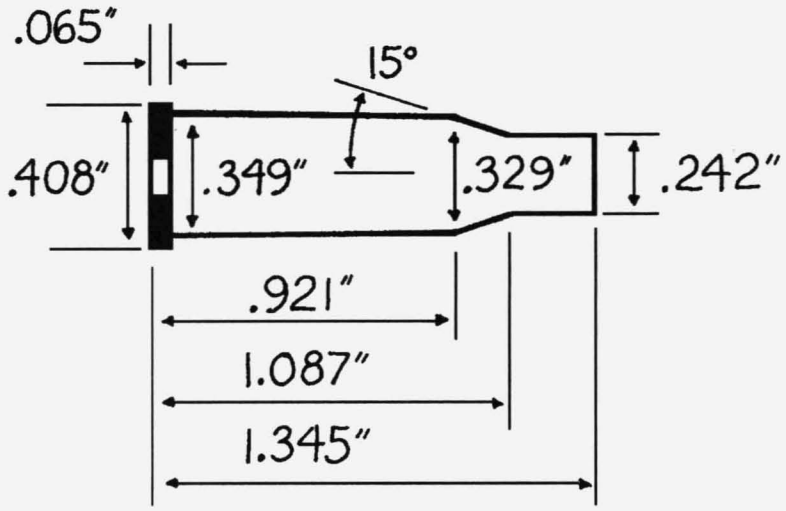
General Comments The 218 Bee has a larger case and somewhat greater powder capacity than the 22 Hornet. It provides higher velocity and a greater effective range than the Hornet, and in a good single shot or bolt-action rifle, is just as accurate. It is one of the most economical small game or varmint cartridges available. On small varmints it can be counted on out to 200 yards, but on coyote, bobcat or the like, it cannot be depended on for one-shot kills farther than 150 yards. On rabbits or other edible game it is necessary to use full-jacketed bullets or reduced loads, otherwise it ruins much of the meat.

The Bee is easy to reload, and one can duplicate anything from the 22 Short up to and exceeding the 22 Hornet. With modern powders, the factory performance can be improved safely. By using heavier bullets of 50 or 55 grains, its killing power and range can be increased.

Although still a fine cartridge and useful for many purposes, the 218 Bee has been largely displaced by the 223 Remington and 22-250 Remington. The 218 Bee, like the 22 Hornet, has a relatively mild report compared to the more powerful 22 centerfires and can be used under circumstances in which the larger cartridges would not be acceptable. It is a better performer than the 22 Hornet and its lack of popularity has always been something of a mystery to me. The Bee is the basis of several useful wildcats. Ackley's version approximately equals 222 Remington performance. The 17 Bee Improved offers impressive short-barrel performance. Factory loaded ammunition is available from Winchester.

218 Bee Loading Data and Factory Ballistics

Bullet (grs.)	Powder	grs.	MV	ME	Source
40 HP	2400	12	2800	697	Sierra
40 HP	IMR-4227	11.7	2600	601	Hornady, Sierra
45 SP	2400	11.6	2700	729	Sierra
45 SP	IMR-4227	13	2800	784	Nosler, Sierra
50 SP	2400	10.5	2500	694	Sierra, Nosler
50 SP	IMR-4227	12	2700	810	Hornady, Sierra
55 SP	2400	10	2300	646	Sierra
55 SP	IMR-4198	14	2500	763	Sierra
55 SP	IMR-4227	12.5	2500	763	Sierra
46 SP	FL		2760	778	Winchester factory load.



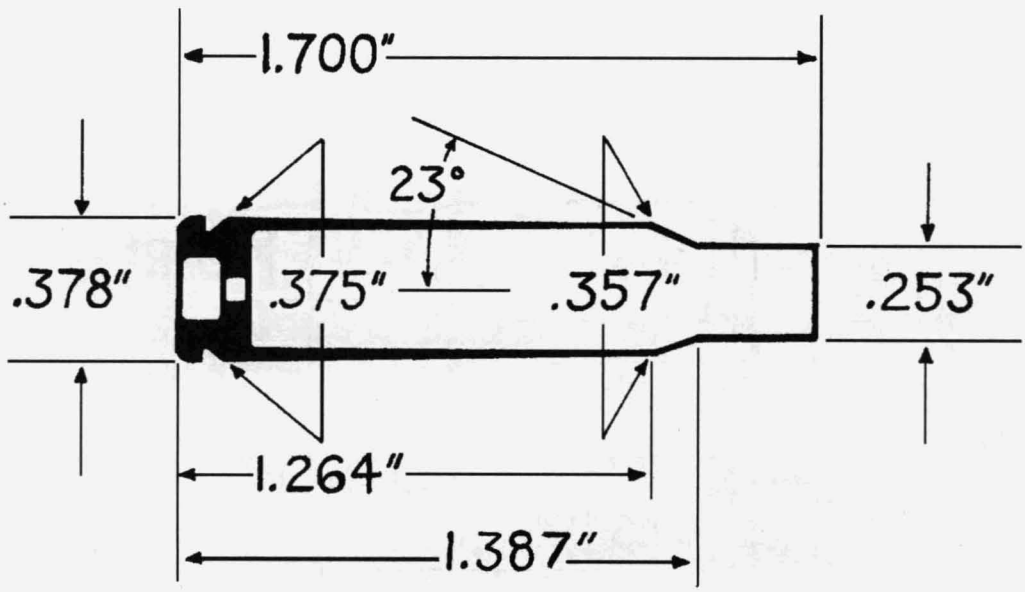
222 Remington

Historical Notes The 222 Remington was introduced by Remington in 1950 for their 722 bolt-action rifle which was later superseded by the current 700 series. For a short time, the Remington Model 760 slide-action repeater was also available in this caliber. Much of the credit for the 222 is due to Mike Walker, a longtime Remington employee. The cartridge became very popular with benchrest competitors in the 1970s and varmint hunters also found its performance excellent. But by the early 1990s the 222 Remington had lost much of its popularity to the 223 Remington.

General Comments The 222 Remington is in about the same class as the older 219 Zipper, but is rimless and adapted to modern bolt-action rifles. It is not based on any older case necked-down, but is of original design. It is a more or less scaled-down version of the 30-06, and fills the gap between the 218 Bee and the 220 Swift. It is well suited to the needs of the average person who desires a high-velocity 22. A great many benchrest matches have been won with the 222 Remington, and it has a reputation for superb accuracy. It is an excellent 200-yard cartridge for the full range of varmint and small game animals up to, but not including, deer. It has been outlawed for big game in many of the 50 states because, like the 220 Swift, you can't always depend on it to kill large animals humanely. I have seen several deer and antelope killed very cleanly with the 222 handloaded with heavier-jacketed 55- and 60-grain bullets. Range was about 125 yards. This caliber is offered by all large domestic ammunition manufacturers and several foreign companies.

222 Remington Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
40 HP	IMR 4198	20	3300	967	Speer, Sierra
40 HP	W748	26.3	3400	1027	Speer, Sierra
45 SP	H335	24.5	3100	960	Hornady, Speer
45 SP	IMR 4198	21	3300	1088	Hornady, Speer, Sierra, Nosler
50 SP	W748	25.8	3100	1067	Speer, Sierra, Hornady
50 SP	RE 7	20.9	3150	1102	Hornady, Speer, Sierra
50 SP	IMR 4198	20	3200	1132	Speer, Hornady, Sierra
55 SP	H335	24	3200	1174	Sierra, Speer, Hornady, Nosler
55 SP	IMR 4320	25	3000	1099	Hornady, Speer
55 SP	IMR 4895	24.5	3000	1099	Speer, Hornady, Sierra
55	Varget	25.0	2095	1170	Hodgdon
60 HP	IMR 4895	23	2900	1121	Nosler, Hornady, Speer
50 SP	FL		3140	1094	Factory load
55 FMJ	FL		3020	1114	Factory load



223 Remington (5.56x45mm)

Historical Notes The 223 Remington first appeared in 1957 as an experimental military cartridge for the Armalite AR-15 assault rifle. In 1964, it was officially adopted by the U.S. Army as the 5.56mm Ball cartridge M193. It is used in the selective-fire M16 rifle which is based on the original AR-15 design. The cartridge was the work of Robert Hutton, who was technical editor of *Guns & Ammo* magazine and had a rifle range in Topanga Canyon, California. One of the requirements for the cartridge was that the projectile have a retained velocity in excess of the speed of sound (about 1080 fps at sea level) at 500 yards, something you could not achieve with the 222 Remington. Working with Gene Stoner of Armalite, Bob Hutton designed a case slightly longer than the 222 and had Sierra make a 55-grain boattail bullet. This combination met the design requirements. All this was documented in the 1971 issue of the *Guns & Ammo Annual*.

Originally an alternate military cartridge, the 223 (5.56x45mm) is now the official U.S. and NATO military round. Additional information will be found in Chapter 6 covering military cartridges. We should note here that NATO forces, including the U.S., have standardized a new 5.56x45mm round with a heavy bullet and the M193 is no longer standard.

Shortly after the military adopted the cartridge, Remington brought out the sporting version, which has largely replaced both the 222 Remington and Remington Magnum in popularity. Practically every manufacturer of bolt-action rifles has at least one model chambered for the 223. In addition, there are a large number of military-type semi-auto rifles available in this caliber. At one time the Remington Model 760 slide action was available in 223.

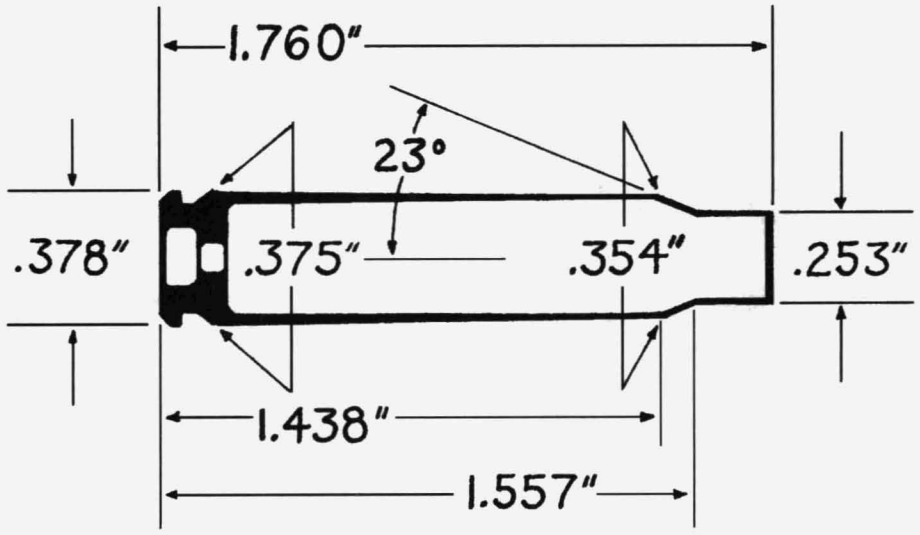
General Comments The 223 Remington is nearly identical to the 222 Remington Magnum, the only difference being that the 223 has a slightly shorter case. The two are not interchangeable, although the 223 will chamber in a 222 Magnum rifle. The result, though, is to create a gross headspace problem, and the 223 case will rupture if fired in the 222 Magnum chamber.

The 223 has proven to be an effective military cartridge for fighting in jungle or forested areas and for close-in fire support, and has been improved lately by NATO with heavier (SS109 designed by FN of Belgium) bullets fired through fast-twist (1 in 7-inch) barrels. As a sporting round, it is just as accurate as any of the other long-range, centerfire 22s. Military brass cases are usually heavier than commercial cases so maximum loads should be reduced by at least 10 percent and approached cautiously. That is because the reduced case capacity results in a higher loading density and increased pressure with the same powder charge. The 223 Remington can be classed as an excellent medium-range varmint cartridge at ranges out to 250 yards.

In 1979, SAAMI cautioned shooters that 5.56x45mm military chambers and throats differ from 223 Remington sporting rifle chambers. Therefore military ball ammo may produce high chamber pressures in sporting rifles.

223 Remington Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
40 SP	IMR 3031	25	3300	1140	Sierra, Speer
40 SP	IMR 4198	22	3200	995	Sierra, Speer
45 SP	IMR 3031	25	3300	1162	Hornady, Sierra
45 SP	IMR 4198	22	3200	965	Hornady, Sierra, Speer
50 SP	IMR 3031	25.2	3250	1250	Sierra, Nosler, Hornady, Speer
50 SP	IMR 4198	21.5	3200	1155	Nosler, Hornady, Speer, Sierra
55 SP	IMR 3031	24.5	3200	1330	Hornady, Nosler, Sierra
55 SP	W748	25	3000	1110	Hornady, Nosler, Sierra
55	Varget	27.5	3384	1395	Hodgdon
60 HP	IMR 3031	24	3100	1130	Hornady, Sierra
80	Varget	25.0	2869	1460	Hodgdon
55 SP	FL		3240	1280	Factory load
55 FMJBT	FL		3250	1290	Military load
40 HP	FL		3650	1185	Federal factory load
60 HP	FL		3100	1280	Remington factory load
64 SP	FL		3020	1296	Winchester factory load
69 HP	FL		3000	1380	Federal factory load



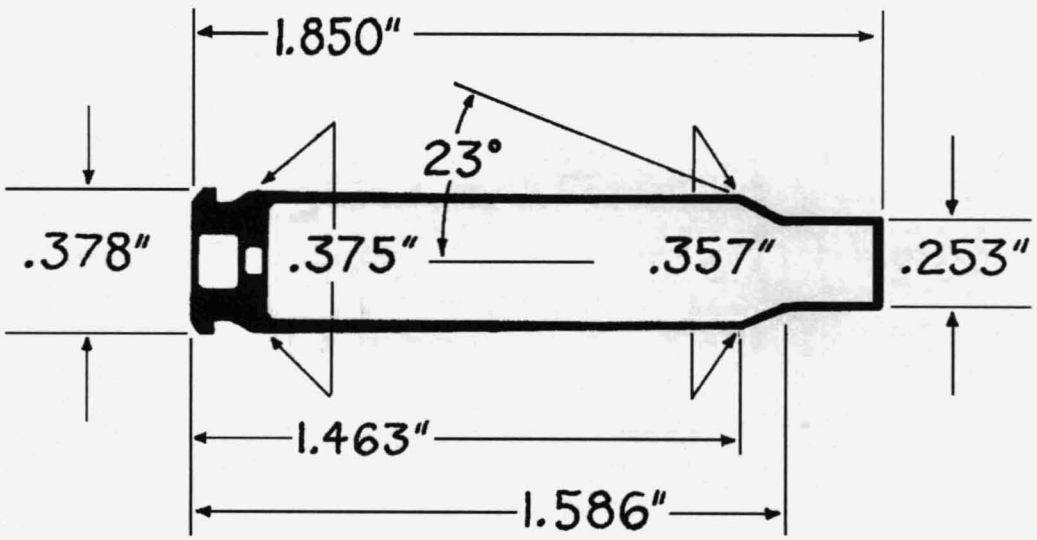
222 Remington Magnum

Historical Notes The 222 Remington Magnum was originally developed as an experimental military cartridge in a cooperative effort between Remington and Springfield Arsenal. Since it was never adopted by the military, Remington introduced it as a sporting round in 1958 as one of the calibers for their Model 722 bolt-action rifle, and also for a time in the later 700 series bolt-action rifles. At present, no Remington rifles are available in this caliber. None of the other major American sporting arms manufacturing companies offer the 222 Remington Magnum among their choice of calibers. The 222 Remington Magnum is fast heading for obsolescence.

General Comments In comparison to the standard 222 Remington, the magnum version has about 20 percent greater case capacity, and consequently delivers 100 or so fps higher muzzle velocity and an effective range of between 50 and 75 yards greater than the 222. Though its case capacity is 4 to 5 percent greater than the 223 Remington, the performance of these two is indistinguishable because the 222 Remington Magnum is factory loaded to a lower maximum pressure. The 222 Magnum is nearly $1/10$-inch longer than the 223 in overall case length and it is also slightly longer in body length. As a result, the two are not interchangeable, and although the 223 can be chambered and fired in a 222 Magnum rifle, a dangerous headspace condition exists and case rupture is certain to occur when the round is fired. The 222 Remington Magnum is every bit as accurate as the standard 222 or the 223 and is certainly adequate for anything up to, but not including, deer. It never achieved the popularity of the standard 222 and has been largely superseded by the 223 Remington. It is, nevertheless, a very fine long-range varmint cartridge. Remington still manufactures ammunition in this caliber.

222 Remington Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
45 SP	H-380	29.5	3400	1125	Hornady
45 SP	BL-C2	27	3400	1236	Hornady, Sierra
45 SP	IMR 4895	27	3400	1082	Speer, Hornady
50 SP	H-380	30	3400	1180	Hornady
50 SP	BL-C2	26	3300	1190	Nosler, Hornady, Speer
50 SP	IMR 3031	26	3300	1204	Speer
55 SP	H-380	29	3200	1234	Hornady
55 SP	RL-7	22	3200	1170	Sierra
55 SP	IMR 3031	26	3300	1332	Speer
55 SP	IMR 4064	26	3300	1340	Hornady
60 HP	IMR 4895	25	3000	1242	Nosler, Hornady
55 SP	FL		3240	1282	Remington factory load.



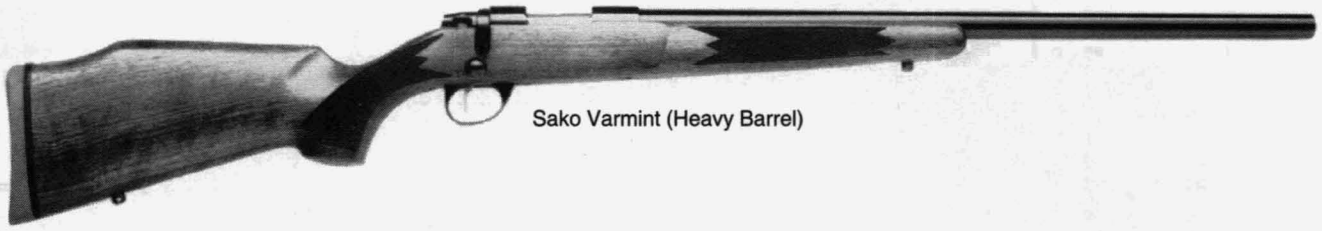
22 PPC

Historical Notes The 22 PPC was developed in 1974 by Dr. Louis Palmisano and Ferris Pindell, primarily as a benchrest cartridge. Although originally a wildcat, Sako of Finland introduced commercial rifles and ammunition late in 1987. Norma followed suit in 1993 with loaded ammunition. Since it is an American development, it is listed here as a current American rifle cartridge rather than as a European cartridge. The cartridge is based on the 220 Russian case which is a necked-down version of the 7.62x39mm Soviet military cartridge. The Wichita Engineering and Supply Co. made the first rifles for both the 22 and 6mm PPC cartridges. Many custom rifles have been turned out in this caliber. In 1993 Ruger announced their No. 1V and M77 varmint rifles in this caliber.

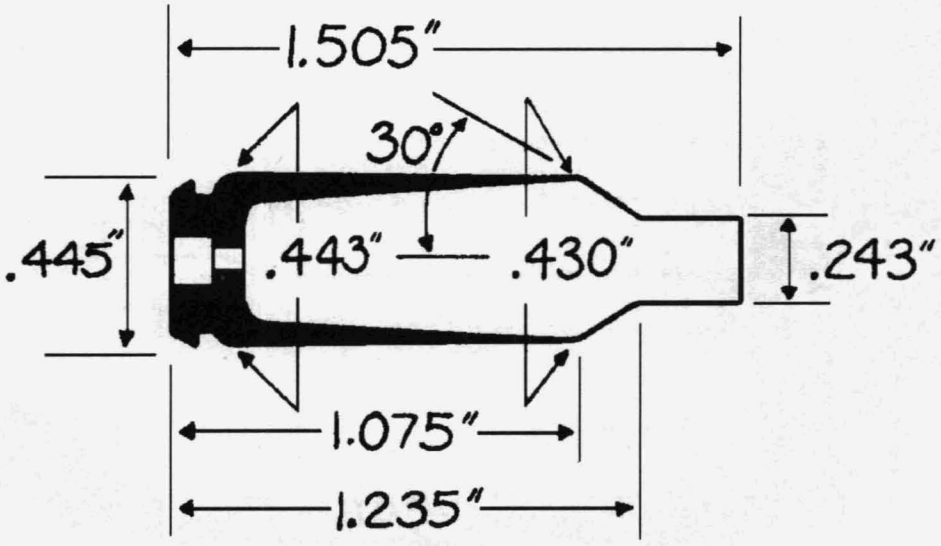
General Comments The originators altered the 220 Russian case by giving it a 10-degree body taper and 30-degree shoulder angle, as well as expanding the neck to accept the standard .224-inch diameter bullet used in the U.S. The cartridge cases are made in Finland by Sako or in Sweden by Norma and use Small Rifle primers. Although the 22 PPC is a short rather stubby case only 1.51 inches long, it nevertheless develops ballistics superior to some larger, longer cartridges such as the 222 and 223 Remington. The 52-grain bullet can be pushed out of the muzzle at over 3500 fps, and this definitely places the 22 PPC in the varmint and small game class. A 1 in 14-inch twist has become pretty much standard for these rifles although 1 in 12-inch twist will sometimes be found.

22 PPC Loading Data and Ballistics

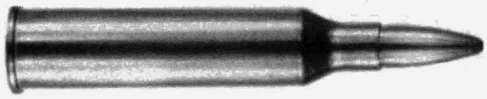
Bullet (grs.)	Powder/grs.		MV	ME	Source
52 HP	BL-C2	28.3	3400	1335	Speer
52 HP	W748	28.0	3300	1258	Speer, Nosler, Hornady
55 SP	H-335	27.0	3200	1251	Speer, Nosler
55 SP	W748	28.0	3200	1251	Hornady, Nosler, Speer
52 HP	FL		3400	1335	Sako factory load.



Sako Varmint (Heavy Barrel)



225 Winchester

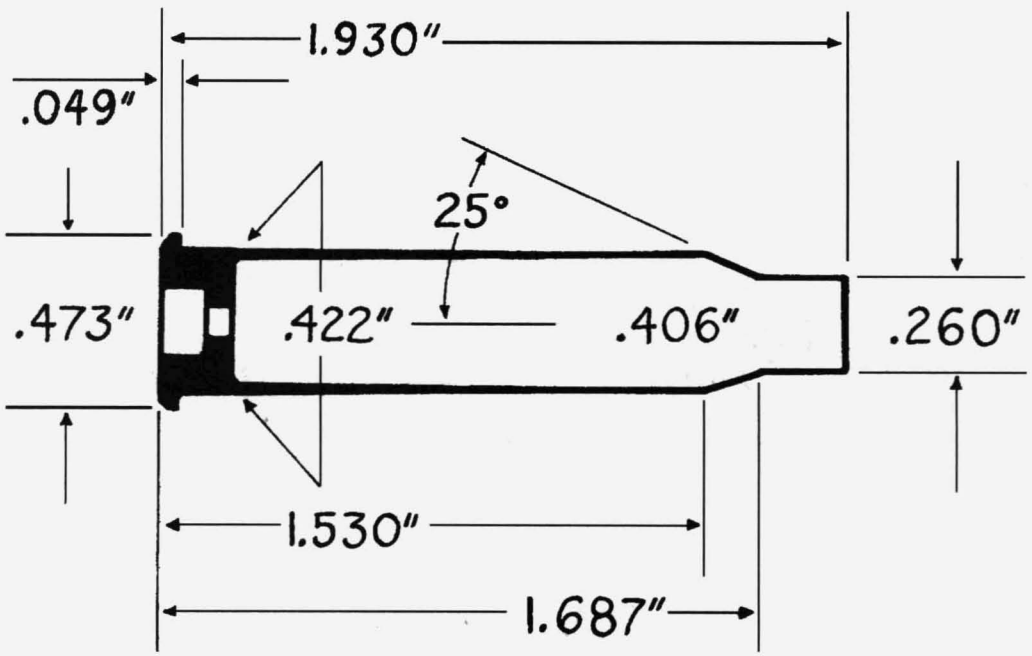


Historical Notes The 225 Winchester was officially announced in June 1964. Both the standard and a heavier-barreled varmint version of the Model 70 bolt action were offered for this round. The 225 replaced the older 220 Swift in the Winchester lineup. It is a rimmed case with an unusually large rim for this type of cartridge. The 220 Swift never achieved great popularity and neither did its replacement, the 225. The last Winchester catalog to list the cartridge as a caliber available for the Model 70 rifle was in 1972. No other manufacturer picked it up as a standard chambering because the already popular 22-250 was standardized by Remington less than a year later, and it was just common sense to adopt it instead. Winchester still loads 225 ammunition but this cartridge did not have a very long life, being semi-obsolete in only 8 years.

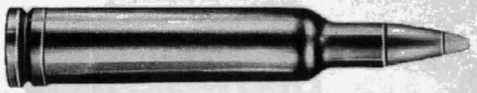
General Comments The 225 is a fine varmint cartridge with performance similar to the 224 Weatherby or the 22-250. But the 22-250 was already established as a popular wildcat with an outstanding reputation, and it was inevitable that it would dominate the field. Those who purchased 225 Winchester rifles have no need to feel bad or trade them off for anything else because the 225 cartridge is just as accurate and will do anything that the more popular 22-250 will do. It simply turned out to be a design or idea whose time had not yet arrived. As a matter of fact, it might be well to hang on to your 225 because not a great many were sold and eventually some gun writer will rediscover it as the greatest 22 varmint cartridge conceived by the mind of man, and at that point all your shooting friends will wish they had one too. The 225 has an edge over both the 222 and the 223 Remington for long-range varmint shooting because of the increased muzzle velocity. At one time, Winchester was supposed to furnish a 50-grain loading at 3800 fps and a 60-grain at 3500 fps, along with the standard 55-grain at 3650 fps (now reduced to 3570 fps), but these loads never materialized. For handloaders, this cartridge is nothing more than a slightly modified 30-30. Neck down the 30-30 to 22 caliber, shorten the case slightly, turn the rim to '06 dimensions and slightly improve and you have the 225 Winchester.

225 Winchester Loading Data and Factory Ballistics

Bullet(grs.)	Powder/grs.		MV	ME	Source
40 HP	IMR 4064	31.5	3400	1027	Speer, Sierra
45 SP	IMR 4064	33	3600	1295	Hornady, Speer
50 SP	IMR 3031	31	3400	1284	Speer, Nosler, Hornady
50 SP	IMR 4895	33	3600	1439	Sierra
55 SP	IMR 4320	34.5	3700	1672	Hornady
60 HP	IMR 4064	31.8	3500	1632	Hornady
70 SP	IMR 4350	34.5	3000	1399	Speer
55 SP	FL		3570	1556	Winchester factory load



224 Weatherby Magnum

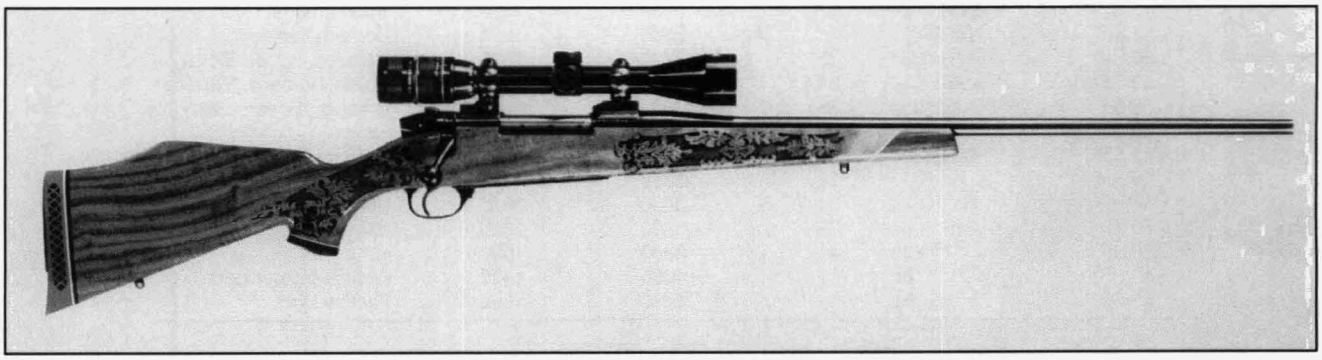


Historical Notes The Weatherby line of proprietary cartridges was somewhat incomplete for lack of an ultra-velocity 22. The previous 220 Weatherby Rocket was actually an improved wildcat based on the 220 Swift case, and Weatherby never manufactured ammunition of this caliber. The 224 Varmintmaster was introduced in 1963, but according to the late Roy Weatherby, development work went back 10 years prior to this. Introduction of the cartridge was delayed due to lack of a suitable action. The caliber is available in a reduced-size version of the Weatherby Mark V rifle. At present no one else chambers this caliber.

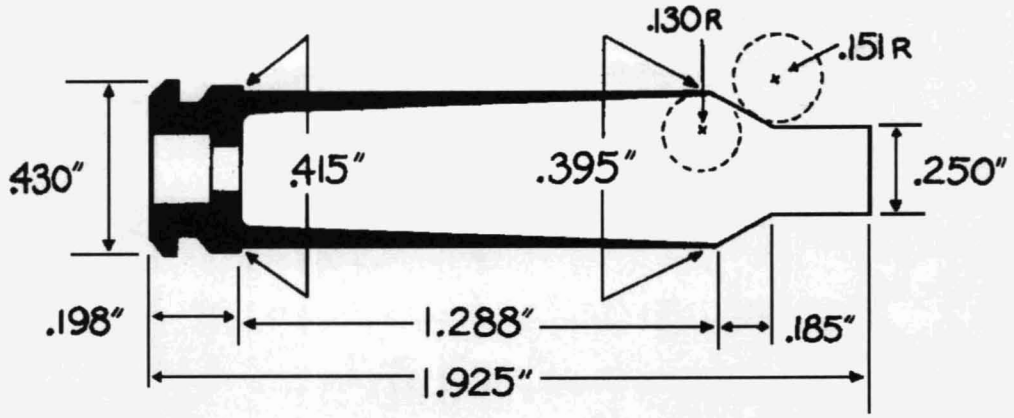
General Comments The 224 Weatherby lies ballistically between the 223 Remington and the 220 Swift. It is a belted case with the advantages and disadvantages inherent in this type of construction. For the handloader, it eliminates certain headspace and case-stretch problems and should provide maximum case life. It is an excellent long-range varmint cartridge with performance similar to the 22-250 Remington. Its popularity has been determined largely by economic factors. One can buy a Remington, Ruger or Winchester bolt action in 22-250 caliber for about one-quarter the price of a Weatherby. The 224 Weatherby is, nevertheless, a fine choice to those who don't mind the extra cost. It is the smallest belted case presently manufactured commercially.

224 Weatherby Magnum Loading Data and Factory Ballistics

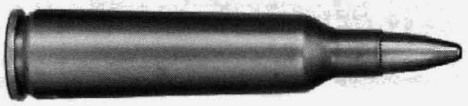
Bullet (grs.)	Powder/grs.		MV	ME	Source
40 HP	IMR 4198	28.5	4100	1493	Sierra
45 SP	IMR 4198	28	3900	1520	Sierra
50 SP	IMR 4064	32.8	3800	1604	Hornady, Sierra
50 SP	IMR 4895	33	3800	1604	Hornady
53 HP	IMR 4064	32	3600	1526	Hornady, Sierra
55 SP	IMR 4064	32	3600	1583	Sierra, Hornady
55 SP	IMR 4895	32	3600	1583	Hornady
55 SP	FL		3650	1627	Factory load
60 HP	IMR 4895	31.5	3500	1632	Hornady



Weatherby Mark V Lazermark



22-250 Remington (22 Varminter, 22 Wotkyns Original Swift)



Historical Notes The 22-250 Remington was adopted early in 1965 as one of the calibers for the Remington 700 series bolt-action rifles, and also for the Model 40XB match rifle. Browning bolt-action rifles were offered in 22-250 caliber two years earlier. This is not a factory design, but rather a popular wildcat that has been around for many years and made good. However, Remington's adoption of the round moved it into the commercial classification.

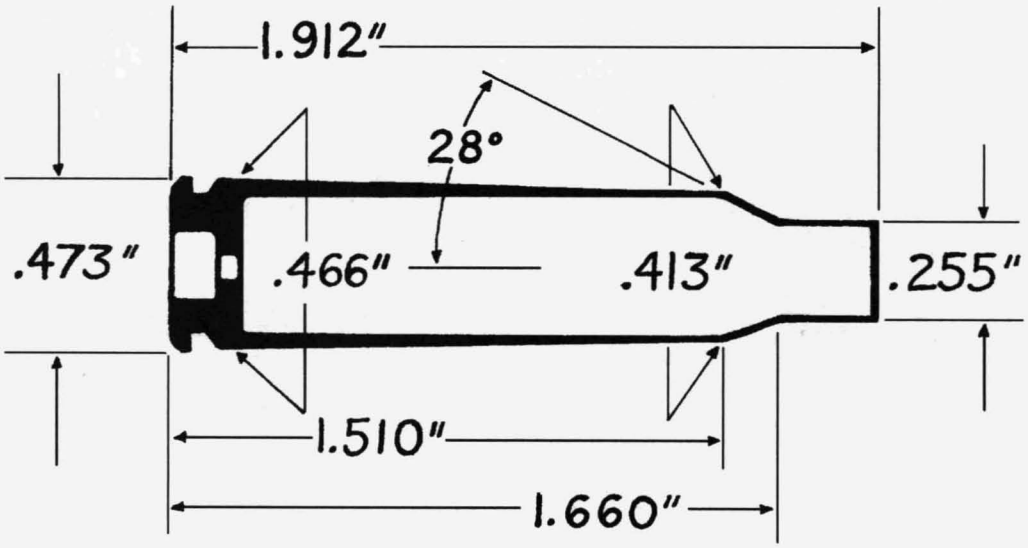
There is some confusion regarding date of origin of the 22-250 which is based on the 250-3000 Savage case necked to 22-caliber. Its moniker is derived from the caliber (22) and the parent case name (250). The parent cartridge was introduced in 1915 and a 22 version may have been made up experimentally shortly thereafter. Harvey Donaldson, Grosvenor Wotkyns, J. E. Gebby, J. B. Smith and John Sweany all worked on versions of the 22-250 between 1934 and 1937. J. E. Gebby and J.B. Smith are usually credited with having developed the present configuration in 1937. However, there are different versions of this cartridge and much depends on which one is referred to. The Gebby version was named the 22 "Varminter" and he obtained a copyright on the name. Other gunsmiths renamed it the 22-250. The Wotkyns version was the forerunner of the 220 Swift, although Winchester ended up using the 6mm Lee Navy case rather than the 250 Savage.

At the present time, all of the major American and European rifle makers furnish bolt-action rifles in 22-250 chambering. In addition, the Ruger, Thompson/Center, and other single shots are available in this caliber.

General Comments The 22-250 is one of the best balanced and most flexible of the high-powered 22 centerfires. It is also the most popular of the long-range 22 varmint cartridges, effective to ranges of 400 yards or more. The 22-250 also has a reputation for outstanding accuracy and has been used with some success for benchrest shooting. Many individuals who have had experience with both the 22-250 and the 220 Swift report that the former gives significantly longer case life with full loads than the latter. The 22-250, as with most of the other high-powered 22s, is not recommended for use on deer or other medium game. The reason, of course, is that the light varmint bullets are made to expand quickly and will not offer sufficient penetration on a large animal. Based on personal experience, and purely as a matter of opinion, I would rate the 22-250 as the best all-round, long-range 22 varmint cartridge available today.

22-250 Remington Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
40 HP	IMR 4895	36	3900	1345	Speer, Sierra
40 HP	IMR 3031	35	3900	1345	Sierra, Speer
40	Varget	39.5	4135	1515	Hodgdon
45 SP	IMR 4064	37	3900	1520	Speer, Sierra
45 SP	IMR 3031	32	3500	1224	Hornady, Speer
50 SP	IMR 4064	36	3700	1520	Hornady, Speer, Sierra
50 SP	IMR 3031	34.5	3700	1520	Speer, Hornady, Sierra
55 SP	IMR 4064	35	3600	1580	Hornady, Speer, Sierra
55 SP	RL-7	29	3500	1496	Sierra
55 SP	IMR 4320	35	3500	1496	Nosler, Hornady, Sierra
60 HP	RL-7	28	3300	1451	Sierra
60 HP	IMR 4320	34	3500	1630	Hornady, Nosler, Sierra
70 SP	IMR 4064	33	3300	1690	Speer
70 SP	N205	41	3300	1690	
40 HP	FL		4000	1420	Federal factory load.
55 SP	FL		3680	1655	Factory load.



220 Swift

Historical Notes The 220 Swift was developed by Winchester and introduced in 1935 as a new caliber for their Model 54 bolt-action rifle. When the Model 70 Winchester bolt action was first issued in 1936, the 220 Swift was one of the standard calibers offered and continued to be until 1964 when it was discontinued. Now the Savage Model 112V, the Ruger Model 77 and the Ruger No. 1V single shot are offered in the 220 Swift chambering. The Model 70 Winchester is no longer made in this caliber. Norma of Sweden lists the 220 Swift with a 50-grain bullet at 4110 fps, and they also sell unprimed brass cases for reloading. Hornady/Frontier offers a 55-grain SP and a 60-grain HP loading.

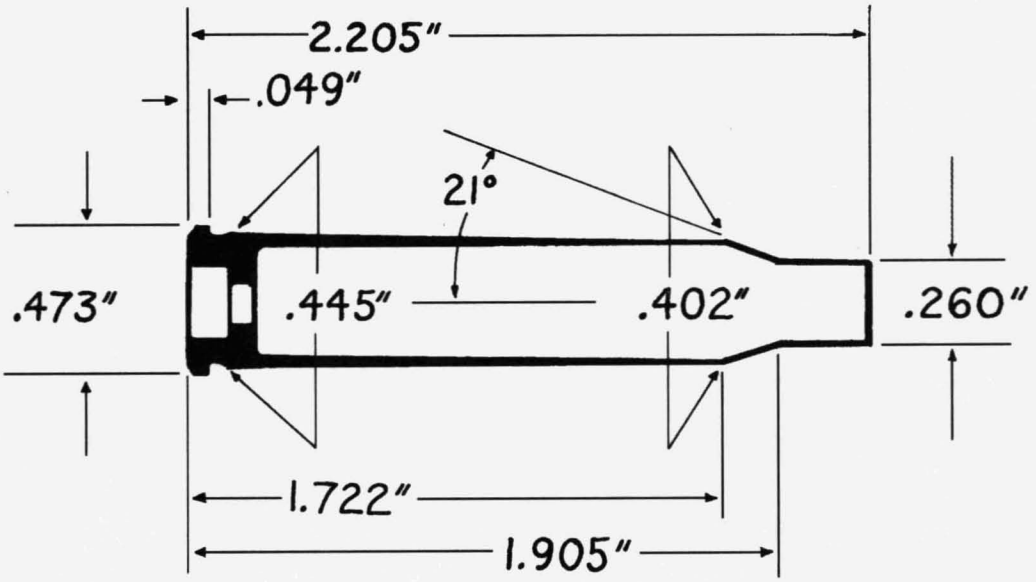
The prototype for the 220 Swift was developed in 1934-35 by Grosvenor Wotkyns who necked-down the 250-3000 Savage as a means of achieving very high velocities. However, the final commercial version developed by Winchester is based on the old 6mm Lee Navy cartridge necked-down. It is a semi-rimmed case.

General Comments The 220 Swift was and still is the fastest commercial cartridge in the world. It is also one of the most accurate super-velocity 22 cartridges ever developed. Its popularity has been somewhat retarded by the fact that ammunition in this caliber is expensive. Swift barrels have never been noted for long life, but this factor has been negated to a large degree by development of modern, erosion-resistant barrel steels since WWII. Factory ammunition has always featured the 48-grain and 50-grain bullets, but the Swift will handle the 55-grain or heavier bullets quite well, at slightly reduced maximum velocity. The 220 Swift is considered adequate on all animals up to deer-size. There is certainly plenty of field evidence to demonstrate that on occasion it will give fantastic one-shot kills on deer and antelope. However, the 220 Swift tends to be erratic in its performance on large animals, and most states will not permit its use on big game of any kind. Properly constructed bullets would almost certainly solve this problem on animals to mule deer size. In any case, factory bullets are designed for quick expansion on light animals. Most varmint hunters agree that the 220 Swift is the best varmint cartridge made. It remains a popular caliber despite the fact that no domestic major manufacturer offers it.

220 Swift Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
40 HP	IMR 4064	39	4000	1421	Speer, Sierra
40	Varget	40.5	4113	1500	Hodgdon
45 HP	IMR 4350	41.5	3600	1295	Hornady, Speer, Sierra
45 SP	IMR 3031	37	4000	1599	Hornady, Speer, Sierra
45 SP	IMR 4895	38.5	3900	1520	Sierra
45 SP	H-380	43	3850	1481	Speer, Sierra
50 SP	IMR 4320	39	4400	1689	Sierra
50 SP	IMR 3031	37	4000	1777	Sierra
55 SP	IMR 4350	44	3800	1764	Speer, Hornady
55 SP	IMR 4320	40	3000	1955	Sierra
55 SP	H-380	42	3800	1764	Nosler, Sierra, Speer
60 HP	IMR 4895	33	3400	1541	Hornady, Sierra
*48 SP	FL		4110	1800	Factory Load
50 SP	FL		4110	1877	Norma Factory Load
55 SP	FL		3650	1627	Hornady/Frontier Factory Load
60 HP	FL		3600	1727	Hornady/Frontier Factory Load

* Discontinued loading.



22 Accelerator

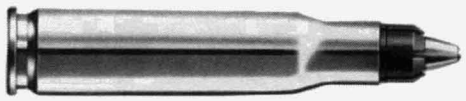
Historical Notes The 22 Accelerator is not a new cartridge, but rather a special loading of 30-30, 308 and 30-06 cartridges using a sub-caliber .224-inch diameter bullet held in a discarding 30-caliber plastic sabot. These loadings were introduced by Remington, the 30-06 in 1977 and the 30-30 and the 308 in subsequent years. All versions employ a 55-grain .224-caliber softpoint bullet retained in a 7-grain, six-fingered, plastic sabot with a hollow base. According to the 1979 Remington catalog, the rifling of the barrel imparts spin, which, combined with air resistance, causes the bullet and sabot to separate approximately 14 inches from the muzzle. The 30-30-224 Accelerator has a muzzle velocity of 3400 fps; the 308 version has a cataloged muzzle velocity of 3800 fps; and the 30-06-224 the impressive muzzle velocity of 4080 fps. The existence of three different 30-caliber Accelerator rounds seems to indicate commercial success. Remington originally intended to offer other Accelerator calibers but these never materialized.

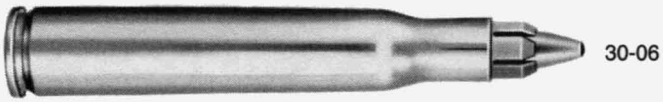
General Comments The author's experience shooting Accelerator cartridges indicated that accuracy is not as good as when the same 55-grain bullet is fired in one of the high-velocity centerfire 22 rifles, such as the 222 Remington, 22-250, etc. Most of these rifles, when properly tuned, will deliver minute-of-angle groups or better. Shooting at 100 yards and using various rifles, I was unable to print any groups with the 30-30 Accelerator that ran under $2^1/_2$ inches or under 2 inches with the 30-06 (five-shot groups). Actually, the Accelerator cartridges appear to group about the same as the standard 30-caliber cartridge does in the same rifle. This is just what the factory says it will do. In other words, if your rifle ordinarily makes 3-inch five-shot groups at 100 yards, it isn't going to do any better with the Accelerator. However, from a practical point of view, the Accelerator loads will allow one to use a regular 30-30 or 30-06 big game rifle for varmint shooting. The lack of MOA accuracy might restrict effective range to 200 yards or less, but this will vary greatly with individual rifles. The Accelerator concept is of greater usefulness to the shooter who does not reload than to the fellow who can cook up his own varmint loads with light 110-grain 30-caliber bullets. After firing, the plastic sabots are usually found anywhere from 40 to 100 feet in front of the muzzle. Remington has applied an old principle to modern sporting ammunition and come up with a very useful innovation.

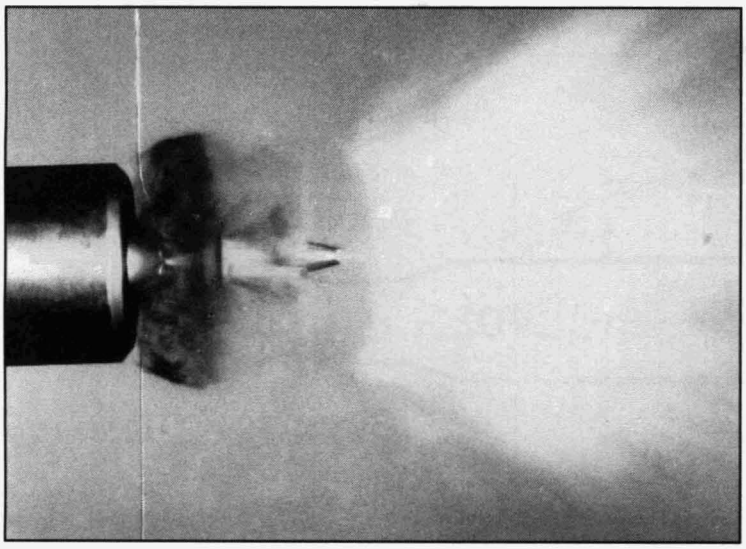
Sabotted military loads, both as new loadings for old chamberings and for sabot specific guns, are most effective. Likely, sabot-specific sporting guns could be accurate enough for sporting purposes and external ballistics could be most impressive.

22 Accelerator Loading Data and Factory Ballistics

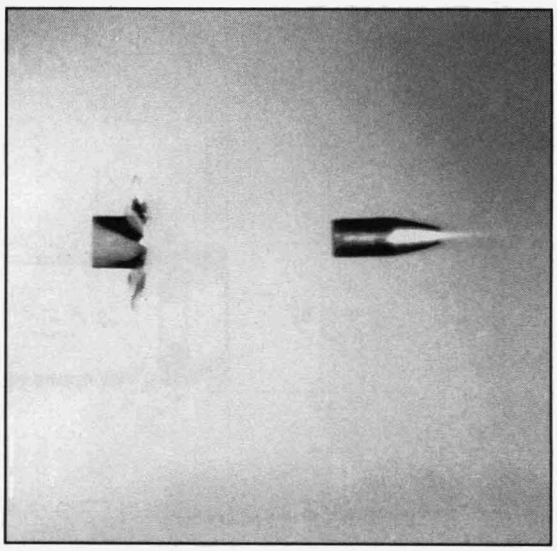
	Bullet (grs.)	MV	ME	Source
30-30 Accelerator	55 SP	3400	1412	Remington factory load
308 Accelerator	55 SP	3770	1735	Remington factory load
30-06 Accelerator	55 SP	4080	2003	Remington factory load







Remington "Accelerator" bullet leaving muzzle at 4080 feet per second.



Remington "Accelerator" sabot and bullet 18 inches from muzzle.

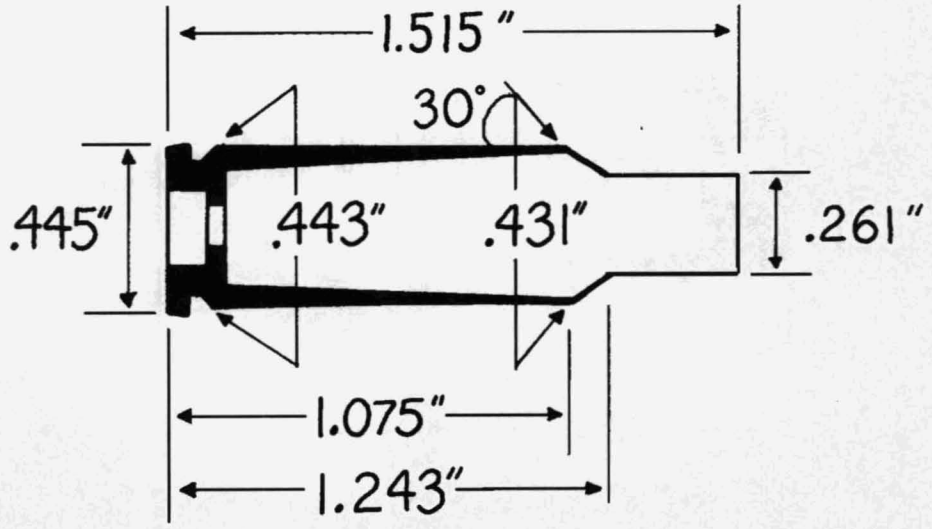
6mm PPC

Historical Notes The 6mm PPC is an outgrowth of the 22 PPC and based on the same case configuration with the neck expanded to take 6mm (.243-inch) bullets. This cartridge was also developed by Dr. Louis Palmisano and Ferris Pindell and based on the 220 Russian case, which is a variation of the 7.62x39mm (M43) Soviet military cartridge. The original rifles were made by Wichita Engineering and Supply Co. in 1975. Many custom rifles have been made up in this caliber in both sporter and benchrest types. Although originally a benchrest wildcat, Sako of Finland began turning out commercial bolt-action rifles and supplying loaded ammunition late in 1987. In 1993 Ruger announced that their M77 Varmint and No. 1 Varmint rifles would be offered in this caliber and at the same time Norma announced factory loaded ammunition. The 6mm PPC is one of the top competitive benchrest cartridges. In addition to loaded ammunition and factory cases, many handloaders make their own cases by fireforming 220 Russian cases or necking-down and reforming 7.62x39mm brass.

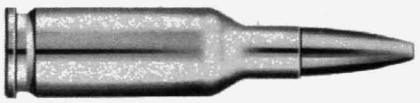
General Comments Chronograph tests by various individuals have demonstrated that the 6mm PPC gives very uniform velocity readings, which accounts for its fine accuracy. On the other hand, practically all rifles chambered for the cartridge are heavy barrel accuracy jobs, and that must also be a factor. Rifles for match shooting usually have a 1 in 14-inch twist, although a few are turned out with a 1 in 12-inch twist. The 6mm PPC is not only an outstanding benchrest cartridge, but gives very good results on small game and varmints. It is only slightly less powerful than the 243 Winchester despite the much smaller case. It should also do well on deer or antelope at moderate ranges. The velocity with the 90-grain bullet is only some 100 to 150 fps less than the 243 Winchester. Popularity of this caliber is growing beyond benchrest shooting; varmint hunters are now taking it up as well. Look for continued growth here.

6mm PPC Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
60 HP	H322	28.4	3200	1365	Sierra
70 HP	H335	29	3100	1494	Hornady, Sierra
75 HP	H-322	26.7	3100	1601	Hornady, Speer, Sierra
80 SP	W748	29	2800	1393	Speer
85 SP	H-335	28.0	3000	1699	Speer
90 SP	H-335	29	3000	1799	Speer
70 SP	FL		3140	1535	Sako factory load.



6mm Bench Rest Remington (6mm BR Remington)



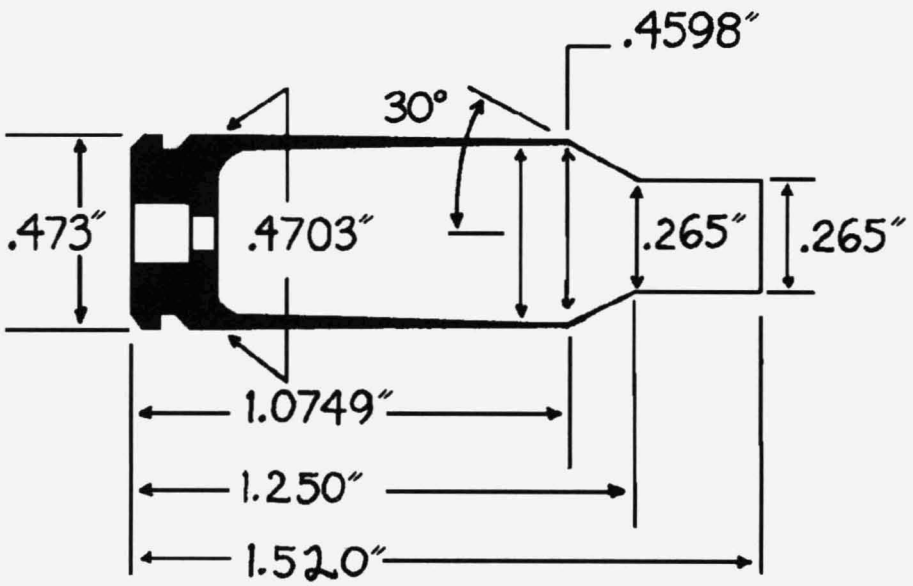
Historical Notes The 6mm BR Remington is one of eight cartridges based on the 308x1 1/2-inch case necked either up or down. It is impossible to determine who first came up with the 6mm version because a number of individuals claim the honor, dating back to 1962 and 1963, shortly after the author introduced the 308x1 1/2-inch. However, Mike Walker of Remington Arms deserves credit for standardizing dimensions and configuration in 1978. This allowed the cartridge to be adopted as a standard commercial cartridge. In late 1988, Remington announced that the 6mm BR would be produced as loaded factory ammunition. Prior to that, it was a sort of factory wildcat. Cases had to be formed from Remington BR brass, which is actually a modified 308 Winchester with a Small Rifle primer pocket, comparatively thin walls and annealing to facilitate reforming. The factory load has a 100-grain bullet with a muzzle velocity of 2550 fps and muzzle energy of 1444 fpe. The 6mm BR was intended primarily as a benchrest cartridge, but it also makes a good varmint number. It is currently available as one of the chamberings for the Remington XP-100 single shot pistol. (*Since the 6mm BR was in use before it was a factory round, there will be some chamber confusion. The original chambers were mostly intended for cases with turned necks. Editor*)

General Comments The 6mm BR is similar to the 6mm PPC, except that the case is of larger diameter and has about 10 percent greater volumetric capacity. The 6mm PPC is loaded somewhat hotter than the 6mm BR with some loading manuals listing the 90-grain bullet at around 3000 fps. There is no reason why the 6mm BR can't do anything the 6mm PPC can. And, the availability of factory ammunition should increase its popularity. This will also help overcome one of the problems with the 6mm PPC—the matter of obtaining suitable brass on an over-the-counter basis and at a reasonable price. Remington is the only manufacturer to take up commercial production of this caliber.

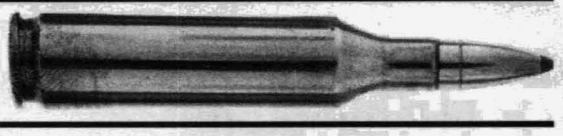
6mm BR Remington Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
70 SP	W748	32	3200	1592	Hornady
75 HP	W748	33	3200	1706	Hornady
80 SP	W748	31.5	3100	1708	Hornady
80 SP	RL-7	24	2900	1494	Hornady
80	Varget	32.5	3159	1740	Hodgdon
87 SP	W748	31	3000	1739	Hornady
87 SP	H-322	25.5	2800	1515	Hornady
100 SP		FL	2550	1444	Remington factory load.

Remington Model 40XB-BR



243 Winchester

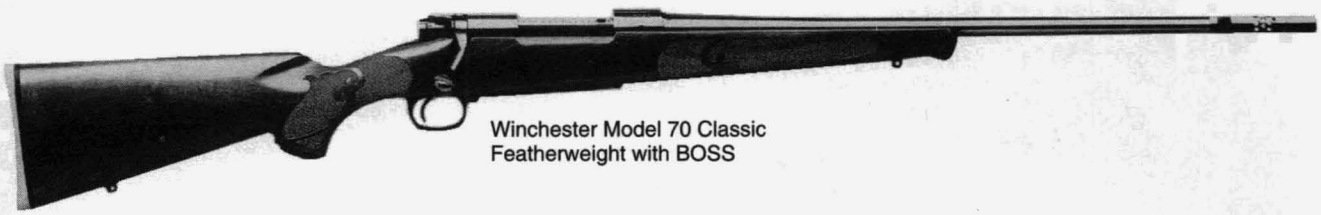


Historical Notes The 243 Winchester was introduced by Winchester in 1955 for their Model 70 bolt-action and Model 88 lever-action rifles. The 243 was quickly adopted by Savage for their Model 99 lever- and Model 110 bolt-action rifles. All of the British and European manufacturers began chambering bolt-action rifles for this round. In fact, even Remington, who developed their own 6mm, had to recognize the popularity of the 243 and start chambering their rifles for it. The 243 (6mm) Winchester is nothing more than the 308 Winchester case necked-down. Original development and publicity was due largely to the efforts of gun writer, the late Warren Page, who along with other wildcatters worked out a similar version before Winchester. The 243 is probably chambered in more different rifles than any other cartridge, except possibly the 30-06 Springfield. All other manufacturers of rifles offer this caliber.

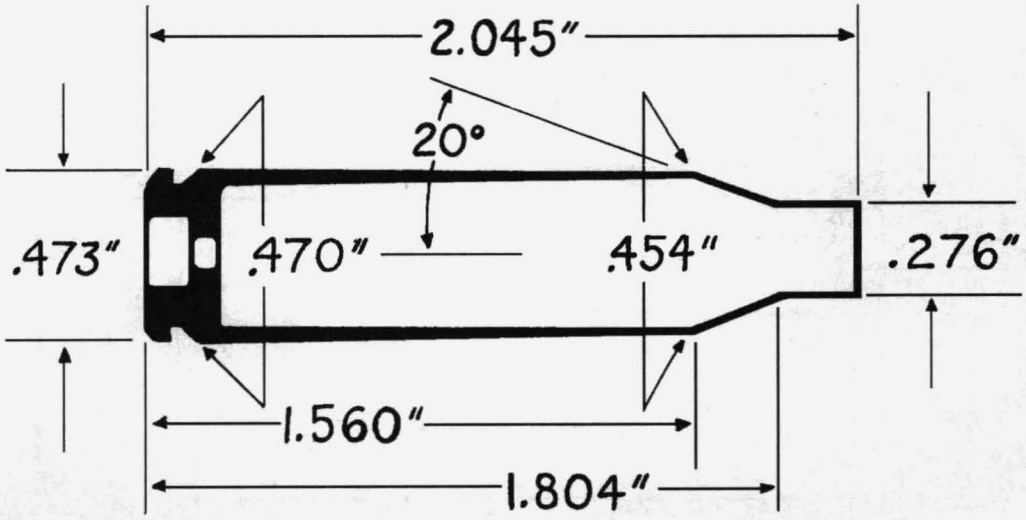
General Comments The 243 Winchester represents a successful effort to develop light deer rifle caliber that could hold its own with the high-velocity 22s for long-range use on small targets and still be adequate for larger animals. The 243 does this job well. It eliminates the need to own two different rifles for anything from small game and pests up to and including deer and antelope. The 80-grain bullet is intended primarily for varmint and small game and the 100-grain bullet for deer-size animals. The 257 Roberts and the 250-3000 Savage are supposed to cover the same range and certainly do. However, the 25-caliber bullets don't have the sectional density for long-range varmint shooting until bullet weight gets up to 120 grains, and then the velocity falls off badly. All major domestic and overseas manufacturers of commercial ammunition offer this caliber. Its popularity as a deer caliber has prevailed over its varmint capabilities.

243 Winchester Loading Data and Factory Ballistics

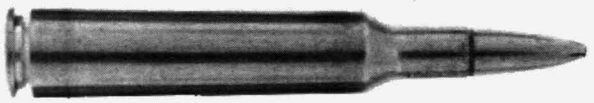
Bullet (grs.)	Powder/grs.		MV	ME	Source
75 HP	IMR 4064	40	3300	1814	Hornady, Speer
80 SP	IMR 4320	38	3000	1599	Speer, Hornady
85 SP	H-380	38.5	3100	1814	Sierra
90 SP	IMR 4831	44	3000	1799	Speer, Sierra
95 SP	IMR 3031	35	2900	1775	Nosler
100 SP	IMR 4350	42	2900	1868	Sierra, Hornady
80 SP	FL		3550	1993	Factory load
85 SP	FL		3320	2080	Factory load
100 SP	FL		2960	1945	Factory load
105 SP	FL		3100	2133	Factory load.



Winchester Model 70 Classic Featherweight with BOSS



6mm Remington (244 Remington)

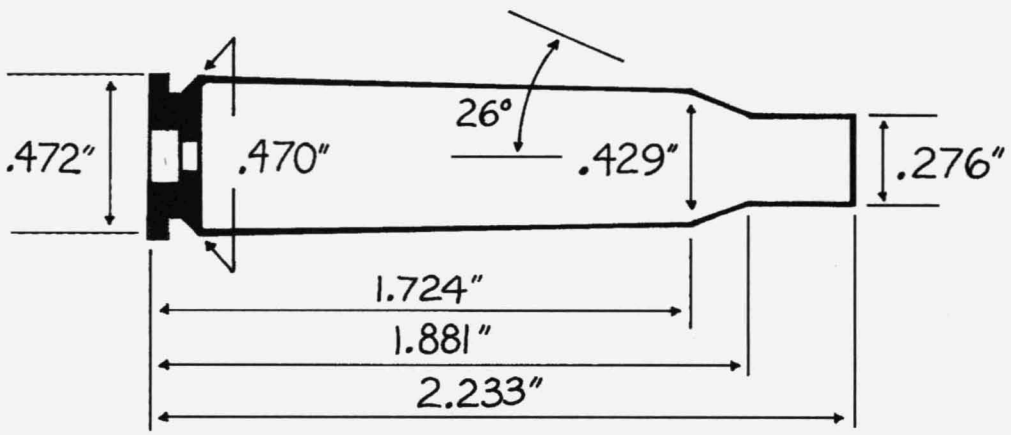


Historical Notes The 6mm Remington has exactly the same case dimensions as the 244 Remington. They differ only in the fact that the 6mm Remington is loaded with bullets of up to 100 grains, whereas the 244 Remington was never loaded with bullets of over 90 grains weight. Ammunition marked 244 Remington can be fired in 6mm Remington chambers and vice versa. However, rifles marked 244 Remington will not stabilize the 100-grain bullet. The difference in the two is that 244 rifles (if manufactured by Remington) have a 1 in 12-inch rifling twist and rifles marked 6mm have a 1 in 9-inch twist. When Remington introduced the 244 in 1955 they selected the 1 in 12-inch twist as best suited to long-range accuracy with bullets of 80 grains. They were correct except that most shooters wanted to be able to use bullets of 100 to 105 grains in order to cover the range of game from varmints through deer with the same rifle. To correct this misjudgement, Remington renamed the cartridge 6mm Remington and changed to a 1 in 9-inch twist. To have retained the 244 designation and simply change the twist would have brought on complaints from purchasers of the original 244s with the slower twist when they tried to use the new 100-grain load. The change in cartridge nomenclature to 6mm and the faster twist occurred in 1963. The Remington 700 series and 788 bolt-action rifles as well as their autoloaders and the slide actions have been available in 6mm.

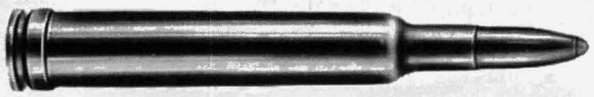
General Comments The original 6mm Remington was loaded only with the 100-grain bullet. However, it is now available with 80-, 90- and 100-grain bullets which greatly extends its flexibility. Although the older 244 lost out to the 243 Winchester, the 6mm Remington is gradually picking up a following. It is an excellent choice for the varmint hunter who also wants to use his rifle for deer and antelope. Although the 6mm has a slightly larger powder capacity than the 243, the difference in performance is negligible as far as killing power is concerned. Nevertheless, this small advance in ballistics appeals to some people and so does the longer neck of the 6mm case, which many handloaders consider desirable. This caliber is commercially loaded by Federal and Winchester as well as Remington.

6mm Remington Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV3	ME	Source
60 HP	H-335	42	3700	1824	Sierra
70 SP	IMR 4350	47	3400	1797	Sierra, Hornady
75 HP	IMR 4064	41	3500	2041	Speer, Nosler
75 HP	IMR 4350	47	3450	1983	Nosler, Speer, Sierra
80 SP	IMR 4350	45	3200	1820	Hornady
80 SP	IMR 4831	47	3200	1820	Hornady, Speer
90 HP	IMR 4350	45	3200	2047	Speer, Sierra
90 HP	IMR 4831	45	3100	1921	Speer, Sierra
100 SP	IMR 4350	42	2900	1868	Hornady, Speer, Sierra, Nosler
100 SP	IMR 4831	44	2900	1868	Speer, Sierra, Hornady
100	H1000	51.0	3111	2145	Hodgdon
105 SP	IMR 4350	42	2950	2030	Speer
105 SP	IMR 4064	37	2900	1961	Speer
80 SP	FL		3470	2139	Factory load.
90 SP	FL		3190	2133	Factory load.
100 SP	FL		3100	2133	Factory load.



240 Weatherby Magnum

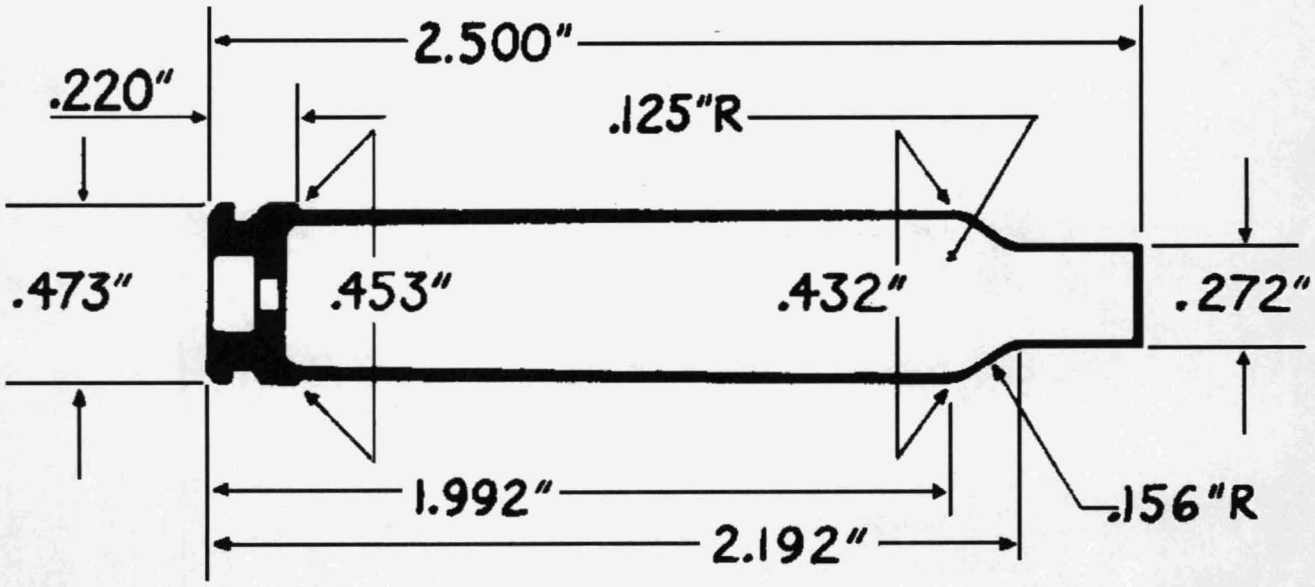


Historical Notes The 240 Weatherby was added to round out the Weatherby proprietary magnum line in 1968. It differs from other 6mms in having a belted case with somewhat greater powder capacity. It is very similar to the 240 Belted Rimless Nitro-Express introduced by Holland & Holland around 1923. Thus far, it is available only in the Weatherby Mark V bolt-action rifle or through custom gunsmiths. It is an excellent cartridge and will push the 100-grain 6mm bullet with about 200 fps greater muzzle velocity than the 6mm Remington and around 400 fps faster than the 243 Winchester. However, a considerable portion of this ballistic advantage results from increased barrel length and loading pressure. It is important to allow plenty of barrel cooling time with this, and all, high-intensity cartridges. It is a more effective deer and antelope cartridge than the other two. The principal detraction regarding the 240 Weatherby Magnum is that ammunition is expensive and difficult to find outside of the large cities. The 240 case has about the same capacity as the 30-06 and the rim diameter is also the same.

General Comments The 240 Weatherby is the most powerful of the 6mm cartridges. It represents the maximum performance that one can squeeze through a 6mm tube with modern powders. The 244 H&H Belted Rimless Magnum, based on necking-down the 375 H&H Magnum case, will hold more powder but doesn't produce any improvement in ballistics. The late Roy Weatherby built a successful proprietary gun business on the basis of a good product plus the all-important element of ballistic one-upmanship. The Weatherby magnum cartridges have traditionally offered higher velocity and energy than their standard factory counterpart. The 240 was born of this same tradition. Of course, Remington, Winchester, Norma et al have their own magnum line in various calibers, and Winchester offered the 300 and 375 H&H Magnums before WWII. However, Roy Weatherby was the first to really popularize this British innovation in the U.S. He convinced the American shooters that it was something they truly needed. For the hunter who must have that extra edge in a 6mm rifle, the 240 Weatherby is the cartridge of choice.

240 Weatherby Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
60 HP	IMR 4350	53	3800	1924	Sierra
70 HP	IMR 4350	52	3700	2128	Hornady, Nosler
75 HP	IMR 4320	50.5	3800	2405	Hornady
80 SP	IMR 4831	52.5	3500	2177	Hornady, Speer
85 SP	IMR 4350	51	3450	2247	Nosler, Speer, Sierra
90 SP	IMR 4831	52	3400	2311	Speer, Hornady, Sierra
95 SP	IMR 4350	47	3050	1963	Nosler
100 SP	IMR 4831	52	3300	2419	Hornady
105 SP	IMR 4831	49.5	3150	2314	Speer
70 HP	FL		3850	2304	Weatherby factory load
87 SP	FL		3500	2366	Weatherby factory load
100 SP	FL		3395	2559	Weatherby factory load



25-20 Winchester (25-20 WCF)

Historical Notes The 25-20 Winchester Center Fire was developed for the short action of the Winchester Model 1892 lever-action rifle. It is the repeating version of the older 25-20 single shot, but is based on the 32-20 necked-down. There is a difference in opinion as to when it was actually introduced. Some authorities say 1893, others 1895. In any event, it was quickly adopted by a majority of the gun manufacturers and achieved considerable popularity. The Winchester lever-action 1892 and modernized Model 65, Remington slide-action Model 25, Marlin slide-action 27 and lever-action Model 94, and the Savage bolt-action repeater Model 23, were all available in 25-20 WCF. Marlin has reintroduced the 25-20 WCF in their Model 1894CL lever action. Winchester also loaded this same chambering with a slightly different bullet shape and headstamped it 25-20 Marlin.

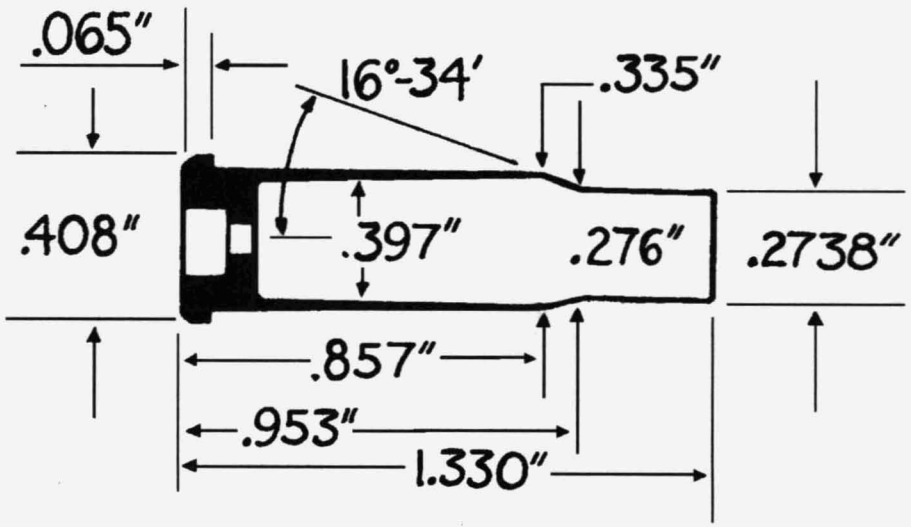
General Comments Prior to the 22 Hornet and the 218 Bee, the 25-20 WCF was one of the most popular small game and varmint cartridges. It was also advertised as being suitable for deer and similar animals. No doubt it has killed plenty of deer, but it is not a satisfactory big game cartridge by any standard. *(Editor's note: Decades ago my uncle dropped two bull elk, quite dead, with three shots from his Model 92 in 25-20. Marksmanship has always mattered.)* Today, it is universally outlawed for big game hunting. On smaller animals, the 60-grain bullet is quite effective for 100- to 150-yard varmint shooting. The 86-grain soft-point or lead bullet does a fine job on rabbit or turkey to 125 yards. A great many rifles were made in this caliber and are still in use by trappers, ranchers and farmers. Under certain conditions, the 25-20 repeater is still a useful small game number. It will probably be around for a good many more years. The 60-grain bullet can't be improved by handloading, but the 86-grain can be stepped up to over 1700 fps.

The 25-20 is another old-timer the author has played around with at various times. Ownership of a Winchester Model 1892 lever action and later a Winchester Low Wall single shot in this caliber allowed ample opportunity to test its potential for small game and varmint hunting. It will do the job, but has serious range limitations due in part to bullet design. The 60-grain high-velocity load achieves its maximum expansion at a range of between 50 and 70 yards. Beyond that good bullet placement is essential if the animal is not going to crawl off and die a lingering death. At ranges out to 50 yards the bullet expansion will ruin most of the edible meat on small game. The 86-grain bullet is a better load for meat hunting although the lower velocity requires good distance judgement at ranges much beyond 75 yards.

On the other hand, the 25-20 is one of those cartridges that can be improved to a satisfying degree by handloading. The 86-grain bullet can be loaded to deliver around 1700 fps, but the 60-grain bullet can't be improved much over the factory load. The 25-20 is also capable of very good accuracy when fired in a single shot or bolt-action rifle. My Winchester single shot would do better than 2-inch groups at 100 yards with handloads. Both Winchester and Remington continue to offer this caliber only with the 86-grain bullet.

25-20 Winchester (25 WCF) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
60 SP	2400	9.6	2200	645	Hornady
60 SP	H-4227	11	2200	645	Hornady
60 SP	FL		2250	675	Factory load.
86 SP	FL		1460	407	Factory load.



25-35 Winchester (25-35 WCF)

Historical Notes The 25-35 was developed by Winchester and introduced in 1895 for the Model 94 lever-action rifle. Along with the 30-30, it was one of the first small-bore, smokeless powder, sporting cartridges developed in the United States. Winchester, Marlin and Savage all chambered repeating lever-action rifles for this cartridge. Quite a few single shot rifles also chambered the 25-35, and in Europe it was used in combination-type arms. No American rifles have been made for the 25-35 since the end of WWII.

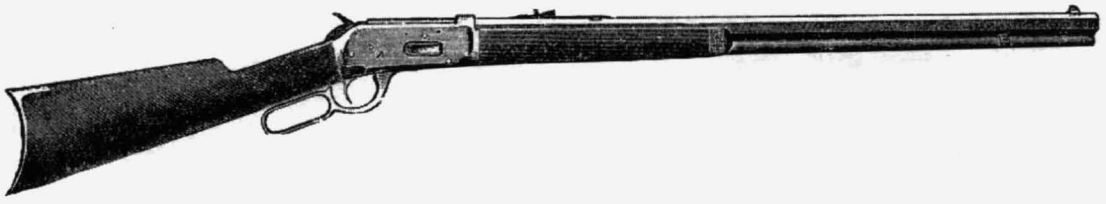
General Comments The 25-35 is one of the most accurate cartridges available in the older lever-action rifles. In a good solid-frame single shot, it will shoot about as accurately as any 25 ever developed. It does not have sufficient velocity for long-range shooting. It has never been noted for great stopping power on deer or similar animals. In fact it is illegal for this purpose in many states. There are still a large number of 25-35 rifles in use, but it is more or less obsolete. It is not nearly as effective as the 250-3000 Savage, 257 Roberts or any of the more modern 6mm cartridges. However, it does have moderate recoil and will do a good job on small game and varmints at medium ranges. Modern powders would allow significant ballistic improvement if loads were at the same pressure as the current 30-30 factory ammunition. Loaded thus, this cartridge might not appear quite so anemic and would be better suited to deer hunting. Ackley's improved version provides impressive performance. Winchester is the only remaining manufacturer of this caliber.

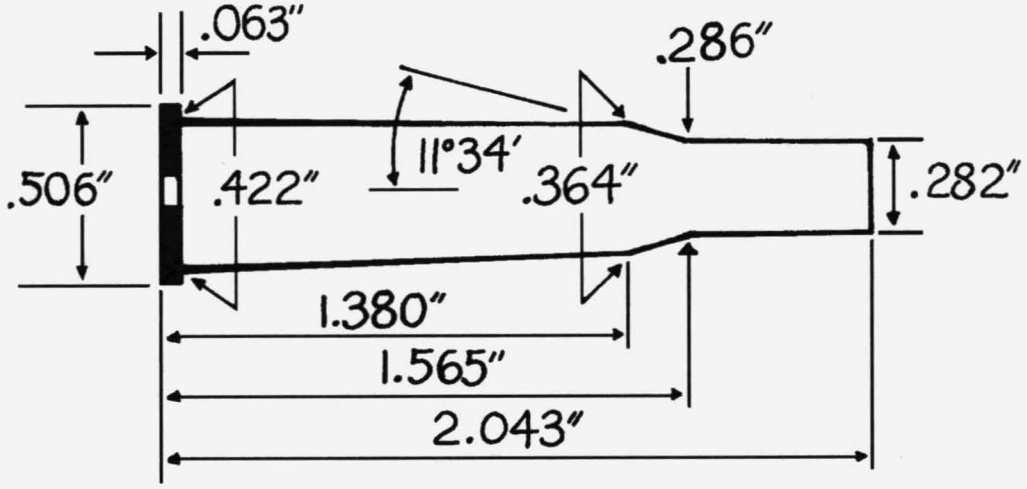
25-35 Winchester (25 WCF) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
60 SP	IMR 4064	30.5	2800	1045	Hornady
60 SP	IMR 4320	32	2900	1120	Hornady
117 SP	IMR 3031	25.5	2300	1375	Hornady
117 SP	IMR 4320	27	2200	1258	Hornady
117 SP	FL		2230	1292	Winchester factory load.

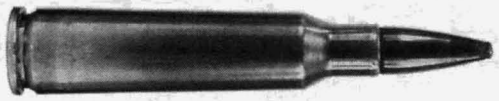
Winchester Repeating Rifle, Model 1894.

Made For .25-35 And .30 W. C. F., .32 W. S., .32-40 And .38-55 Cartridges.





250 Savage (250-3000)

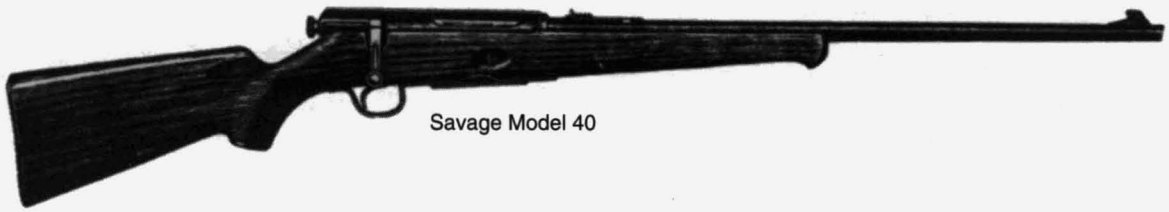


Historical Notes Designed by Charles Newton, the 250 Savage was introduced by the Savage Arms Company as a high-velocity round for the Model 99 lever-action rifle. The original loading used an 87-grain bullet at 3000 fps muzzle velocity, and Savage named it the 250-3000. One suspects the 87-grain bullet was chosen because it could be safely driven at 3000 fps with the powders then available. This allowed Savage to introduce it with the ever so sexy name 250-3000. Remember in 1915, when this cartridge was introduced, riflemen were still marvelling at cartridges achieveing 2000 fps. About 1932, the 100-grain bullet load was marketed by Peters Cartridge Company and later the velocity of the 87-grain bullet was slightly increased. Now it is simply called the 250 Savage. The Savage Model 20 and 40 bolt-action rifles also chambered the round, as did the Winchester Model 54 and 70 bolt actions. Late in 1971, Savage announced that their Model 99 would again be available in this caliber. Others, such as Ruger and Remington, have made rifles in this caliber also.

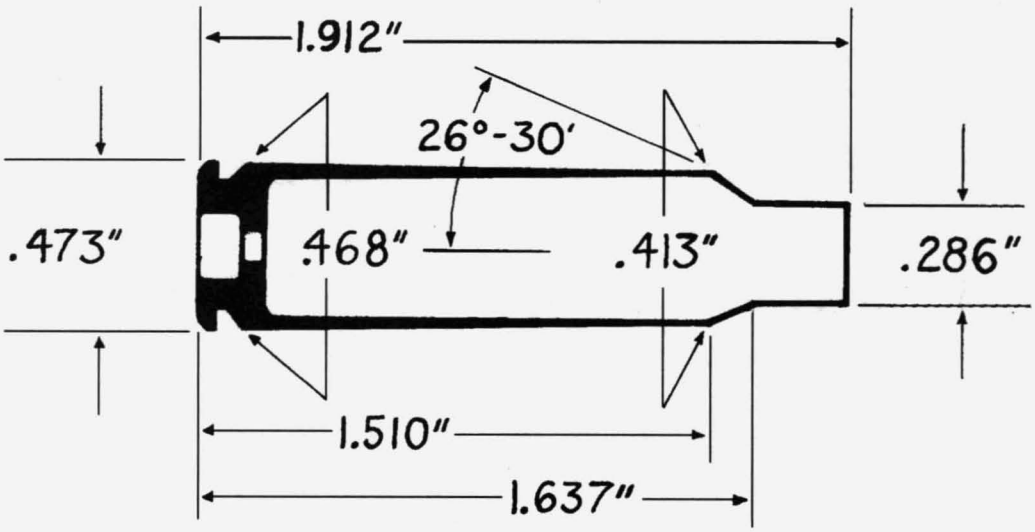
General Comments Flat trajectory, outstanding accuracy and good killing power on anything up to and including deer are established characteristics of the 250 Savage. It was, and is, excellent on varmints through deer. In the past few years it has been edged out by the 257 Roberts and the new 6mm cartridges. It is far superior as a deer cartridge to the 30-30 or anything in that class, regardless of what some 30-30 addicts claim. Because of its light recoil, it is an excellent choice for youths and women. The 250-3000 is the basis of one of Ackley's best wildcats, the 250 Ackley Improved. Both Remington and Winchester continue to load this caliber. However, the 87-grain and 120-grain bullets are no longer factory loaded.

250 Savage (250-3000) Loading Data and Factory Ballistics

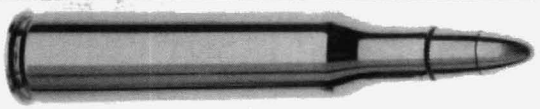
Bullet (grs.)	Powder/grs.		MV	ME	Source
60 SP	IMR 4064	39	3500	1632	Hornady
87 SP	IMR 4895	36.5	3200	1979	Sierra
87 SP	IMR 4064	35	3100	1857	Sierra
100 SP	IMR 4320	36	2800	1741	Nosler
117 SP	IMR 4064	32.5	2700	1894	Hornady
87 SP	FL		3030	1770	Factory load.
100 SP	FL		2820	1765	Factory load.
120 SP	FL		2645	1865	Factory load.



Savage Model 40



257 Roberts (257 Roberts +P)



Historical Notes The commercial version of the 257 Roberts was released by Remington in 1934 chambered in their Model 30 bolt-action rifle. It was quickly picked up by Winchester for their Model 54 and the later Model 70. The Remington 722 bolt-action and the 760 slide-action models were also available in 257-caliber. In recent years many American manufacturers have discontinued it, although Ruger continues to offer it their Model 77 bolt action. The original cartridge was designed by N. H. Roberts (a well-known experimenter and gun writer during the 1920s and '30s) and is based on the 7x57mm Mauser necked-down. Remington changed the Robert's shoulder angle from 15 to 20 degrees. The name of the cartridge was adopted to honor its original developer. Custom rifles in this caliber were made by the Niedner Rifle Co. as early as 1928.

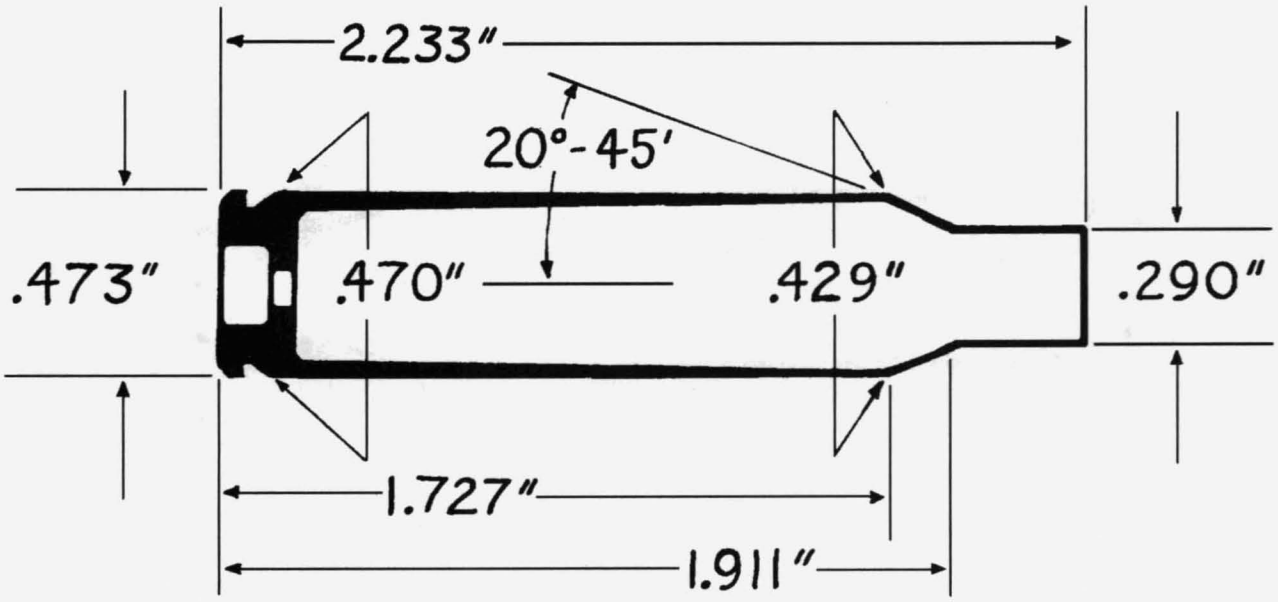
General Comments The 257 Roberts has often been referred to as the "most useful rifle cartridge ever developed." That is not very far wrong. It is suitable for a wide range of hunting under a variety of conditions. As a long-range varmint cartridge, it is as good as they come, being only slightly inferior to the newer 6mms. On deer, antelope, black bear, sheep or goat it is as good as any other cartridge available. Naturally, it is not as powerful as the 270 Winchester, 30-06, but it has ample power for the game mentioned at all practical ranges.

The 257 was underloaded by ammunition companies. However, in the late 1980s higher pressure +P loads were introduced which enabled factory loaded 257 Roberts ammunition to reach full potential. With modern powders the reloader can improve performance safely in all bullet weights. With 117- or 120-grain boattail bullets at velocities of around 2800 fps the 257 can be used successfully on elk and caribou. It is at this end of the scale that it has an advantage over the 6mms. The author has used it for many years and it is one of his favorite calibers for western hunting. Ackley's improved version of the 257 Roberts practically duplicates the ballistics of the larger 25-06. Winchester, Federal and Remington all offer this caliber. The 87-grain bullet is no longer factory loaded.

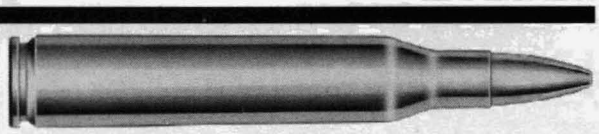
257 Roberts (257 Roberts +P) Loading Data and Factory Ballistics

Bullet (grs.)	Powder	grs.	MV	ME	Source
60 SP	IMR 4064	44	3600	1727	Hornady
75 HP	IMR 4064	42	3300	1814	Sierra
87 SP	IMR 4320	37.5	3000	1739	Hornady
87 SP	H-380	46	3200	1979	Sierra, Hornady
100 SP*	IMR 4831	45.5	3100	2134	Nosler, Speer
100 SP	IMR 3031	34	2800	1741	Hornady, Sierra
117 SP	IMR 4320	36	2600	1757	Sierra
117 SP	IMR 4064	34.5	2600	1757	Hornady, Sierra
120 SP*	IMR 4831	42.5	2800	2091	Nosler
120 SP	IMR 4350	38.5	2600	1802	Hornady
87 SP	FL		3200	1980	+P Factory load.
100 SP	FL		3000	1998	+P Factory load.
117 SP	FL		2780	2009	+P Factory load.
120 SP	FL		2645	1865	Factory load.

* +P data



25-06 Remington

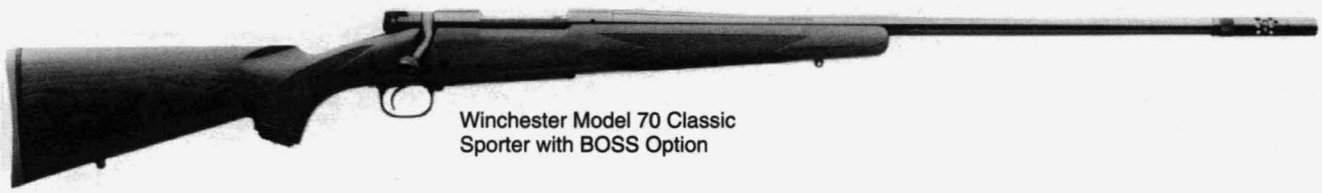


Historical Notes The 25-06, originally a wildcat cartridge, was picked up by Remington and added to their commercial line late in 1969. The wildcat version dates back to 1920, when it was introduced by A. O. Niedner. Remington has stuck to his original configuration of simply necking-down the 30-06 case. The Remington Model 700 series bolt-action rifles were the first to be offered in the newly-adopted caliber. At the present time, Remington, Interarms, Ruger, Savage, Winchester, Weatherby, Sako and almost every other manufacturer of bolt-action rifles offer at least one version in 25-06. In addition, the Ruger single shot is available in this caliber. Since its commercial introduction, the 25-06 Remington has become a very popular number.

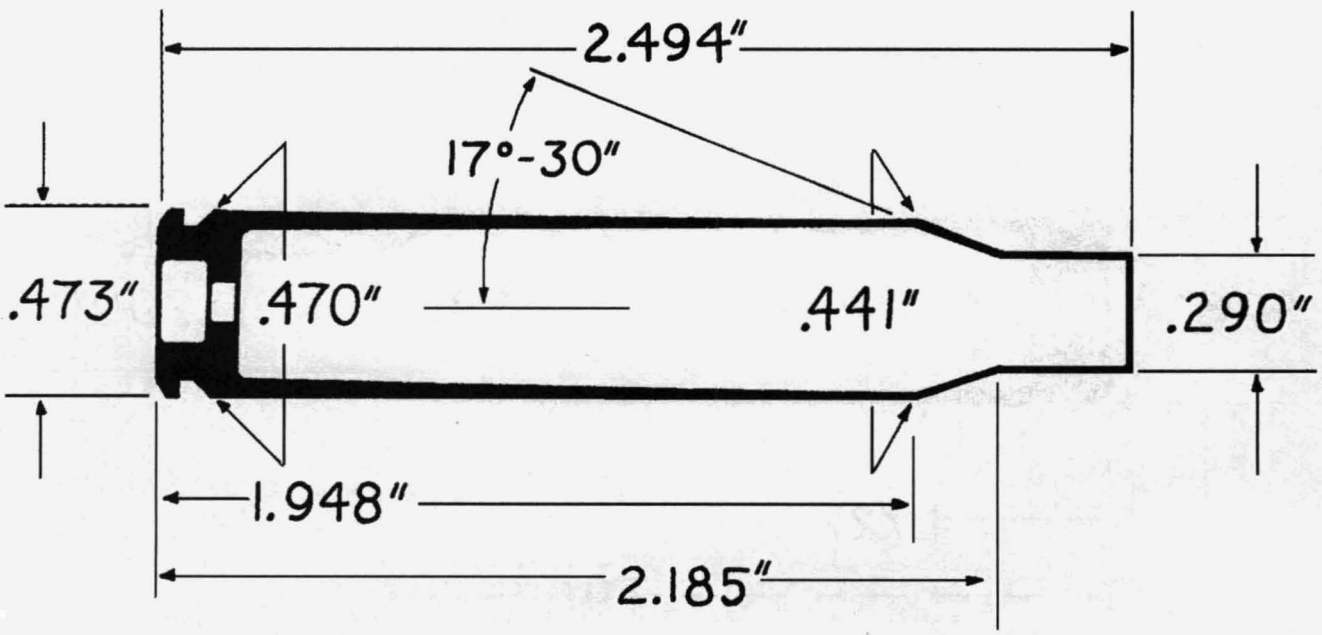
General Comments The 25-06 was probably the finest of the 25-caliber wildcats. Its emergence as a standardized factory load has been welcomed by many. As a varmint cartridge with the 87-grain bullet it is said to be unsurpassed. However, a comparison of factory ballistics and a little chronographing can be most informative. Comparing factory data, we see that as a varmint cartridge both the 6mm Remington and 270 Winchester beat anything the 25-06 can offer in every category that matters. Amazingly, in spite of its much smaller case, the 6mm Rem. 100-grain load is only marginally behind the 25-06 120-grain load in retained energy at long range. There really isn't any comparison between hunting loads in the 25-06 and the 270 Win. Chronographing results suggest that factory data is equally representative of what each can realistically do. So just exactly what does the 25-06 offer? Evidently something, because many laud the 25-06 as among the best. Federal, Winchester and Remington offer this caliber in several bullet weights.

25-06 Remington Loading Data and Factory Ballistics

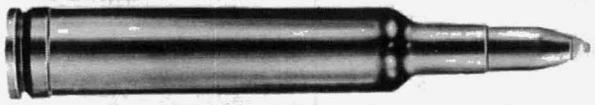
Bullet (grs.)	Powder/grs.		MV	ME	Source
75 HP	IMR 4350	55	3500	2041	Hornady, Sierra
87 SP	IMR 4831	57	3500	2367	Hornady
100 SP	IMR 4831	54.5	3300	2419	Sierra, Speer
120 SP	IMR 4064	44	3000	2399	Hornady
120 SP	IMR 4831	50	3000	2399	Nosler, Speer
87 SP	FL		3500	2370	Factory load.
90 SP	FL		3440	2364	Factory load.
100 SP	FL		3230	2316	Factory load.
117 SP	FL		2990	2320	Factory load.
120 SP	FL		2940	2382	Factory load.



Winchester Model 70 Classic Sporter with BOSS Option



257 Weatherby Magnum

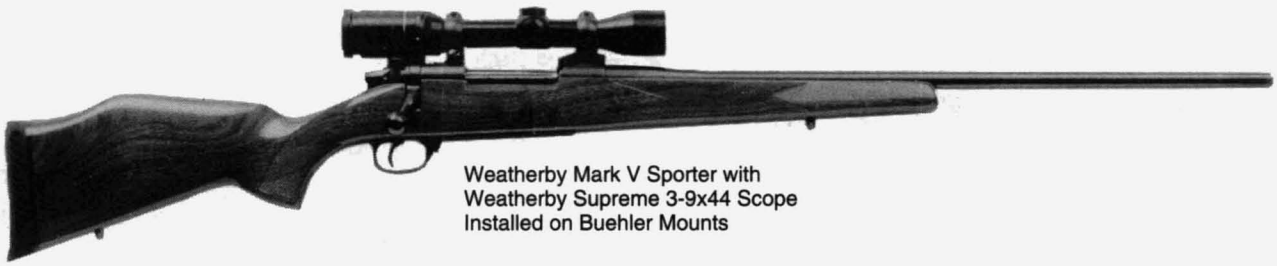


Historical Notes This cartridge was designed by Roy Weatherby in 1944, a year before he went into the commercial gun business. Like most other Weatherby cartridges, it is based on the necked-down and blown-out 300 H&H case. Commercial ammunition under the Weatherby name has been available since 1948. These have been based on Norma components since 1951. There are a number of wildcat versions of the 300 H&H Magnum necked-down to 25-caliber, but the Weatherby cartridge has largely displaced these.

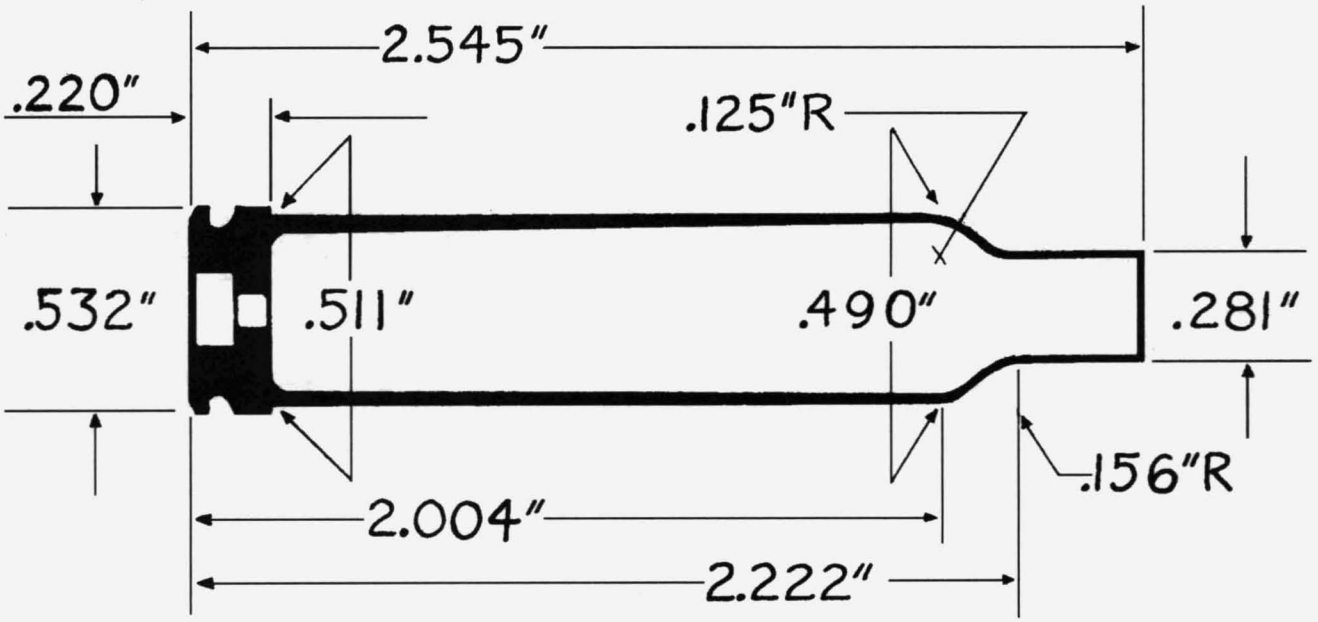
General Comments The 257 WM is one of the first modern, ultra-velocity, small-bore, rifle cartridges to be produced on a commercial basis that developed and retained a degree of popularity. It is accurate and well-suited for long-range varmint shooting on one hand and delivers sufficient velocity and energy to take on almost any North American big game on the other. A superb deer, antelope, sheep, goat or black bear cartridge, it has also been used successfully on elk, moose, brown bear, lion, buffalo and zebra. Many authorities insist that it is much too light for heavy game, but high-velocity advocates insist that with proper bullets, it is adequate for anything except the largest game in close cover. However, like most of its ilk, this number can be extremely hard on its barrel especially if not enough time is allowed between shots to allow the barrel to cool down or if the barrel has not been cleaned adequately. And, like all high intensity chamberings, it loses a great deal of velocity with barrels shorter than 26 inches. It is in its element for long-range plains or mountain hunting. The author used a custom Model 70 Winchester and later a Weatherby Mark V in this caliber, and it is dynamite on deer-size animals. For long-range varmint shooting it can only be described as "spectacular."

257 Weatherby Magnum Loading Data and Factory Ballistics

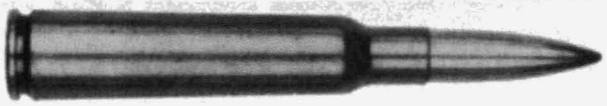
Bullet (grs.)	Powder/grs.		MV	ME	Source
75 HP	IMR 4350	66.5	3800	2405	Hornady
87 SP	IMR 4831	71	3700	2645	Speer
100 SP	IMR 4831	66.5	3400	2568	Sierra, Speer, Nosler
117 SP	IMR 4831	61.5	3100	2497	Hornady, Sierra
120 SP	IMR 4350	59	3200	2729	Hornady
87 SP	FL		3825	2827	Weatherby factory load.
100 SP	FL		3602	2882	Weatherby factory load.
120 SP	FL		3305	2911	Weatherby factory load.



Weatherby Mark V Sporter with
Weatherby Supreme 3-9x44 Scope
Installed on Buehler Mounts



6.5x55 Swedish Mauser

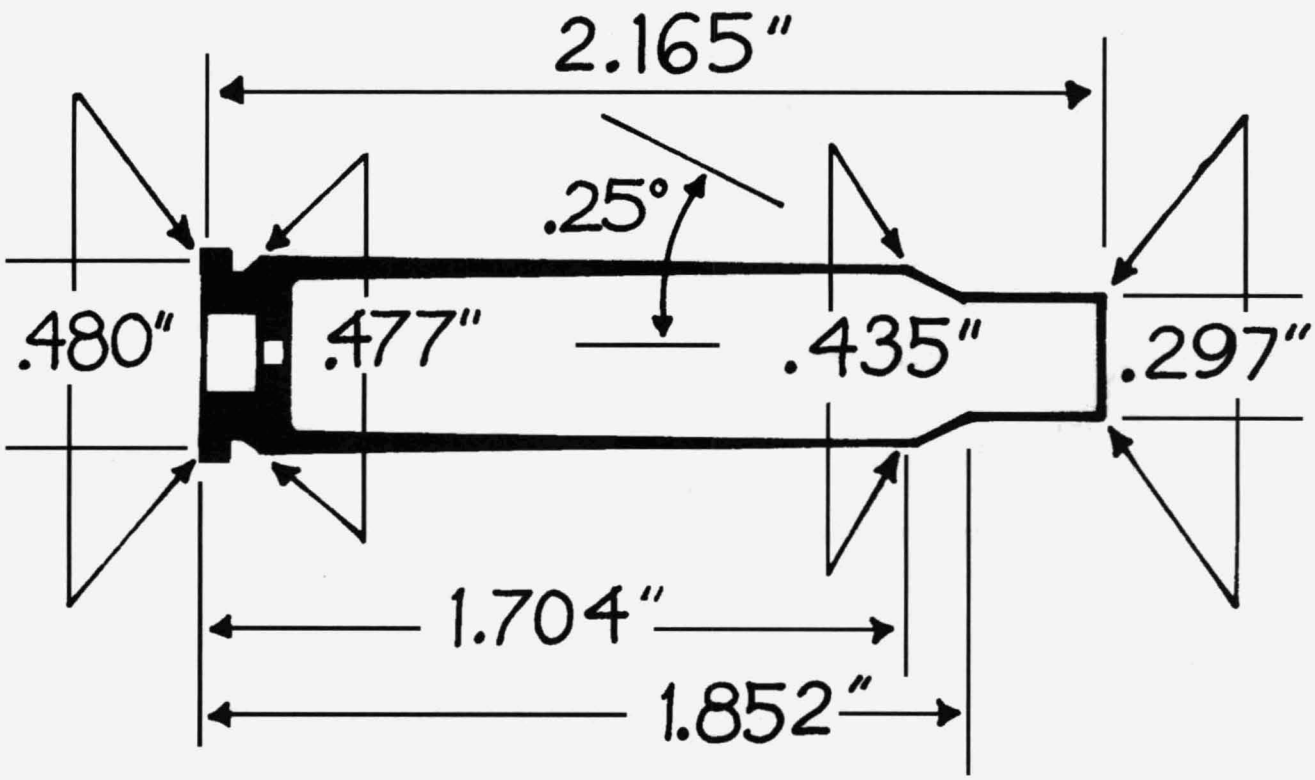


Historical Notes Adopted by the Swedish Army in 1984, the 6.5x55 remained in active Swedish military service until quite recently. This caliber is quite popular throughout Scandinavia for hunting all types of game including moose. It is also a popular choice for 300-meter target shooting and other forms of rifle competition. Prior to World War II, the 6.5x55 Swedish was almost unknown in the U.S. After the war, Canadian and U.S. sportsmen became acquainted with this caliber through the thousands of surplus Swedish Mauser rifles sold in North America. Many of these excellent rifles were sporterized leaving them in their original caliber. Canadian sportsmen were first off the mark to appreciate the virtues of this caliber in the 1950s and 1960s. Later U.S. sportsmen arrived at the same conclusions in the 1970s and 1980s. Other than imported rifles from Scandinavian countries, few sporting rifles in this caliber were available in the U.S. until the 1990s. This has now changed as Winchester offers their Featherweight M70 rifle and Ruger their M77 rifle in this caliber.

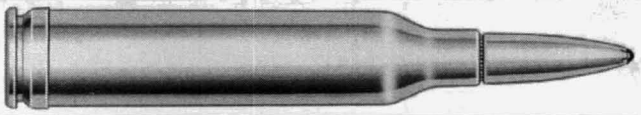
General Comments The 6.5x55 is one of the few 6.5mm calibers ever to catch on in the U.S. For many years, Norma of Sweden was the only manufacturer of this caliber until 1991-92 when Federal Cartridge Co. added this caliber to their Premium product line. This caliber continues to gain popularity as surplus Swedish Mauser rifles are still being imported. Two reasons for its growth in popularity are low recoil and superb accuracy. It is an excellent deer and antelope caliber and is also suitable for bear and elk under good conditions at moderate ranges. Because of its flat trajectory, it is an outstanding choice for hunting sheep and goat in mountainous terrain using lightweight rifles. Lack of suitable bullets and handload data handicapped the full potential of the caliber for many years. This has changed now as good bullets and reloading data are now available from most component manufacturers. The 140-grain bullets are best for most types of hunting and are also the most accurate. The 6.5x55 Swedish Mauser case is not related to typical Mauser cartridges.

6.5x55mm Swedish Mauser Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
85 HP	IMR 4320	47	3100	1814	Sierra
100 HP	H-380	43.5	3000	1999	Hornady
120 SP	H-4350	47	3000	2399	Nosler, Barnes
129 SP	H-380	43.5	2800	2246	Hornady
140 SP	IMR 4831	47	2600	2102	Speer, Barnes
160 SP	H-4831	44	2600	2402	Speer
140 SP	FL		2550	2020	Federal factory load.



264 Winchester Magnum



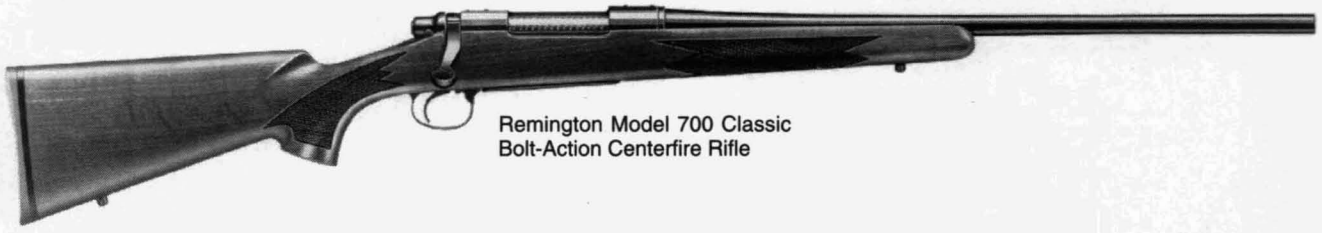
Historical Notes This cartridge was officially announced by Winchester in 1958. The 264 Magnum is one of a series of cartridges based on the original Winchester 458 belted case, necked-down. It is historically significant as it is the first American 6.5mm cartridge since the long-defunct 256 Newton was announced back in 1913. It was originally available only in the Winchester bolt-action Model 70 "Westerner" with a 26-inch stainless steel barrel. For a time, the Remington 700 Series was offered in 264-caliber as was the Ruger M77.

General Comments The 264 Winchester is a very fine, ultra-velocity cartridge with excellent long-range capabilities and ballistics superior to the time-tried 270 Winchester. Its development may well have been suggested by the 257 Weatherby Magnum, for the two are quite similar. The 264 is able to equal the 257 WM, but with the added advantage of the heavier 140-grain bullet for larger species of big game. The 100-grain bullet is intended for animals in the deer and antelope class, the 140-grain for elk and above. The rifling twist used by Winchester is not quick enough to stabilize spitzer bullets of more than 140 grains. The handloader has a wide choice of bullets ranging from 87 to 160 grains. All things considered, the 264 Magnum is adequate for any North American big game. It is a plains and mountain cartridge. Like most of its ilk, this number can be extremely hard on its barrel, especially with either careless shooting, inadequate barrel cooling between shots or inadequate cleaning. (Joyce Hornady said they went through three barrels for this chambering just trying to work up the data for three bullets with a few powders each. They were tipped off to a problem when the maximum charge for the 140-grain bullet turned out to be quite a bit higher than the maximum charge for the 120-grain bullet with the same powder.) And, like all of the high-intensity chamberings, it loses a great deal of velocity with barrels shorter than 26 inches. To quanitify this: Best possible safe 264 Winchester Magnum loads from 22-inch barrels produce less energy than best possible 270 Winchester loads from a 22-inch barrel with equal weight bullets. Both Remington and Winchester still offer this caliber. However, only the 140-grain bullet is available.

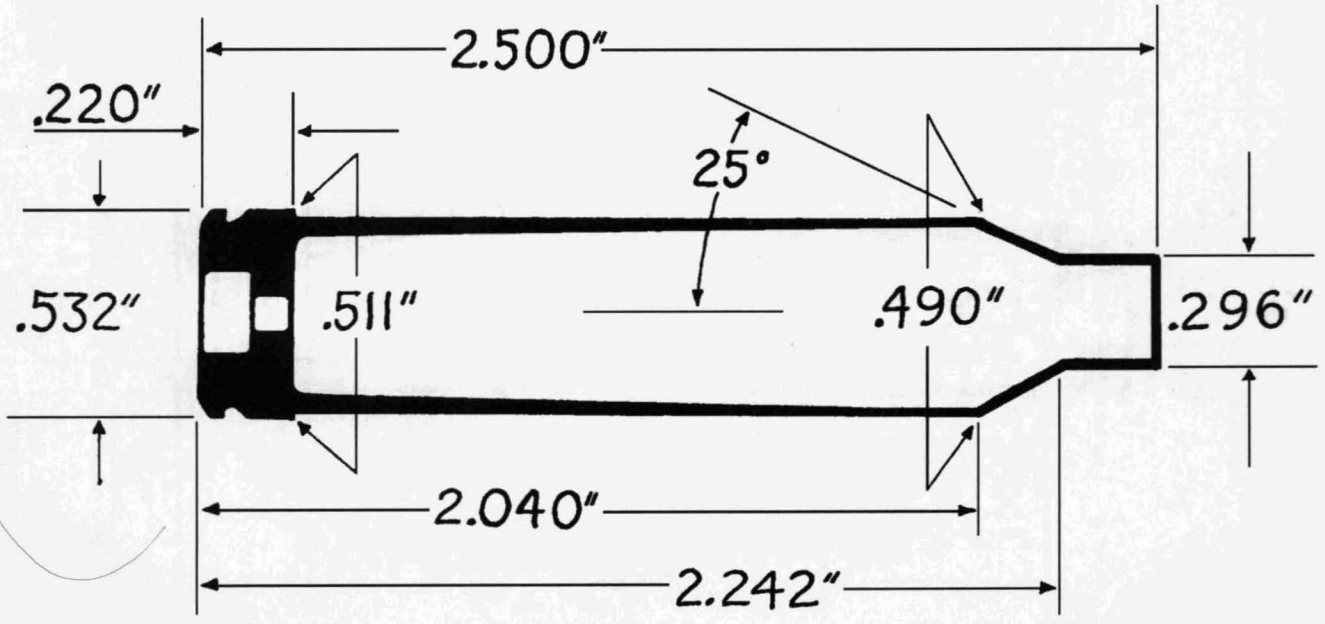
264 Winchester Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
85 SP	IMR 4895	57	3700	2585	Sierra
100 SP	IMR 4831	65	3500	2721	Hornady
120 SP	IMR 4350	60	3200	2729	Nosler, Sierra
129 SP	IMR 4350	57	3100	2753	Hornady
140 SP	IMR 4831	61	3100	2988	Hornady
140 SP	IMR 4350	55	3000	2799	Speer, Nosler
160 SP	IMR 4831	54.5	2700	2591	Hornady
140 SP	FL		3030	2854	Factory load

Loads shown are for the factory 26″ barrel, using Winchester-Western cases.



Remington Model 700 Classic
Bolt-Action Centerfire Rifle



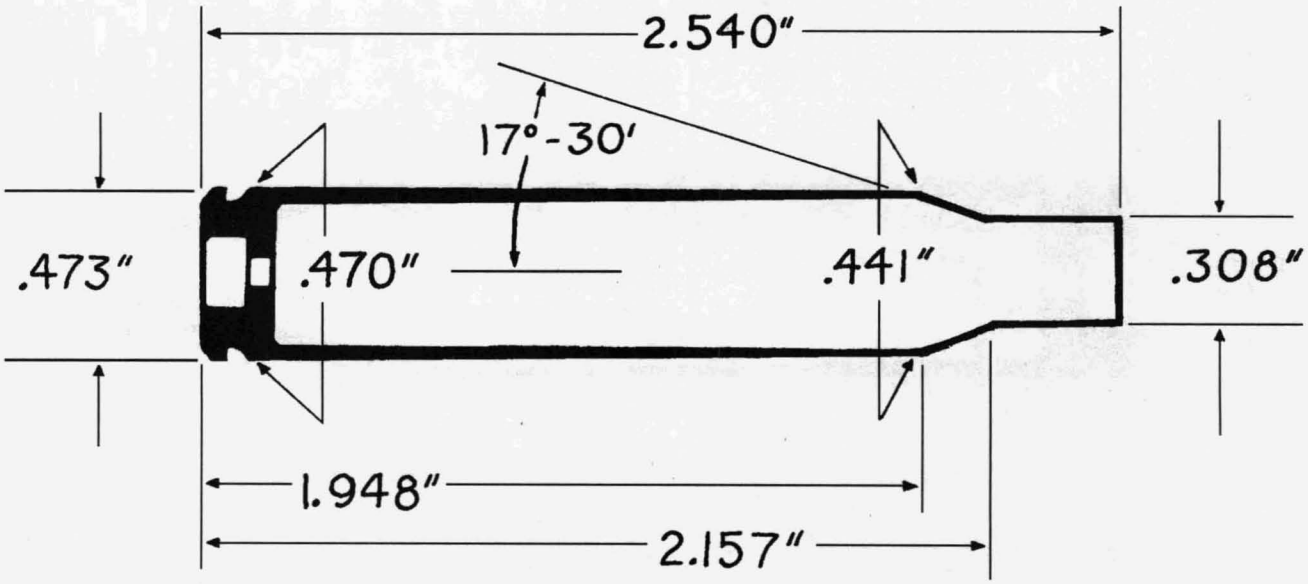
270 Winchester

Historical Notes Designed by Winchester in 1925 for their Model 54 bolt-action rifle, the 270 caused quite a stir in shooting circles. It has remained somewhat controversial ever since. At the time of introduction, it offered better long-range performance than any big game cartridge available on the American market. It has now been adopted by practically every manufacturer of standard bolt-action high-powered sporting rifles in the world. The Remington slide actions and Remington and Browning semi-autos are also available in 270-caliber. The cartridge is based on the 30-06 case necked-down to .277-inch. (It is just possible that Winchester chose a 0.277-inch bullet to avoid paralleling anything European or British and they could possible have been inspired by a Chinese cartridge that used a 0.277-inch bullet. We will likely never know. The case neck is 0.050-inch longer but, except for the neck and headstamp, the 270 Winchester is otherwise identical to the 30-06. This cartridge was a long-time favorite of well-known gun writer the late Jack O'Connor, who probably contributed more to popularizing the 270 than any other individual. Today the 270 Winchester is one of the most popular calibers on the market.

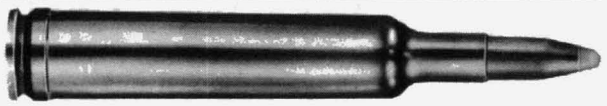
General Comments Along with the 30-06, this is one of the most accurate and effective all-round American big game cartridges. Its reputation and popularity have increased steadily since its introduction. Although not intended as a varmint cartridge, the 270 will serve very well in that capacity when loaded with bullets of 100 grains. It is generally conceded to be a better long-range varmint cartridge than its parent, the 30-06. The 130-grain bullet at over 3000 fps muzzle velocity is considered adequate by many experienced hunters for any North American big game. When first introduced, some deer hunters complained that the 130-grain bullet had such an explosive effect it ruined too much meat. To satisfy the demand for a deer load, Winchester brought out a 150-grain bullet at a reduced velocity of 2675 fps. However, it was short-lived because the people who demanded it wouldn't buy it. The present 150-grain bullet at 2860 fps is intended for maximum penetration on heavier animals such as elk, moose or bear. Some disagree, but current evidence reinforces the conclusion that the 270 is adequate for any North American big game and some African plains game as well. Assuming the hunter uses the proper bullet for the job at hand, the 270 will deliver reliable performance. In any comparison of the 270 with the 30-06, much depends on intended use and hunting conditions. For some reason many individuals shoot better with the 270 than the 30-06. The 270 is flatter shooting than the 30-06, and thus makes a better varmint/big game rifle where this is a consideration. The 30-06, with its 180-, 200- and 220-grain bullets, must be conceded as a better woods, brush or heavy game caliber. In accuracy and general performance, there isn't a great deal to argue about. Anyone trying to make a big case for one against the other is beating a pretty dead horse. The 270 Winchester is commercially loaded by all large domestic and most foreign ammunition manufacturers.

270 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
90 HP	IMR 4350	60.5	3500	2449	Sierra
100 SP	IMR 4064	53.5	3400	2568	Hornady
110 HP	IMR 4350	55	3200	2502	Sierra
130 SP	IMR 4350	55	3100	2775	Nosler, Sierra, Hornady, Speer
140 SP	IMR 4350	53	2900	2615	Hornady
150 SP	IMR 4831	54	2800	2612	Speer, Sierra, Hornady
150 SP	IMR 4350	52	2800	2612	Nosler, Speer, Hornady, Sierra
160 SP	IMR 4350	51	2800	2786	Nosler
100 SP	FL		3480	2612	Factory load.
130 SP	FL		3060	2702	Factory load.
150 SP	FL		2850	2705	Factory load.



270 Weatherby Magnum

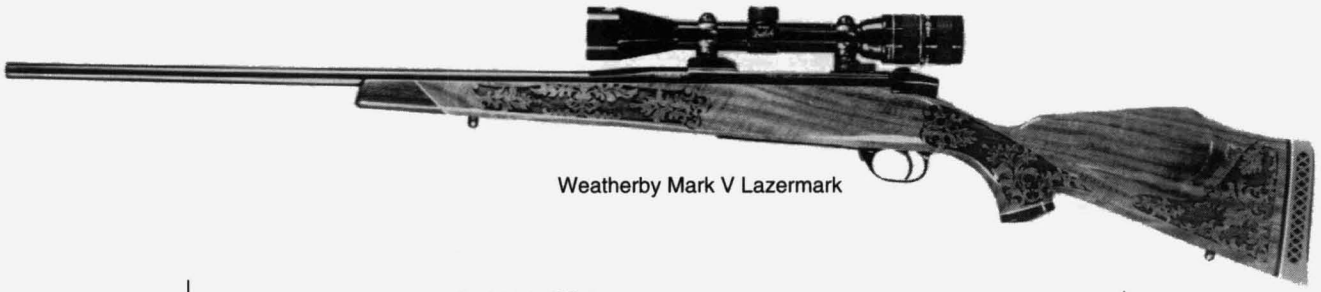


Historical Notes Most shooting enthusiasts think that the 270 Weatherby was developed to satisfy a demand for this caliber after the popularity of the 300 Weatherby Magnum had been established. As a matter of fact, the 270 was the first of the line developed by Roy Weatherby on the necked-down 300 H&H case. This was in 1943, following experiments with an improved 220 Swift which Weatherby called the 220 Rocket. It was due largely to actual hunting experience with the 270 WM that started Weatherby on the high-velocity trail. This culminated in his starting a commercial gun business in September, 1945.

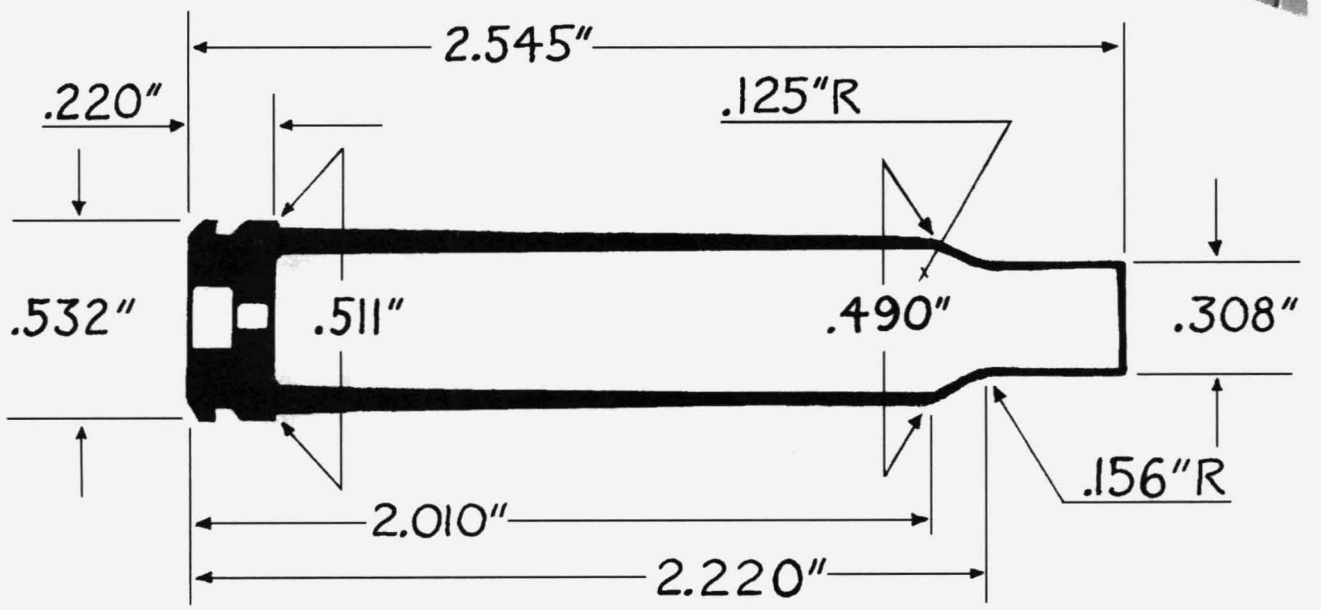
General Comments The popularity of the 270 Winchester made it almost mandatory for Weatherby to add this caliber to his line of commercial magnum rifle cartridges. The 270 WM has been used extensively, and successfully, on all species of North American big game. It has also achieved notable success on African plains game. Those who have used it claim the 270 Weatherby provides flat trajectory, excellent long-range stopping power on all thin-skinned game and noticeably less recoil than the famous 300 WM. As an added attraction, the 270 WM is not impractical for varmint shooting. The 100-grain bullet is excellent for this purpose thus making the 270 WM a very versatile all-round caliber. However, it is important to allow plenty of barrel cooling time with this, and all, high-intensity cartridges. The 270 WM is easy and economical to reload, and empty cases are available for it. Like the other large-capacity magnum cases, it does not lend itself to reduced loads and is at its best with full or nearly full charges. It is a very fine choice for the man who wants to include a varmint hunting potential in his big game rifle. It is one of the most popular calibers that Weatherby offers.

270 Weatherby Magnum Loading Data and Factory Ballistics

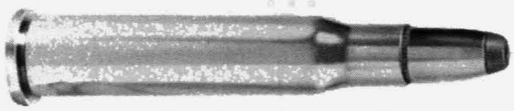
Bullet (grs.)	Powder/grs.		MV	ME	Source
90 HP	IMR 4350	73	3800	2886	Sierra
100 SP	IMR 4350	71	3600	2878	Speer
100 SP	H-4831	76.5	3500	2721	Hornady
130 SP	IMR 4350	68	3300	3144	Speer, Sierra, Nosler
130 SP	IMR 4831	70	3300	3144	Sierra, Speer
140 SP	IMR 4350	66.5	3100	2988	Nosler
150 SP	IMR 4350	66	3000	2998	Hornady, Speer
150 SP	IMR 4831	67	3000	2998	Nosler, Sierra
160 SP	IMR 4831	65	2900	2989	Nosler
100 SP	FL		3760	3139	Weatherby factory load.
130 SP	FL		3375	3283	Weatherby factory load.
150 SP	FL		3245	3501	Weatherby factory load.



Weatherby Mark V Lazermark



7-30 Waters

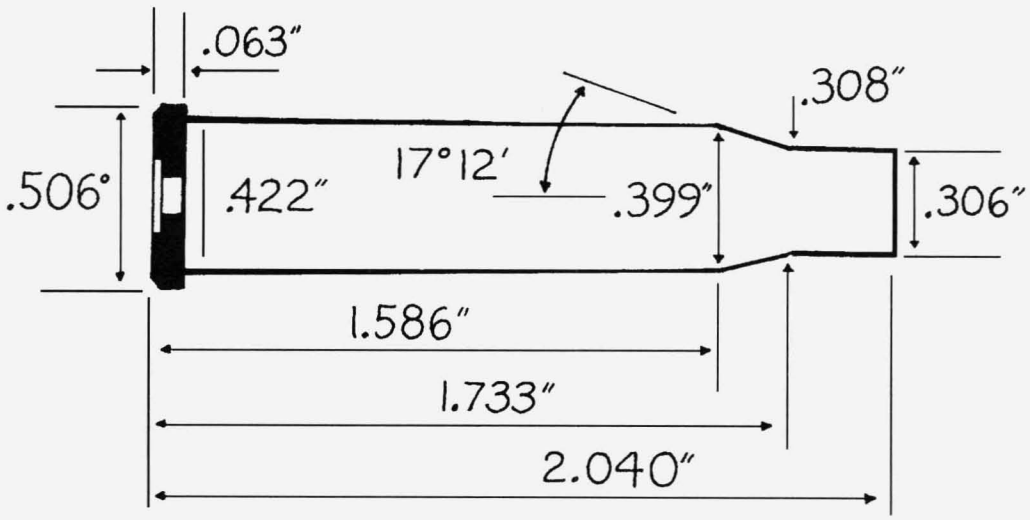


Historical Notes The 7-30 Waters was introduced by in 1984 for the U.S. Repeating Arms Model 94XTR Angle Eject rifle and carbine. The cartridge was the work of Ken Waters, a well-known gun writer and ballistics expert. He began planning the cartridge in 1976 as a high-velocity, flat-trajectory round for short, handy, lever-action carbines. There are many problems to be overcome by those who would improve on the performance of the 30-30-class cartridges in lever-action rifles. Severe restrictions are imposed by tubular magazines, the length of the action and permissible working pressures. However, by 1982 Ken had developed a cartridge that would push the 139-grain 7mm bullet at 2600 fps. At this point, U.S. Repeating Arms Co. became interested in the project and decided in 1983 to produce Model 94 lever-action rifles for this new cartridge. Federal Cartridge Co. then completed the final version of the cartridge by making various dimensional changes and opting for a lighter 120-grain bullet to achieve higher velocity at less pressure. The current commercial loading uses a 120-grain Nosler Partition bullet which develops a velocity at the muzzle of 2700 fps when fired from a 24-inch barrel.

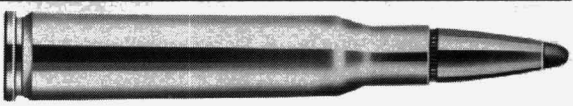
General Comments The 7-30 Waters does offer improved performance for those who like lever-action carbines or rifles. This caliber should make a good deer/black bear-class cartridge. However, the majority of 30-30 lever-action shooters prefer the short carbine since most are woods hunters. The 7-30, with its light 120-grain bullet is unlikely to best the 30-30, 32 Special, 38-55, etc. with shots at close range. Also, it is not going to be the answer for the long-range plains or mountain hunter. When fired from a 20-inch barrel, its performance is considerably reduced. So anyone interested in this caliber will be better served if they buy the rifle rather than the carbine. The light recoil of this cartridge makes it an excellent choice for a woman, boy or anyone who is recoil sensitive. The 7-30 is at its best in broken country with shots varying from patches of brush and trees to open areas with shots ranging from 75 to 175 yards.

7-30 Waters Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
120 SP	H-335	28.5	2500	1666	Nosler
130 SP	H-335	33	2600	1952	Speer
140 SP	W748	35	2500	1943	Hornady
140 SP	H-335	34	2600	2102	Hornady
145 SP	748	34	2400	1855	Speer
120 SP	FL		2700	1940	Federal factory load.



7mm Mauser (7x57mm)

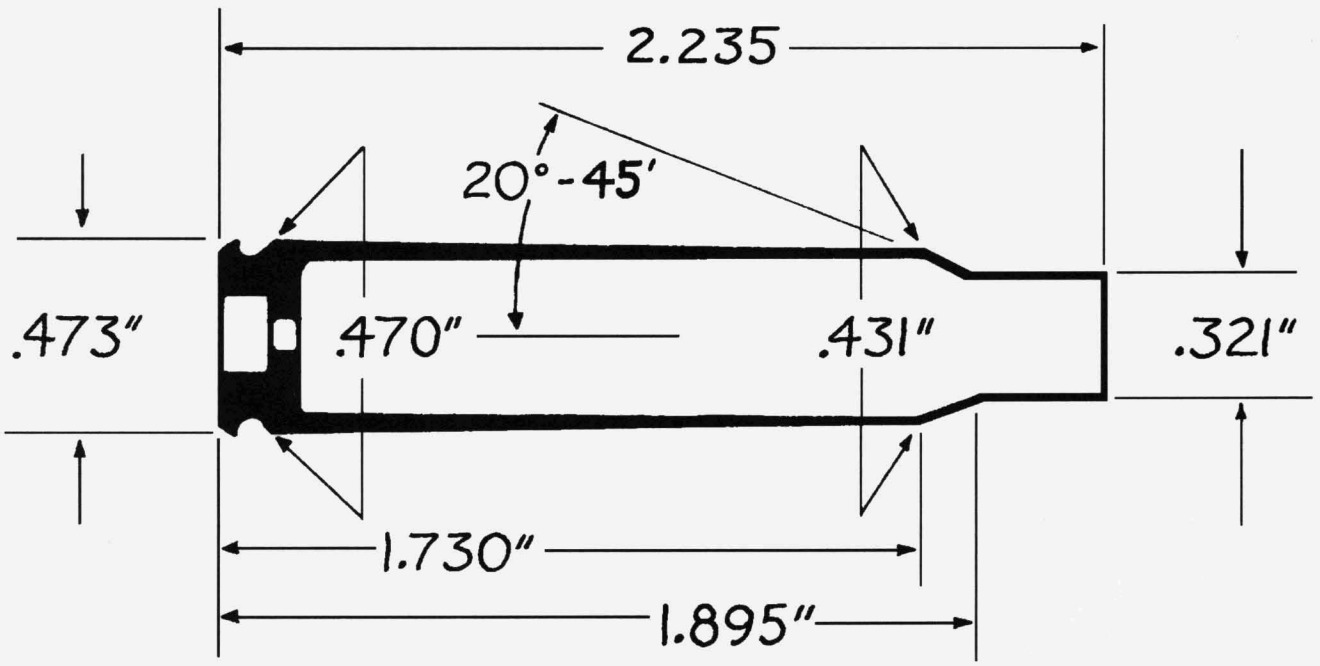


Historical Notes Developed by Mauser as a military cartridge the 7x57mm was introduced in 1892. Shortly afterward this caliber was adopted by the Spanish government and chambered in a limited quantity of Model 92 Mauser bolt-action rifles. In 1893, Spain adopted a new model Mauser rifle in this same caliber. This rifle has been called the Spanish Mauser ever since, although it was also adopted by Mexico and a number of South American countries. Remington chambered their rolling block and Lee rifles for the 7mm about 1897, and later the Model 30. The Winchester Model 54 and 70 also chambered it. Currently, the Ruger Model 77 and Winchester Featherweight bolt action, plus the Ruger Number One single shot offer the 7mm as standard. Also, most European-made bolt-action rifles and combination guns chamber the 7mm Mauser, as do many custom-made rifles each year.

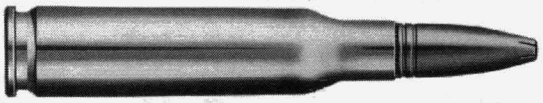
General Comments Although originally a military cartridge, the 7x57mm Mauser has proven one of the best all-round sporting rounds ever developed. It is particularly useful in lightweight rifles because it delivers good killing power with moderate recoil. It has been used successfully on every species of big game on earth. However, it is no dangerous game cartridge in the true sense of the term. Its success in the field is due largely to the ability of the hunters who have used it. Ballistically, it is only slightly less powerful than the 270 Winchester or the 280 Remington. It is adequate for most American big game, but is perhaps on the light side for large bear or moose. The 7mm Mauser was discontinued by American gun manufacturers about 1940 due to lack of popularity. Since the end of WWII, it has become increasingly common due to the influx of surplus 7mm military rifles. The wide selection of 7mm bullets now available for handloading has also contributed to an increase in popularity. The 7x57mm Mauser is commercially loaded by all domestic and most foreign ammunition manufacturers.

7mm Mauser (7x57mm) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
100 HP	W748	52.6	3300	2419	Hornady
115 SP	IMR 3031	46	3000	2299	Speer
120 SP	IMR 4064	46	2900	2241	Hornady
130 SP	IMR 4350	52	2850	2345	Speer
139 SP	IMR 4064	45	2800	2420	Hornady
150 SP	IMR 4064	41.5	2700	2429	Sierra, Nosler, Hornady
160 SP	IMR 4895	38	2500	2221	Sierra, Nosler
175 SP	IMR 4895	42	2500	2430	Hornady
175 SP	IMR 4064	39	2450	2333	Nosler, Sierra
140 SP	FL		2660	2199	Factory load.
145 SP	FL		2690	2334	Factory load.
154 SP	FL		2690	2475	Factory load.
175 SP	FL		2440	2313	Factory load.



7mm-08 Remington



Historical Notes Remington introduced this medium-capacity rifle cartridge to the marketplace in 1980. It is based on the 308 Winchester case necked-down to 7mm and loaded with a 140-grain bullet at 2860 fps. Remington advertised this cartridge as the "...first modern 7mm round designed for use in short-action rifles." This is an interesting claim in view of the fact that the 284 Winchester, designed for the same purpose, arrived on the scene in 1963. Furthermore, the 7mm-08 is a direct copy of the 7mm/308 wildcat dating back to 1958 and earlier. This is not meant to denigrate a fine cartridge, but to demonstrate that there really isn't much new under the sun despite advertising claims. The 7mm-08 is chambered in exactly the same actions as the 284 Winchester but does not and can not equal 284 ballistics.

Original rifles chambered for the 7mm-08 were the Remington Model 788 and 700BDL Varmint Special bolt actions. Current Remington catalogs list the 700 series and Model Seven bolt actions as available in this chambering. Other makers are beginning to chamber it; among them Savage. Silhouette shooters of all types favor the 7mm-08 Remington for its excellent ballistics.

Remington has hung their hat on the 7mm caliber and with considerable success. They now offer five chamberings: 7mm-08, 7x57mm Mauser, 7mm Express (280 Remington), 7mm Remington Magnum and 7mm BR. However, the 7mm BR originated as something of a semi-wildcat based on the 308x1.5-inch necked-down. Remington has contributed more than any other company to the belated recognition of the ballistic advantages of the 7mm caliber by U.S. shooters.

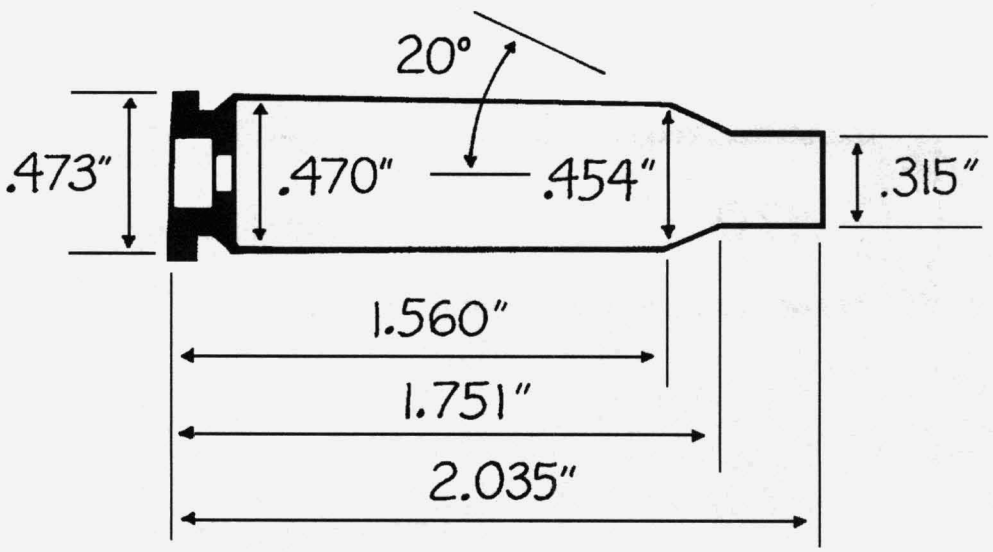
General Comments The 7mm-08 140-grain load surpasses the 308 Winchester 150-grain load downrange, according to Remington tests from a 24-inch barrel. This appears to be true. At 500 yards the 7mm-08 bullet has an edge of 238 fps and 750 fpe over the 308 bullet. This would make quite some difference in potential killing power and also help in better bullet placement at unknown distances. There is not sufficient difference to cause owners of 308-caliber rifles to rush down and trade them off for 7mm-08s, but it does illustrate the ballistic advantages of the smaller caliber loaded with more streamlined bullets.

The 7mm-08 is a great favorite with many metallic silhouette shooters, and I have heard many glowing reports regarding its accuracy on the range, particularly with handloads. It is also building a good reputation as a long-range deer and antelope cartridge. When handloaded with heavier bullets than the factory 140-grain, it would also be suitable for heavier game such as elk. Unfortunately, the two factory bullet weights do not make for a very flexible big game cartridge. On the other hand, by handloading, this cartridge can be adapted to anything from varmint shooting through elk.

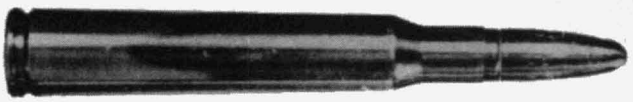
The case capacity of the 7mm-08 is slightly less than the 7x57mm Mauser and performance with the heavier bullets of around 175 grains is about 100 to 150 fps less, which is not anything to get real excited about. The fact of the matter is that the 7mm-08 is adequate for most North American hunting, but is handicapped by only two commercial bullet loadings. Remington has been joined by Federal in offering factory loaded ammunition in this caliber.

7mm-08 Remington Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
100 HP	H-335	40.5	3000	1999	Hornady
120 SP	IMR 4320	41	2700	1943	Hornady, Sierra, Nosler
130 SP	IMR 4064	45	3000	2599	Speer
140 SP	IMR 4895	44	2900	2615	Sierra
150 SP	IMR 4320	38	2400	1919	Hornady, Sierra
160 SP	IMR 4350	44	2650	2496	Nosler, Sierra, Speer
175 SP	IMR 4350	44	2600	2627	Speer
120 SP	FL		3000	2398	Factory load.
140 SP	FL		2860	2542	Factory load.



7x64mm Brenneke



Historical Notes This caliber was developed by Wilhelm Brenneke in Germany in 1917. Although nearly unknown in the U.S., this caliber rivals the 7mm Remington Magnum for popularity in Europe. Unlike the 7mm Remington Magnum, the 7x64 is not belted although is has virtually the same case length. However, base and rim diameter are much smaller. Both fit in standard length actions as loaded length is nearly the same.

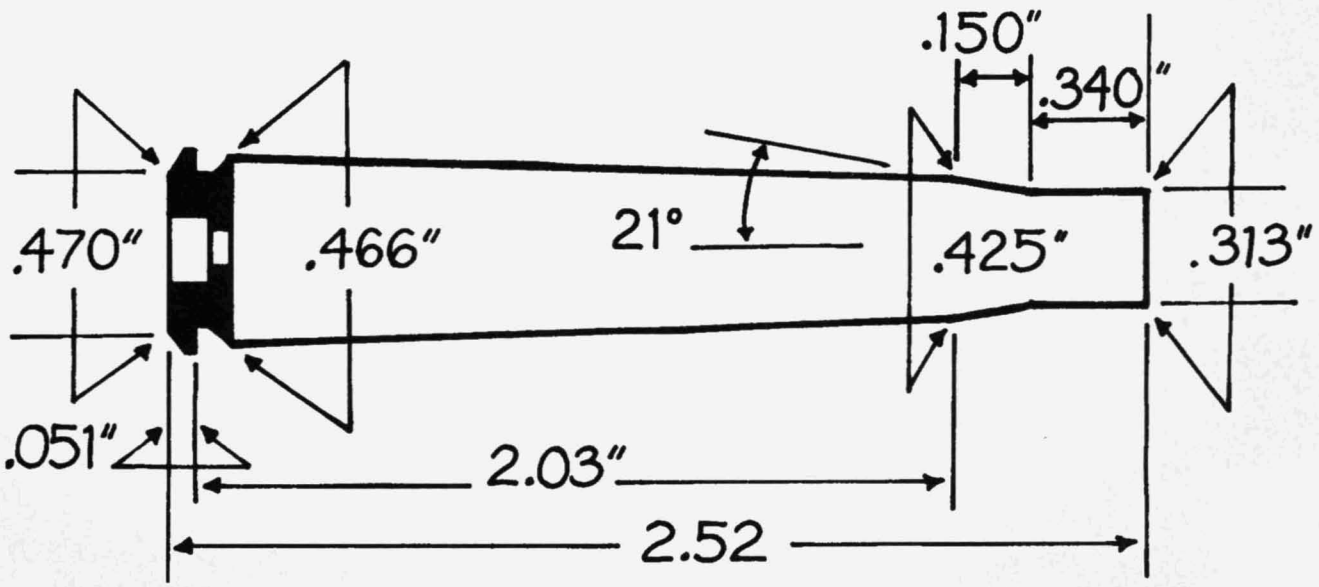
The 7x64 is unique in that it is one of the few cartridges in modern times made by American manufacturers to meet European demand without a significant demand in the U.S. In 1991-92 Federal Cartridge Co. added the 7x64 to its Premium product line.

General Comments Ballistically, the 7x64 is very similar to the 284 Winchester. However, the 7x64 is outclassed by the 7mm Remington Magnum which offers 11 percent more muzzle velocity and 24 percent more muzzle energy. This explains why American sportsmen prefer the 7mm Remington Magnum. Still, higher velocity is not always better and the 7x64 is an excellent choice for hunting deer, antelope, and other medium game at longer ranges. Loading data is not yet available. If you do wish to handload, cases for this cartridge can not be formed from standard Mauser-type cartridge cases. However, cases are commercially available for the 7x64 from Remington and Federal.

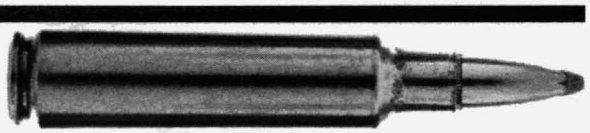
7x64mm Brenneke Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
160 SP	FL	2650	2495	Federal factory load.

Reinhart Fajen stocked F.N. Mauser in 7x64 Brenneke



284 Winchester

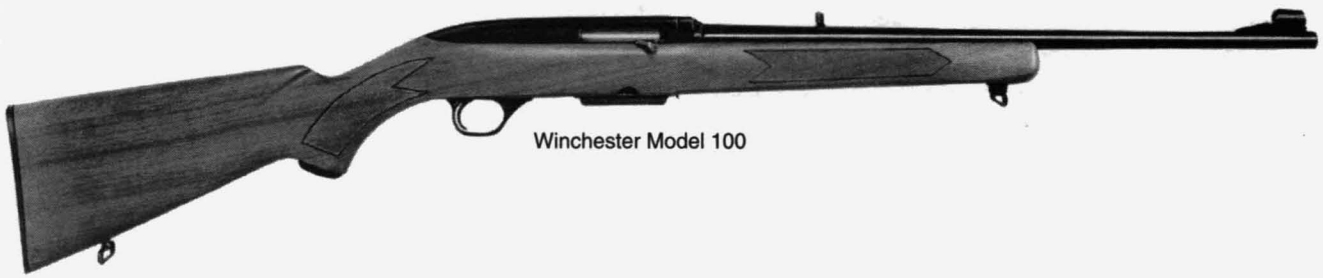


Historical Notes The 284 was introduced by Winchester in 1963 for their Model 88 lever-action and Model 100 semi-auto rifles. Both have since been discontinued. This is the first American commercial cartridge to have a rebated or undercut rim of smaller diameter than the body of the case, though British and European designers used this type of case years ago. For a short time, the Savage Model 99 lever action was available in 284. No major gun makers offer this caliber now.

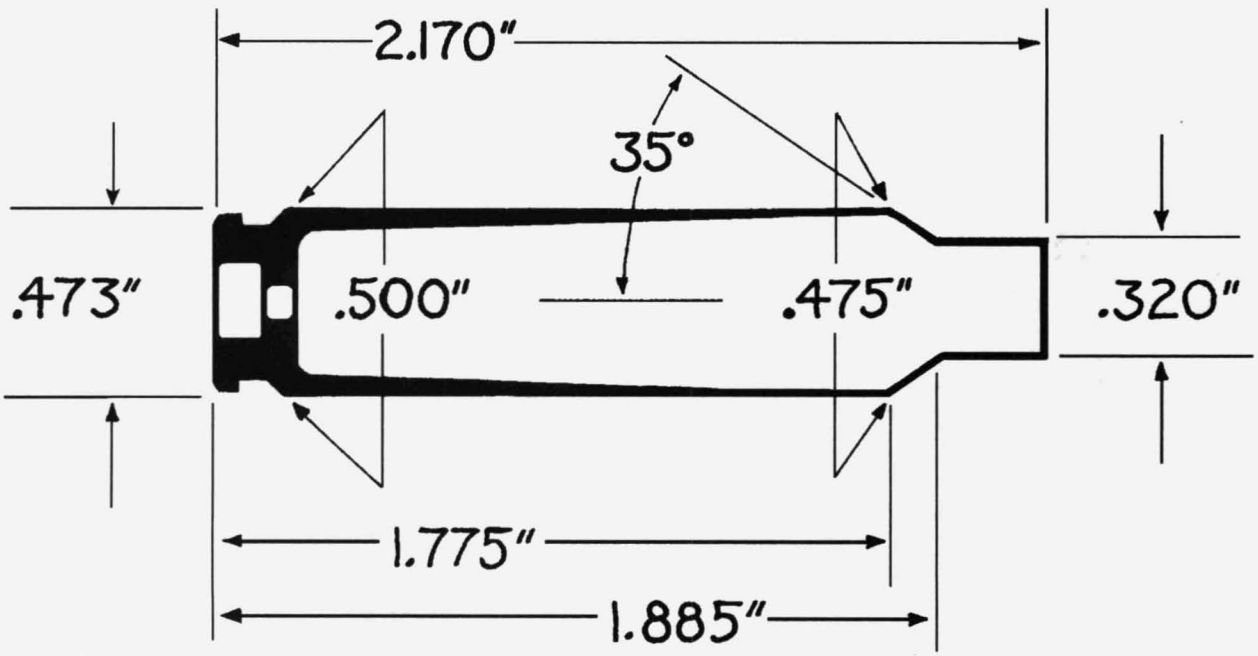
General Comments The 284 Winchester has the rim diameter of the 30-06 and the body diameter of the belted magnums. This provides increased case capacity in a relatively short case. The cartridge is designed for short actions and will increase the performance of these short, light rifles. Ballistics are practically identical to the 280 Remington. There is no difference in killing power, range or capability between the two. (Except in some gun writer's imagination!) The 284 Winchester should be a good long-range cartridge for any North American big game. It could also be adapted for varmint shooting. This cartridge has recently staged a well-deserved comeback.

284 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
100 HP	IMR 4350	60.5	3200	2274	Sierra
120 SP	IMR 4350	58	3200	2729	Hornady
130 SP	IMR 4350	58	3100	2775	Speer
140 SP	IMR 4350	55	3000	2799	Hornady
140 SP	IMR 4895	46	2800	2438	Sierra
145 SP	IMR 4831	57	2900	2708	Speer
150 SP	IMR 4350	53.5	2800	2612	Sierra
160 SP	IMR 4350	52	2700	2591	Speer, Sierra
175 SP	IMR 4350	50	2600	2627	Hornady, Sierra, Speer
150 SP	FL		2860	2724	Winchester factory load.



Winchester Model 100



280 Remington/7mm Express Remington

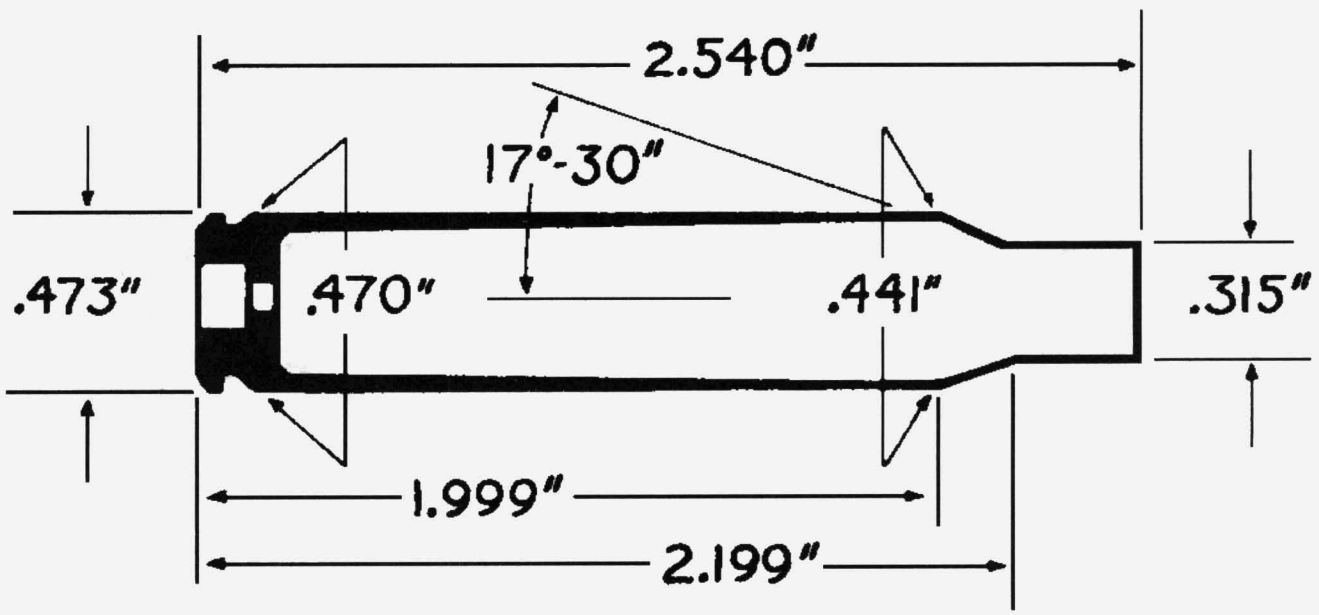
Historical Notes The 280 Remington was introduced by that company in 1957. Initially it was chambered in the Remington Model 740 autoloader, later in the 760 slide action and the 721 and 725 bolt actions. The Remington 700 series bolt-action rifles originally included the 280 chambering. In an effort to increase sales, from 1979 to 1980 Remington cataloged the 280 as the "7mm Express Remington." But too much confusion resulted and Remington went back to the original 280 moniker. The 280 Remington, actually a 7mm with a bullet diameter of .284-inch, is based on the 30-06 case necked-down. It is very similar to the wildcat 7mm-06 which has been around for a good many years. In 1979, Remington introduced a new 150-grain loading.

General Comments This is a 30-06 case necked down and with the shoulder moved forward 0.050-inch to prevent its being chambered in 270 Winchester rifles. Had this been possible, the oversize neck might not have had room to open enough to free the bullet and the results could have been extremely dangerous. However, by moving the shoulder forward, Remington created an even more dangerous situation. The 270 Winchester cartridge, which is visually almost indistinguishable from the 280 Rem., chambers effortlessly in 280 Remington rifles. Should the extractor catch the case during loading and then allow it to slip forward when the firing pin strikes the primer, or should the striker reach the primer of a load that was chambered ahead of the extractor, the results would be a 0.050" headspace problem with almost certain head separation and the resulting flood of 50,000 psi gas in ones face. Not a pretty thought. Remington could have solved the original problem and eliminated the one they created by simply enlarging the case at the shoulder.

The 280 Remington is slightly more powerful than the 270 Winchester. It would be stretching a point to say that the 280 is better than the 270 Winchester, although it is probably a little more versatile due to the wider variety of factory bullets available. If you are a handloader, any difference would be one of personal preference. The 280 is certainly adequate for any North American big game and would also lend itself for use on large varmints. It is another case of a good wildcat cartridge finally emerging in a commercial version. It has picked up a modest following among 7mm fans since its introduction. Loaded with the 120-grain or new 100-grain varmint bullets, the 280 becomes an excellent varmint cartridge. The 150-grain bullet at 2970 fps brings out some of the latent potential of the caliber, which is truly an excellent long-range big game cartridge. Both Remington and Winchester commercially load this caliber. However, Remington offers four bullet weights to Winchester's one.

280 Remington Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
100 HP	IMR 3031	45.5	3200	2274	Hornady
120 SP	IMR 4350	54.5	3000	2399	Sierra
130 SP	IMR 4350	57	3100	2775	Speer
140 SP	IMR 4350	54	2900	2615	Sierra
150 SP	IMR 4831	48	2900	2802	Sierra, Nosler
160 SP	IMR 4350	51.5	2700	2591	Speer, Sierra, Hornady
175 SP	IMR 4350	52	2650	2730	Speer, Hornady
120 SP	FL		3150	2643	Factory load.
150 SP	FL		2890	2781	Factory load.
165 SP	FL		2820	2913	Factory load.
140 SP	FL		3050	2799	Factory load.



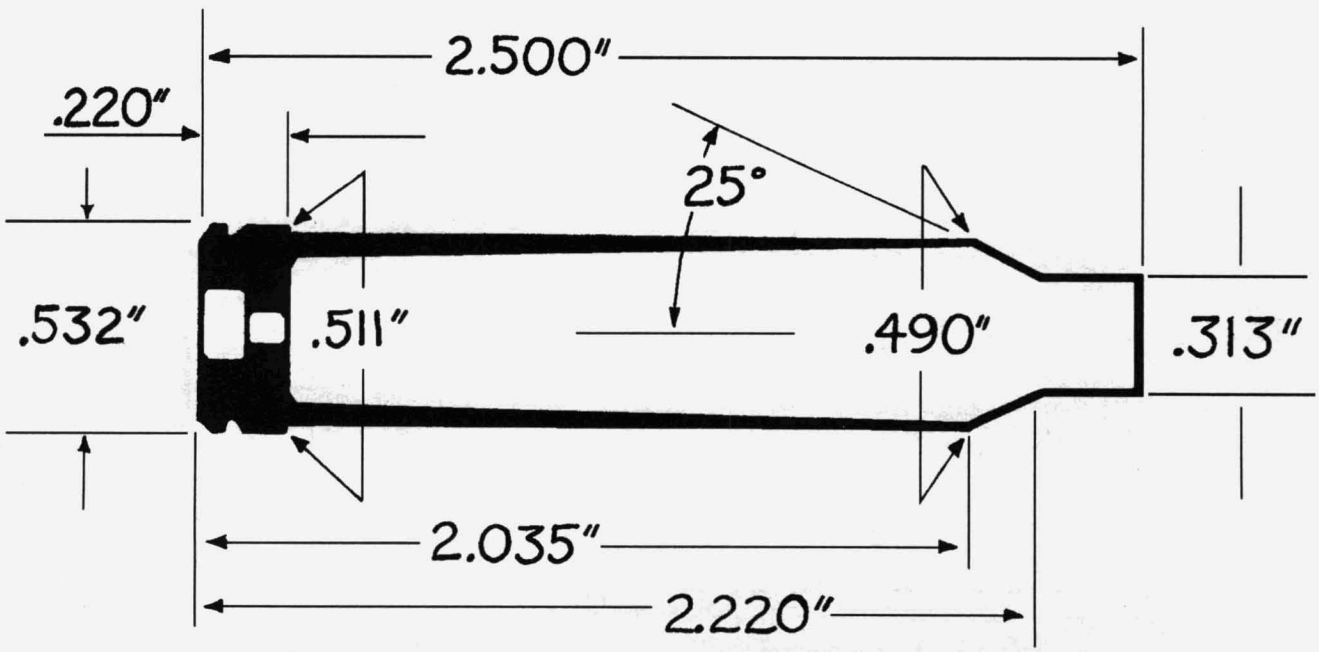
7mm Remington Magnum

Historical Notes Introduced by Remington during 1962, the 7mm Remington Magnum was brought out at the same time as the improved, bolt-action 700-series rifles, which replaced the earlier Models 721, 722 and 725. Most other manufacturers have since added this popular caliber to their lines. It took American firearms manufacturers nearly 40 years to realize that the 275 Holland & Holland (made long ago by Western Cartridge Co.) is a first-rate, medium-game, long-range caliber. The long line of 7mm wildcats is much like the old 275 H&H which came out in 1912. Remington chose to ignore the classic 7mm bullet—a 160-grain spitzer—in its 7mm Magnum loads.

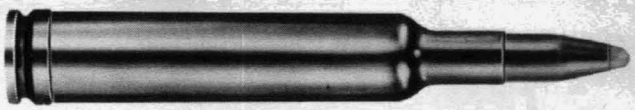
General Comments The 7mm Remington Magnum is a fine, long-range, big game cartridge. There is a good selection of factory loaded 7mm bullets available and the handloader could make it do for just about anything. It has ample power for any North American big game and most thin-skinned African varieties. However, it is an open-country, plains or mountain cartridge rather than a woods or brush number. Many will compare it with the 7mm WM or the 7x61mm Sharpe & Hart Super. Bitter arguments will ensue as to which is the best or most powerful. This will be akin to the ancient Greek pastime of discussing how many spirits can dance on the head of a pin. However, any difference in these cartridges will be strictly a matter of opinion or imagination. They all have nearly the same case capacity and none will do anything the others can't duplicate. In fact, the 7mm Remington is hardly a new or brilliant design. It is largely a commercial version of several wildcat short-belted 7mm magnums (Ackley, Luft, Mashburn, etc.). Its principal advantage lies in the fact that it is a standard factory product that is widely distributed and available in well-made, moderately-priced rifles. Come to think of it, that's quite a bit to a lot of people. However, don't trade off your present 7mm Magnum with the idea that the Remington round is going to provide some mysterious extra margin of power or knockdown. The 7mm Rem can be somewhat hard on barrels especially with either careless shooting, inadequate barrel cooling between shots or inadequate cleaning. And, like all similar chamberings, loses significant velocity with barrels shorter than 24 inches. Actual ballistics may be closer to the 7mm Weatherby Magnum than factory data suggests. Ammunition in 7mm Remington Magnum caliber is available in a wide variety from all domestic and most foreign ammunition manufacturers.

7mm Remington Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
100 HP	IMR 4831	71.5	3500	2721	Hornady
115 HP	IMR 4831	71	3400	2953	Speer
120 SP	IMR 4350	66	3350	2991	Sierra, Nosler
130 SP	IMR 4350	63	3200	2957	Speer
140 SP	IMR 4350	64	3100	2988	Nosler, Sierra, Hornady
150 SP	IMR 4831	62	3000	2998	Nosler, Sierra
160 SP	IMR 4831	62.5	3000	3198	Sierra, Nosler, Speer
175 SP	H-450	64.5	2900	3269	Sierra
140 SP	FL		3175	3133	Factory load.
150 SP	FL		3110	3221	Factory load.
160 SP	FL		2950	3090	Factory load.
165 SP	FL		2900	3081	Factory load.
175 SP	FL		2860	3178	Factory load.



7mm Weatherby Magnum



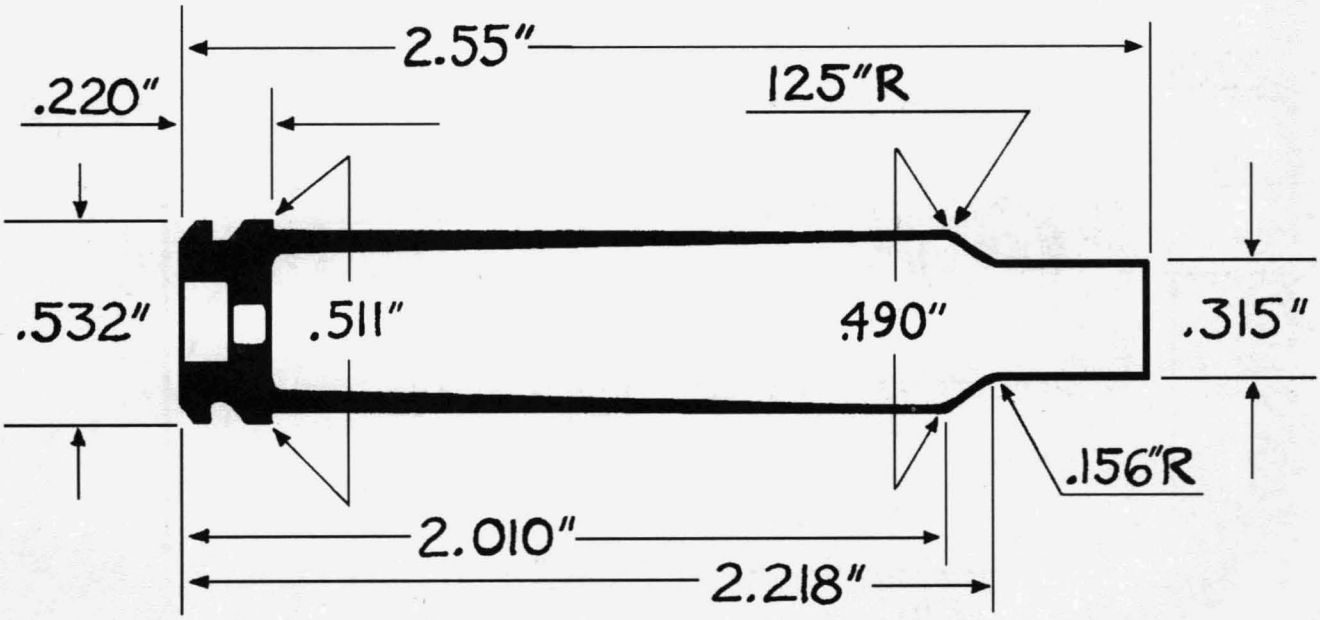
Historical Notes The 7mm Weatherby Magnum was developed in 1944 as one of a series of cartridges based on the necked-down 300 H&H case. There are several similar wildcat versions, but Weatherby's design is the most popular due to the availability of commercial ammunition.

General Comments The 7mm (or 284-caliber) has long been popular in the United States in various wildcat cartridges, yet the original 7mm Mauser never generated any great enthusiasm. The 7mm Weatherby Magnum, offered as a maximum performance cartridge is probably the best known and widely used of the current 7mm Magnums with the single exception of the 7mm Remington Magnum. This is due in part to the availability of factory-loaded ammunition with a good selection of bullet weights. The 7mm Weatherby has a slight edge over the 270 Weatherby on tough or dangerous game because it uses heavier bullets and churns up greater energy. However, if long-range varmint shooting is on the agenda, the 270 is the better choice. The 7mm WM is adequate for any North American big game and all thin-skinned African game. The 7mm Weatherby Magnum has, to a large extent, lost popularity to the 7mm Remington Magnum because the Remington version is available in a wide variety of rifles less expensive than the Weatherby. Like most high-intensity cartridges, the 7mm WM can be somewhat hard on its barrel especially with either careless shooting, inadequate barrel cooling between shots or inadequate barrel cleaning. And, like all similar chamberings, it loses significant velocity with barrels shorter than 24". Ammunition in this caliber is now available from Remington and PMC as well as Weatherby. For many years now Norma has loaded Weatherby ammunition in all calibers under the Weatherby brand name. In 1992 Norma began offering Weatherby calibers under the Norma brand name. Norma ammunition is distributed by Dynamit Nobel in the U.S.

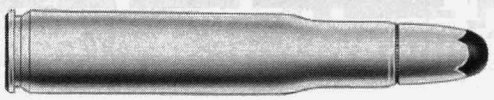
7mm Weatherby Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
100 HP	IMR 4350	73.5	3600	2878	Hornady
115 HP	IMR 4831	76	3600	3310	Speer
120 SP	IMR 4350	70	3400	3081	Sierra, Nosler, Hornady
130 SP	IMR 4320	63	3300	3144	Speer
139 SP	IMR 4350	68	3200	3161	Sierra, Nosler, Hornady
154 SP	IMR 4350	67	3100	3287	Hornady
160 SP	IMR 4350	65	3000	3198	Sierra, Speer
175 SP	IMR 4350	65	2800	3047	Speer, Hornady
195 SP	IMR 7828	61	2500	2707	Speer
139 SP	FL		3340	3443	Weatherby factory load.
154 SP	FL		3260	3633	Weatherby factory load.
175 SP	FL		3070	3662	Weatherby factory load.

Weatherby Vanguard VGX



30 Remington



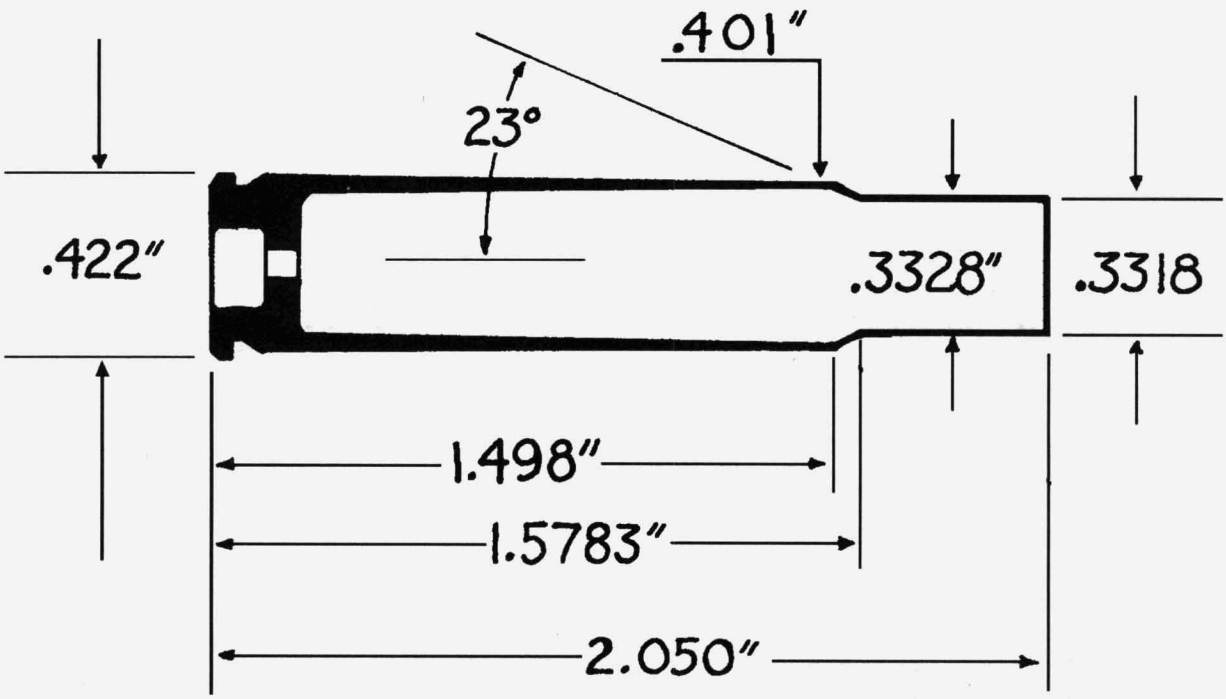
Historical Notes A rimless version of the 30-30, the 30 Remington was introduced by Remington in 1906 for their Model 8 autoloader. When the Model 14 slide action came out in 1912, it was also chambered for the 30 Remington as was the Model 30 bolt action introduced in 1921. The Stevens lever-action Model 425 and the Standard gas-operated rifle also used the 30 Remington. No new rifles have chambered this round since immediately following WWII. Some domestic ammunition companies have loaded it continuously since the war's end. There are a very large number of rifles for this caliber still in use.

General Comments Identical to the 30-30 in performance, the 30 Remington is strictly in the small-, medium- and deer-size game class. Its advantages are in the nature of the guns that chambered it. For one thing, it is possible to use spitzer bullets in most 30 Remington rifles which helps retain velocity at longer ranges. Secondly, most rifles chambered for this round will stand slightly higher pressures than the typical lever-action 30-30. The 30 Remington can be reloaded to better performance than the 30-30 Winchester. Interestingly, handloading data has seldom, if ever, reflected this possibility. Similarly, factory load ballistics have uniformly downplayed the Remington rimless series with loads rated a full 100 fps slower than their rimmed counterparts. However, the difference is not great enough to take the 30 Remington out of the 30-30 class. Note: The nominal bullet diameter is given as .307″.

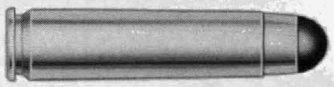
30 Remington Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
150 SP	IMR 4895	35.5	2350	1840	Lyman
150 SP	IMR 4320	36.0	2320	1794	Lyman
170 SP	IMR 3031	30.0	2115	1690	Lyman
170 SP	IMR 4895	33.0	2145	1735	Lyman
170 SP	FL		2120	1696	Remington factory load.

Remington Model 8A



30 Carbine (30 M-1 Carbine)



Historical Notes In 1940, the U.S. Ordnance Dept. concluded that a light carbine would have advantages over the 45-caliber pistol in many combat situations. Various designs were submitted by a number of private manufacturers and, in the end, Winchester's offering was selected. The semi-auto 30 M1 Carbine was officially adopted in 1941. The cartridge, a modification of the 32 Winchester Self-Loading round of 1906, was hardly a revolutionary new design, but it served the purpose. At about the same time, the Germans developed their Stg 44 assault rifle and the 7.92mm Kurz cartridge. The M1 Carbine is not an assault rifle. The military insists it was designed to fulfill a different purpose.

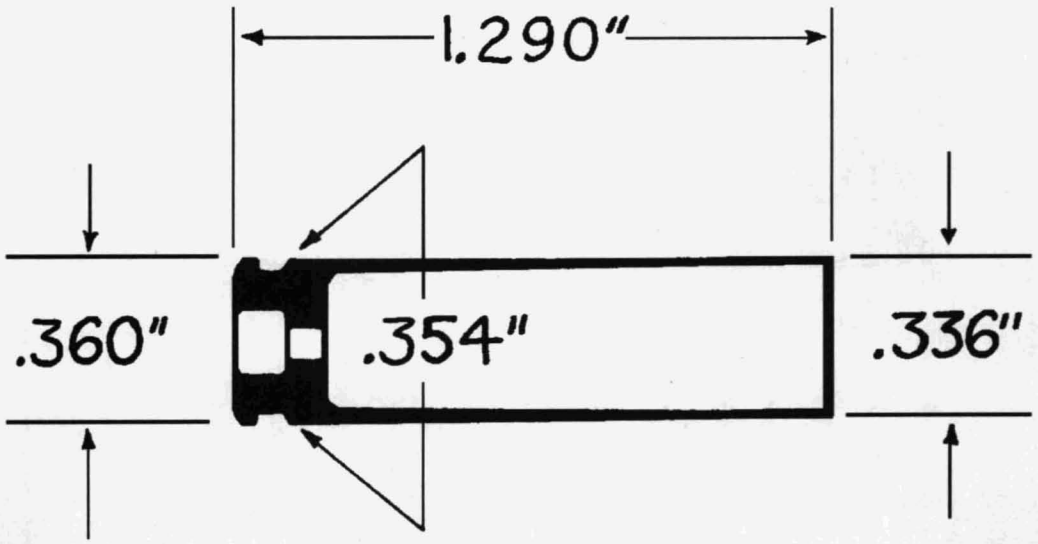
For a few years, starting in 1966, the Marlin Model 62 Levermatic was available in 30 Carbine caliber. Iver Johnson, Plainfield and others manufactured several versions of the M1 carbine for the sporting trade. Federal, Remington and Winchester load softpoint sporting ammunition. One version of the Ruger Blackhawk single-action revolver is available in 30 Carbine.

General Comments In mid-1963, the government began releasing 30-caliber M1 Carbines for sale to civilians through the National Rifle Association at the moderate price of around $20. Thousands of these guns are, as a result, used for sporting purposes. The 30 Carbine cartridge is in the same class as the 32-20 WCF. It is wholly a small game and varmint number, despite contrary claims by those who love the short, light, handy M1 Carbine. The accuracy of the carbine combined with the ballistics of the cartridge limit the effective sporting accuracy range to about 150 yards, maximum. The author used an M1 Carbine to hunt small game and deer as early as 1943, before most people could get their hands on one, so he has a pretty good idea of the capability of the cartridge. Remember that the 32 Winchester Self-Loading round became obsolete in 1920 because it was more or less useless for sporting purposes. The 30 Carbine was derived from it and shares the same shortcomings. Because of inadequate energy, the 30 Carbine is illegal for deer hunting in most states. It is, however, effective against the smaller deer species where shots are at short range. It is ideal for hunting smaller game such as peccary.

30 Carbine Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
100	H-110	14.5	1950	845	Speer
100	H-110	16.5	2200	1075	Hornady
110 SP	H-110	14	1900	882	Hornady, Speer
110 FMJ	FL		1900	882	Military load.
110 SP	FL		1990	967	Factory load.

Marlin Model 62



30-30 Winchester (30-30 WCF/30 Winchester/7.62x51Rmm)

Historical Notes The 30-30, or 30 WCF, was the first American small-bore, smokeless powder sporting cartridge. It was designed by Winchester and first marketed in early 1895 as one of the calibers available for the Model 1894 lever-action rifle. The original loading used a 160-grain softpoint bullet and 30 grains of smokeless powder. Thus the name 30-30 for 30-caliber bullet and 30 grains of powder. This is really an older way of describing a caliber based on blackpowder. Muzzle velocity was 1970 fps.

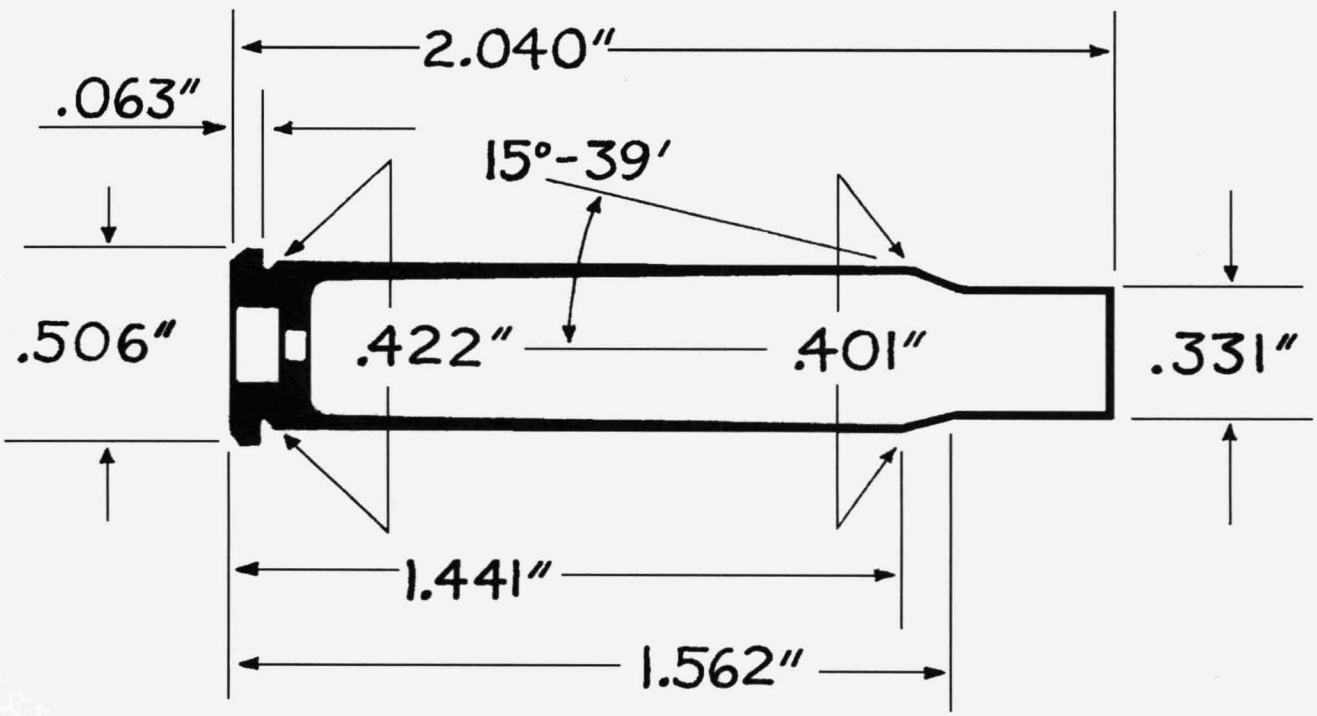
It was adapted to the Winchester Model 54 bolt action as well as various versions of the original 1894 action such as the Models 55 and 64. Marlin chambered it in their Model 1893 lever action and the improved 36. The latest Model 336 is also available in 30-30. At one time, the Savage Model 99 lever action was made in 30-30, and they also chambered the old Model 40 bolt action for it as well as Model 340. The Remington rolling block and Winchester single shot were also at one time available in this caliber. In Europe, the 30-30 is known as the 7.62x51R and is popular in single shot and combination guns. Modern factory loads in this caliber are assembled with 150- or 170-grain bullets. Despite the designation .308 diameter bullets are used.

General Comments The 30-30 has long been the standard American deer cartridge, and it is still the yardstick by which the performance of all others is compared. To say that a cartridge is in the 30-30-class means that it is suitable for game up to and including deer at moderate ranges. Its popularity is due to the fact that this cartridge has always been available in short, light rifles or carbines. It is extremely popular in Mexico and Latin America. So much so that in many backcountry areas, the *treinta-treinta* is the only high-powered cartridge anyone knows or has heard of. It was, and to a large extent still is, the most popular small-bore sporting cartridge. Despite this popularity, the 30-30 is no wonder cartridge with regard to accuracy or killing power. For larger deer the 170-grain bullet is a good choice and the 170-grain Nosler Partition is the best choice for those who wish to tackle elk. For smaller species, 125- to 150-grain bullets give adequate penetration with reduced recoil. In no case is it suited to shots beyond about 200 yards. Although sometimes reloaded with light bullets of 80 to 110 grains, it has neither the velocity nor accuracy in most rifles to make a very good varmint round. Despite its faults, it is a perfectly adequate deer cartridge if properly used by a good shot. The author's first modern high-powered rifle was a 30-30 Model 1894 Winchester carbine, and it served for many useful and game-filled years. All major domestic ammunition companies offer this caliber.

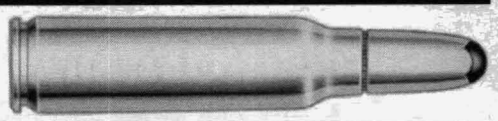
30-30 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
100 SP	IMR 3031	33	2600	1394	Speer
110 HP	IMR 4064	35	2500	1527	Sierra, Speer
125 SP	IMR 4064	35.5	2500	1735	Sierra
150 SP	IMR 3031	31	2200	1612	Nosler, Hornady, Sierra
170 SP	IMR 3031	29	2100	1665	Sierra, Nosler
150 SP	FL		2390	1902	Factory load
170 SP	FL		2200	1827	Factory load

Always use round- or flat-pointed bullets in tubular magazine rifles; sharp-pointed bullets might set off other cartridges in the magazine.



300 Savage

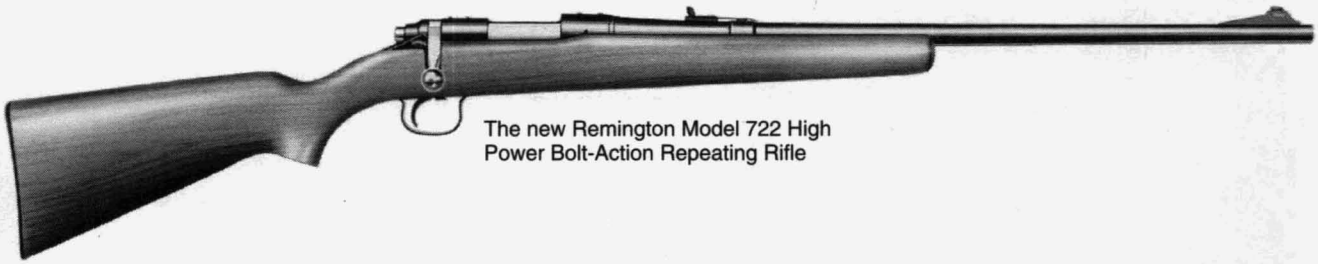


Historical Notes Developed and introduced by Savage Arms company for their Model 99 lever-action rifle in 1920, the 300 Savage was later chambered in the Savage Models 20 and 40 bolt actions. The 300 Savage was intended as a cartridge that would work through medium-length actions and deliver ballistics similar to the 30-06. Remington chambered it in their Model 81 autoloader, 760 slide action and 722 bolt action. The cartridge achieved considerable popularity, but has now lost out to the superior 308 Winchester.

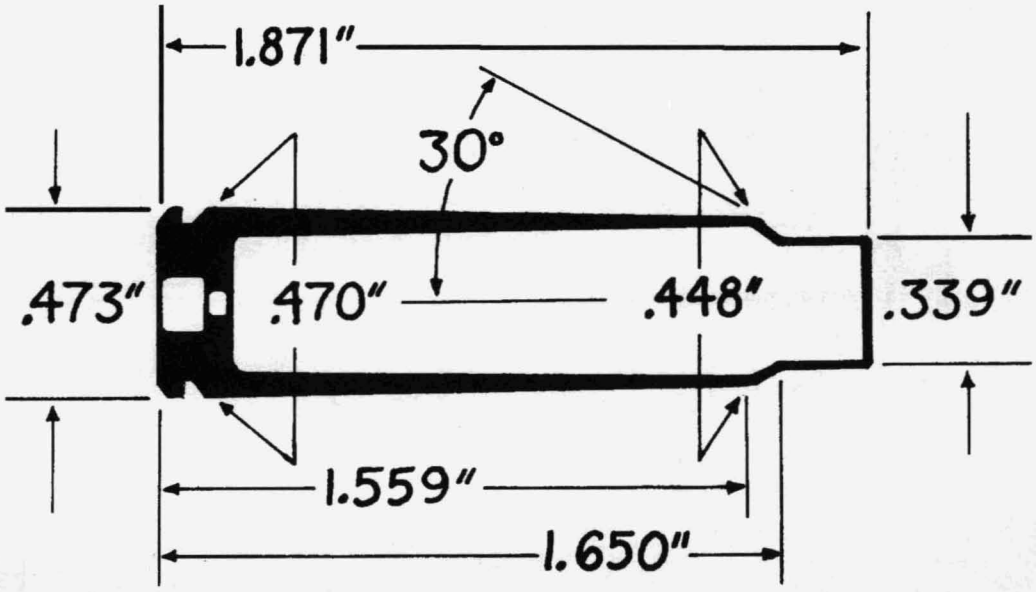
General Comments The 300 Savage provided lever-, slide-action and semi-auto fans with performance close enough to the 30-06 to make rifles of this type useful for most American big game. The original factory load was with the 150-grain bullet and matched the original 30-06 sporting load at 2700 fps. If loaded to original factory pressure levels with IMR-4064, it can significantly exceed that velocity safely. It is not fully adequate for moose or brown bear, but it is a fine deer and elk cartridge. It is a better choice than the 30-30 for deer under any conditions. The 308 Winchester fulfills the same function as a short-action cartridge and has somewhat more power, so it has gradually replaced the 300 Savage. However, many thousands of 300 Savage caliber rifles are still in use so the cartridge will continue to be loaded for many more years. In a bolt-action rifle, it is as accurate as any other 30-caliber. All the major domestic ammunition companies offer this caliber.

300 Savage Loading Data and Factory Ballistics

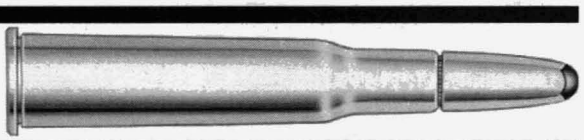
Bullet (grs.)	Powder/grs.		MV	ME	Source
100 SP	IMR 4064	46	3000	1999	Speer
110 SP	IMR 4895	43	2800	1915	Speer, Sierra
110 SP	BL-C2	42	2800	1915	Hornady, Speer, Sierra
125 SP	IMR 4895	43.5	2800	2177	Sierra
130 SP	IMR 4064	43	2700	2105	Speer, Hornady
150 SP	IMR 4064	41.5	2600	2252	Sierra, Hornady, Speer
150 SP	IMR 4895	40.5	2600	2252	Sierra
150 SP	IMR 4064	44.0	2800	2610	Hornady
165 SP	IMR 3031	37.8	2500	2290	Hornady, Sierra
180 SP	IMR 4350	46	2400	2303	Hornady, Speer
180 SP	IMR 4895	39.5	2400	2303	Sierra
150 SP	FL		2630	2303	Factory load.
180 SP	FL		2350	2207	Factory load.



The new Remington Model 722 High Power Bolt-Action Repeating Rifle



30-40 Krag (30 Army)



Historical Notes The 30 U.S. Army, or 30-40 Krag, the first United States small-bore military cartridge, was adopted in 1892. The Winchester high-wall single shot was the first commercial rifle in the U.S. produced for a small-bore, smokeless powder cartridge. This happened when the 30-40 Krag was added to the available calibers during 1893. The Remington-Lee bolt action, Remington rolling block, Winchester Model 95 lever action and high-wall single shot were the first commercial sporting rifles to offer this caliber. No commercial rifles used the cartridge from 1936 to 1973. The first smokeless sporting cartridge (30-30) didn't arrive until 1895. From 1973 until 1977 the Ruger No. 3 single shot was chambered for the 30-40 Krag, thus stimulating a renewed interest in the cartridge.

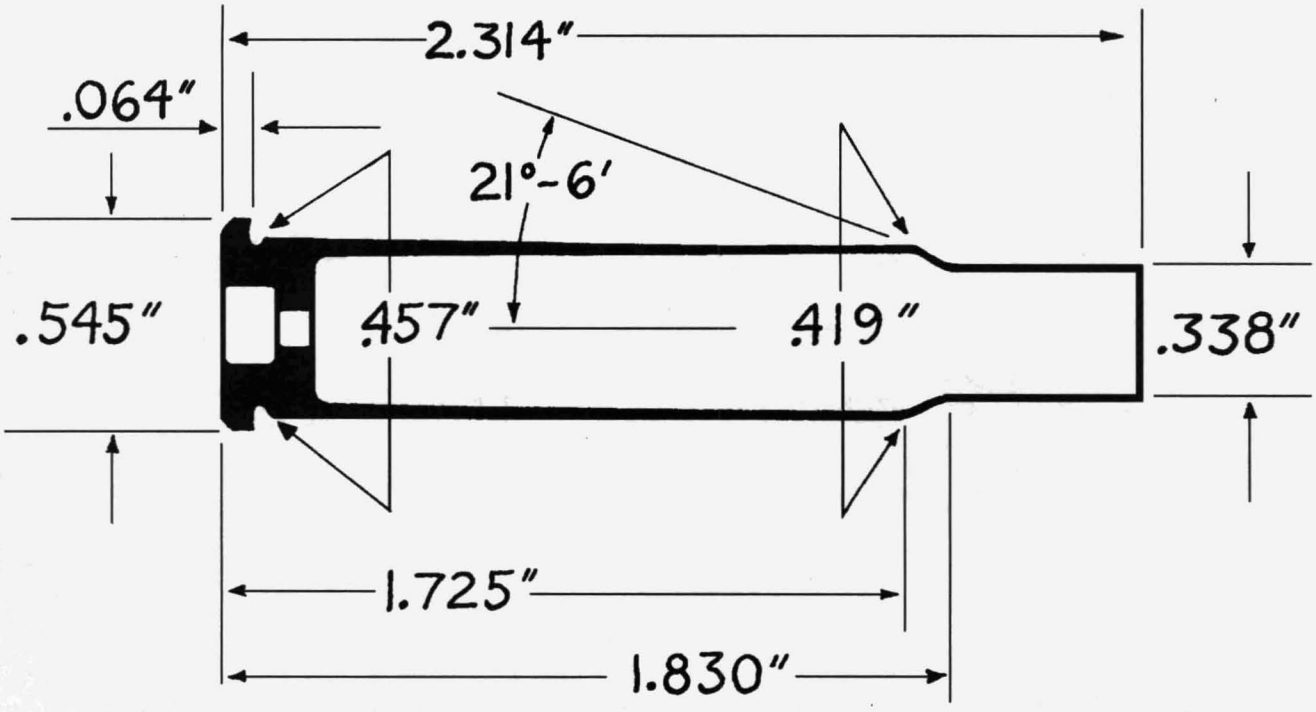
General Comments The 30-40 (30-caliber/40 grains of the original smokeless powder load) Krag holds the unusual distinction of being the cartridge used to take what is still the world's record Rocky Mountain elk in 1899. This cartridge has retained its popularity primarily because large numbers of fine sporting conversions of the Krag military rifles and carbines chambered for it are still in use. This speaks highly for both the cartridge and the gun. If there is or has been a smoother working bolt-action rifle, I have not seen it.

Although not quite as powerful as either the 30-06 or the 308 Winchester, the 30-40 is well suited for use against North American big game. Just as with any cartridge, marksmanship and bullet choice are important, especially when going after the biggest and the meanest species on this continent. The Krag earned its reputation with the 220-grain loading, but it can be loaded to great advantage with lighter bullets for smaller species.

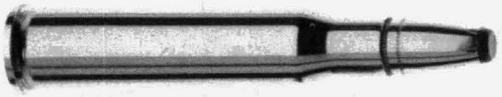
Interestingly, most authorities consider the 1895 Winchester chambering to be safe with loads at a somewhat higher pressure than the Krag rifle. However, both actions have limitations and one should be particularly circumspect in this regard. Bountiful loading data can be found in current manuals. The 30-40 is the basis of an entire genre of powerful Ackley Improved chamberings particularly suited to strong single shot rifles. Winchester is the only remaining manufacturer of this caliber. Only the 180-grain bullet is still offered.

30-40 Krag Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
100 SP	H-322	45	3000	1999	Speer
110 SP	IMR 4320	47	2700	1781	Sierra, Speer
125 SP	IMR 4895	44.5	2600	1877	Sierra
130 SP	IMR 4064	45.5	2900	2428	Hornady, Speer
150 SP	IMR 4895	40	2400	1919	Nosler, Sierra
165 SP	IMR 4350	47	2500	2290	Hornady, Nosler, Sierra
180 SP	IMR 4350	46	2450	2400	Nosler, Sierra, Speer
180 SP	IMR 4895	39	2200	1935	Sierra
200 SP	IMR 3031	34	2100	1959	Nosler, Speer, Sierra
220 SP	IMR 4350	42	2100	2155	Hornady, Speer, Nosler
180 SP	FL		2430	2360	Factory load.
220 SP	FL		2200	2360	Factory load.



307 Winchester



Historical Notes The development of the rimmed 307 Winchester began in 1980, with the first public announcement in December, 1982. However, the cartridge and the Model 94 XTR Angle Eject carbine chambered for it were not available until early 1983. The Marlin Model 336ER in 307 chambering introduced at the same time is no longer offered. The Angle Eject feature is a design modification of the beefed-up Model 94 XTR that ejects spent cartridge cases to the side rather than straight up, which was the way they ejected from earlier Model 94 actions. This was accomplished by changing the position of the extractor and ejector and lowering the right receiver side wall.

The 307 caliber designation is to avoid confusing this cartridge with the other 30 calibers. It actually uses standard .308-inch bullets. The 307 Winchester is essentially a rimmed 308 Winchester although there is a difference in the overall cartridge length and case thickness. Original factory loadings had 150- and 180-grain bullets.

General Comments The popular Model 1894 Winchester lever action has always suffered from two major deficiencies: The design did not allow center mounting of a scope sight; and the tubular magazine required the use of flat-point bullets to prevent one cartridge from setting off others in the magazine under recoil. These factors combined to relegate the Model 1894 to largely short-range woods and brush use. The new XTR Angle Eject redesign eliminates the scope mounting problem and modernizes an old, but popular action.

The 307 Winchester will certainly enhance the range and power of lever-action rifles so chambered. It is, based on factory ballistic figures, faster than the 30-30 by some 375 fps in muzzle velocity. Although the 307 Winchester has the same general configuration as the rimless 308 Winchester, there are slight differences that prevent it from achieving the full power of the 308. For one thing, the bullet is seated slightly deeper to maintain an overall length compatible with the length of the Model 1894 action. The result is that for any given barrel length with the same bullet weight the 308 will deliver approximately 60 to 110 fps more muzzle velocity. Also, with its pointed bullet, the 308 will lose velocity at a slower rate than the 307 flat-point.

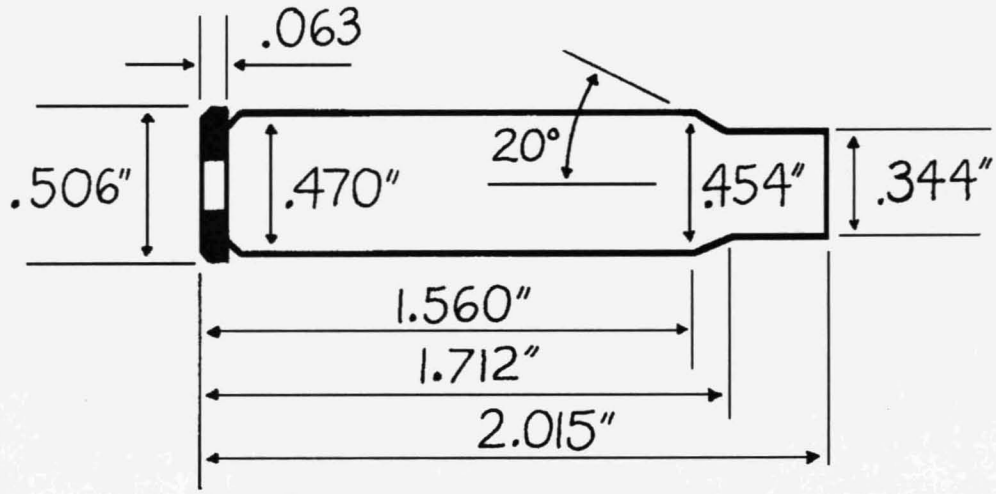
It is possible to chamber and fire 308 cartridges in some 307 rifles. However, for various reasons, this is an unsafe practice that could result in damage to the rifle and possible injury to the shooter.

The 307 has slightly less velocity at 200 yards than the 30-30 has at 100 yards. If the 30-30 is an adequate 100-yard-plus deer cartridge, then the 307 is certainly a 200-yard deer cartridge. It is not likely to replace the 30-30 as America's favorite deer cartridge, but it is a more versatile cartridge and certainly takes the Model 94 carbine out of the woods, bush and short-range class. Although it has been reported that the 307 Winchester has thicker case walls and, therefore, reduced internal volume, measurements do not verify this. Winchester is the only manufacturer of ammunition in this caliber. Only the 180-grain bullet is still offered.

307 Winchester Loading Data and Factory Ballistics

Bullet (grs.)*	Powder/grs.		MV	ME	Source
110 SP	IMR 4895	44	2700	1781	Speer
130 SP	H-335	45	2800	2264	Speer
150 SP	IMR 4064	41	2500	2082	Hornady, Speer
150 SP	H-335	41	2500	2082	Speer
170 SP	IMR 4064	41	2500	2360	Hornady
170 SP	W748	41	2450	2266	Speer, Hornady
150 SP	FL		2760	2538	Factory load.
180 SP	FL		2510	2519	Factory load.

*In tubular magazine rifles, load only flat-point bullets.



308 Winchester (7.62x51mm NATO)

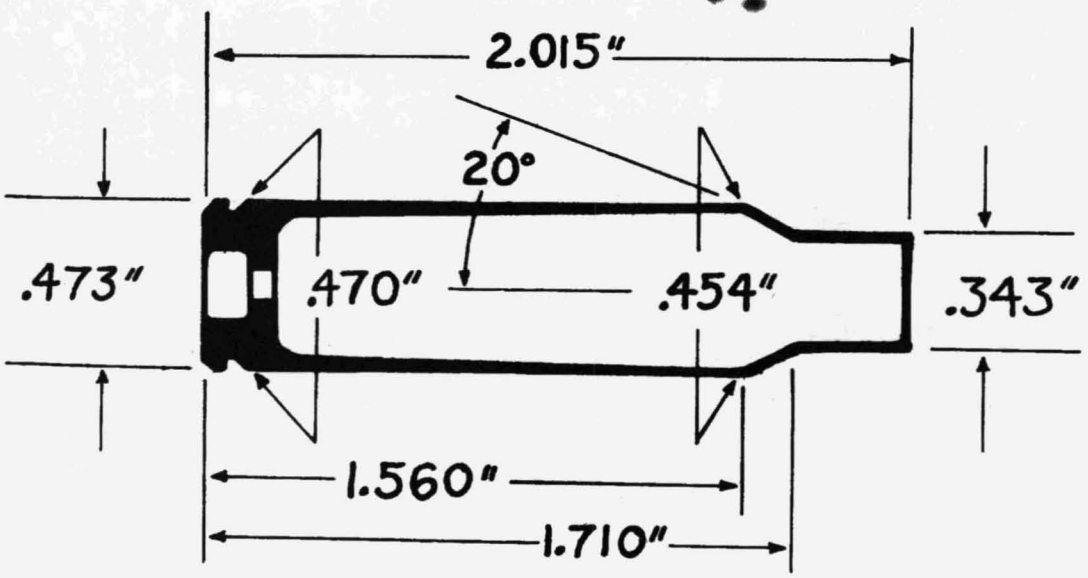
Historical Notes Introduced by Winchester as a new sporting cartridge in 1952, the 308 is nothing more than the NATO 7.62x51mm military round. This was a very smart move, to tack the Winchester name on what was sure to become a popular sporting number. Practically every manufacturer of high-powered sporting rifles chambers the 308 since it will work through medium- or standard-length actions. The Model 70 bolt-action and 88 lever-action Winchester were the first American sporting rifles so chambered. It was adopted as the official U.S. military rifle cartridge in 1954, although weapons for it were not ready until 1957.

General Comments In power, the 308 Winchester is superior to the 300 Savage and almost equal to the 30-06. It delivers about 100 fps less muzzle velocity than the larger 30-06 with any given bullet weight. Most authorities consider the 308 suitable for most North American big game, although it's on the light side for moose or big brown bear. This caliber is a favorite of target shooters and has a reputation for excellent accuracy. It is the basis for a number of wildcat cartridges that have been adopted as factory chamberings: 243 Winchester, 7mm-08 Remington, 358 Winchester and the rimmed versions 307 Winchester and 356 Winchester. All major domestic and foreign ammunition companies offer this cartridge.

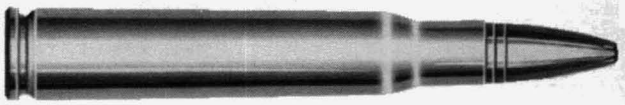
308 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
110 SP	IMR 4064	50	3200	2502	Sierra
110 SP	IMR 4895	48	3200	2502	Hornady, Sierra
125 SP	W748	51.5	3100	2668	Sierra, Nosler
150 SP	IMR 4064	46	2800	2612	Nosler, Sierra, Speer
150 SP	IMR 4895	44	2700	2429	Nosler, Speer, Sierra
165 SP	IMR 4064	43	2600	2477	Sierra, Speer, Nosler, Hornady
180 SP	IMR 3031	41	2500	2499	Nosler
180 SP	IMR 4064	41.5	2500	2499	Nosler, Sierra, Hornady
190 SP	IMR 4064	41.5	2500	2637	Hornady, Speer, Sierra
200 SP	IMR 4064	41.5	2400	2559	Sierra
150 SP	FL		2820	2648	Factory load.
168 HPBT	FL		2600	2180	Factory load.
180 SP	FL		2620	2743	Factory load.

Sako TRG 21 with accessories



30-06 Springfield (7.62x63mm/ 30 Government M'06)

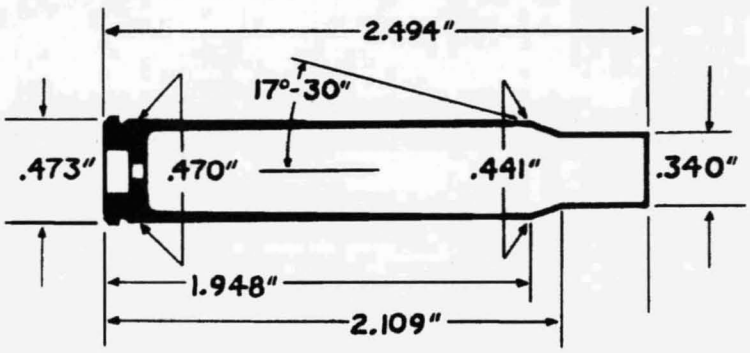


Historical Notes The 30-06 Springfield is a United States military cartridge adapted from the 30-03 by adopting a lighter streamlined bullet and making other minor changes. In this it parallels other military cartridge developments at about the same time, with French and German developments leading the way. It was adopted in 1906 for the Model 1903 Springfield service rifle, which was based on the Mauser bolt-action system. The Winchester Model 1895 lever action appears to have been the first sporting rifle chambered for the 30-06. The cartridge was added to the line in 1908. The Remington bolt-action Model 30, introduced in 1921, and the Winchester bolt-action Model 54 brought out in 1925 both offered the 30-06, among other calibers. The Savage bolt-action Model 40 and 45 Super-Sporter rifles were also so chambered when introduced in 1928. At present, in addition to the many bolt-action rifles, the Remington Model Six slide action and Four semi-auto, as well as the Browning semi-auto, include the 30-06 as standard calibers. The Ruger Number One single shot rifle is also offered in 30-06. A number of British and European side-by-side or over/under double rifles can be ordered in this caliber, and so can some European rifle-shotgun combination guns.

General Comments The 30-06 is undoubtedly the most flexible, useful, all-round big game cartridge available to the American hunter. For many years it has been the standard by which all other big game cartridges have been measured. To say that a cartridge is in the 30-06 class means it is suitable for any game in North America. The secret of success when using this cartridge is to select the right bullet for the game and hunting conditions at hand. Lighter bullets of 100 to 130 grains should be used only for varmint and small game hunting. While these bullets can be driven at impressive velocities (well over 3000 fps), they are designed to expand rapidly on small game and will not penetrate properly on large game. For deer, antelope, goat, sheep, black or brown bear, under most hunting conditions, the 150- or 165-grain bullet is proper and a good compromise for those seeking one load for medium to heavy game. For heavier game such as elk, moose or the big brown bear, the 180-, 200- or 220-grain bullets are the best choice. The heavier bullets are also considered best for woods or brush hunting, regardless of the quarry. The '06 performs impressively with handloads using 250-grain bullets. Many experienced hunters consider the 180-grain bullet the most satisfactory all-round loading for the 30-06 because it can be used effectively on anything from deer to the heaviest game under almost any hunting conditions. As a matter of fact, the 30-06 will give a good account on all but the heaviest or most dangerous African or Asiatic species under average hunting conditions. The 220-grain bullet is generally recommended for African game although the 180-grain also has a good reputation there. With the proper bullet, this cartridge can be adapted to any game or hunting situation in North or South America, whether in the mountains, plains, woods or jungles. Few other cartridges can claim equal versatility.

30-06 Springfield Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
100 SP	IMR 4064	59	3400	2568	Speer
110 SP	IMR 4064	54.5	3300	2660	Sierra, Hornady
110 SP	H-380	56	3300	2660	Sierra
125 SP	IMR 3031	50	3100	2668	Sierra
130 SP	IMR 4350	58	3000	2599	Hornady, Speer
150 SP	IMR 4350	59	3000	2998	Nosler, Speer, Sierra, Hornady
150 SP	IMR 4895	51	2900	2802	Nosler
165 SP	IMR 4320	50.5	2800	2873	Sierra
180 SP	IMR 4320	48.5	2700	2910	Sierra, Nosler
180 SP	IMR 4831	57	2750	3023	Speer, Nosler, Sierra
190 SP	IMR 4350	54	2700	3076	Hornady, Speer, Sierra
200 SP	IMR 4320	47	2400	2559	Nosler, Sierra
220 SP	IMR 4350	50.5	2400	2854	Hornady, Sierra, Barnes
220 SP	IMR 4831	54	2500	3054	Hornady, Sierra
250 SP	IMR 4831	47	2100	2499	Barnes
55 SP	FL (Accelerator)		4080	2033	Remington factory load.
125 SP	FL		3140	2736	Factory load.
150 SP	FL		2920	2839	Factory load.
165 SP	FL		2800	2873	Factory load.
168 HPBT	FL		2700	2720	Factory load.
180 SP	FL		2700	2913	Factory load.
220 SP	FL		2410	2837	Factory load.



300 Holland & Holland Magnum (300 H&H Super)

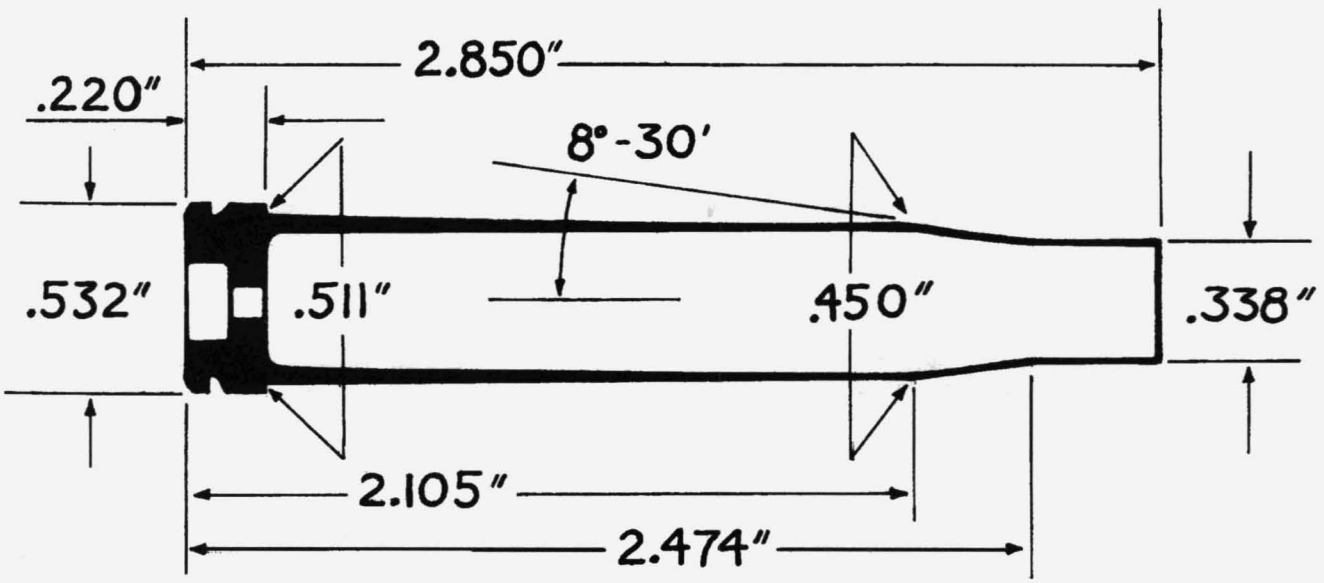
Historical Notes The 300 H&H Magnum was introduced in 1925 by the British firm of Holland & Holland as "Holland's Super 30." The Western Cartridge Co., the first American company to load this round commercially, offered it here in 1925. No American-made commercial rifles were chambered for the 300 H&H until 12 years after its introduction. However, Griffin & Howe and other custom rifle makers turned out rifles for it almost as soon as the British. In 1935, Ben Comfort won the 1000-yard Wimbledon Cup Match with this cartridge, and overnight it became the new sensation. The Model 70 Winchester was chambered for the 300 H&H in 1937, and the Model 721 and succeeding Model 700 Remingtons were also available in this caliber. Most European bolt-action rifles chambered it as standard.

General Comments Since 1935, the 300 H&H has enjoyed a limited popularity in the United States. Many shooters consider it the best all-round 30-caliber available to the American hunter; others insist it is hardly better than the 30-06. Regardless of which side one favors, this is an accurate cartridge and adequate for any North American big game. Its most useful range is from elk on up, but it is also a very fine long-range cartridge for antelope, sheep or goat. It is popular in Africa as an all-round caliber for plains game. Lately, its popularity has suffered considerably from competition with the 300 Weatherby and 300 Winchester Magnums. It is no longer used for match competition. Derived from the earlier 375 H&H, the 300 H&H is the direct progenitor of an entire family of "belted magnums." With modern powders and best handloads the 300 H&H is very close ballistically to even the biggest 300 Magnums. Winchester, Remington and Federal all load this caliber.

300 Holland & Holland Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
110 HP	IMR 4350	76	3600	3166	Sierra, Hornady
130 SP	IMR 4320	64	3400	3338	Hornady
150 SP	IMR 4831	73	3300	3628	Nosler, Sierra, Speer
165 SP	IMR 4350	69	3100	3522	Sierra, Speer, Hornady
180 SP	IMR 4831	68	2900	3362	Sierra, Speer
190 SP	H-380	65.5	3000	3798	Hornady
200 SP	IMR 4831	67.5	2800	3483	Sierra, Speer
220 SP	IMR 4350	63	2700	3562	Hornady, Sierra
150	FL		3190	3390	Factory load.
180	FL		2880	3315	Factory load.
220	FL		2620	3350	Factory load.

Holland & Holland Best Quality



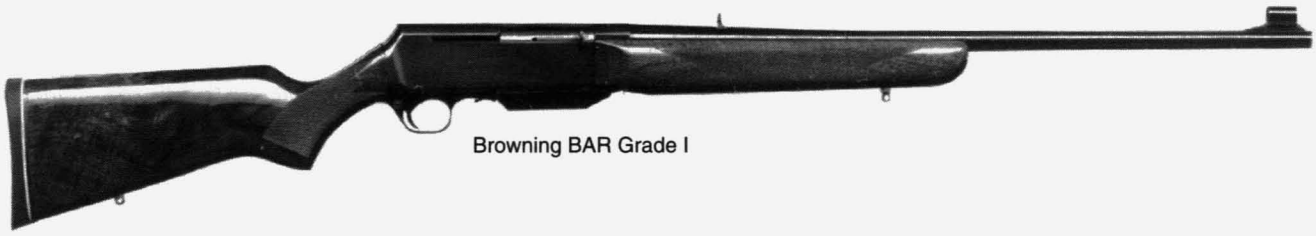
300 Winchester Magnum

Historical Notes This cartridge was introduced in 1963 for the Winchester Model 70 bolt-action rifle. Rifles chambered for the 300 Winchester Magnum have since been introduced by most domestic and European manufacturers.

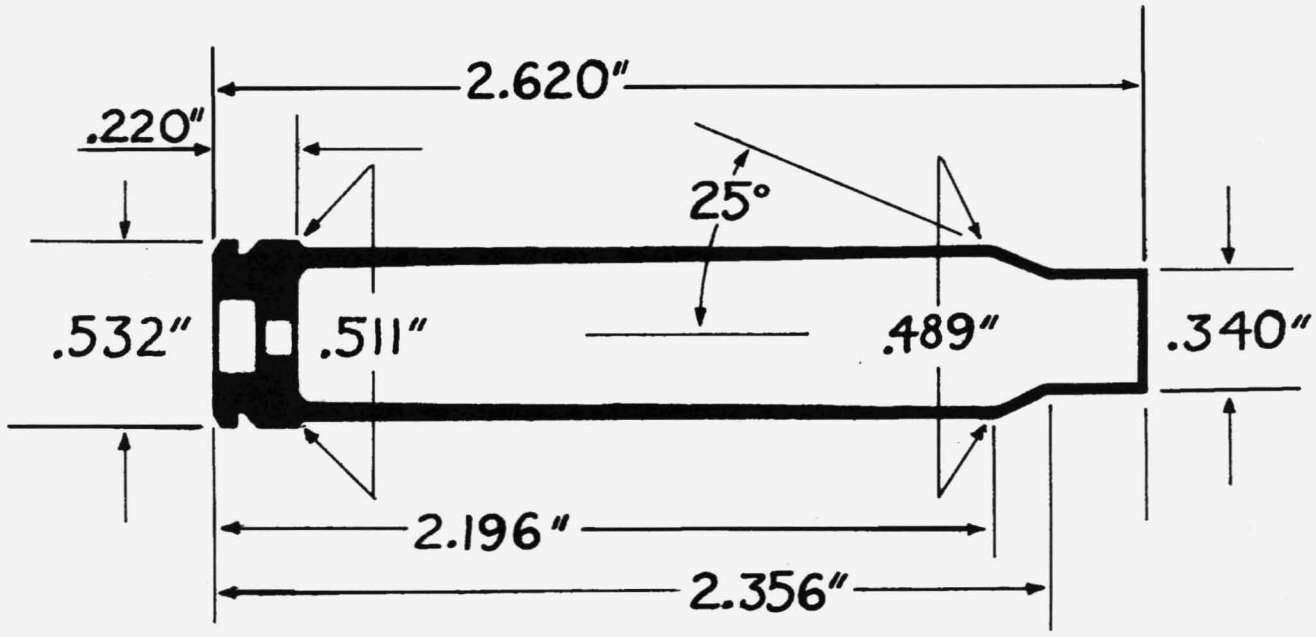
General Comments The 300 Winchester Magnum's arrival was rather anti-climatic because everyone had been predicting it from the day the 338 Winchester Magnum was brought out in 1958. The 30-338 wildcat quickly followed. The newer 300 Winchester Magnum has a slightly longer body (by about .12-inch) and a shorter neck than its predecessors. This short neck is considered a poor feature as it means the heavy bullets have to project back into the powder space quite a bit. Whether Winchester just wanted to make sure their round was different from the rest or made the body longer so owners of 30-338 or 308 Norma rifles could rechamber to the new cartridge is anyone's guess. In any event, the 300 Winchester Magnum is a fine long-range big game cartridge in the same class as the 300 Weatherby and suitable for any North American species. Actual factory-load ballistics may be closer to 300 Weatherby Magnum ballistics than published data suggests. With cartridges in this class and above recoil becomes a factor for many shooters. It is loaded by all domestic and many foreign ammunition manufacturers.

300 Winchester Magnum Loading Data and Factory Ballistics

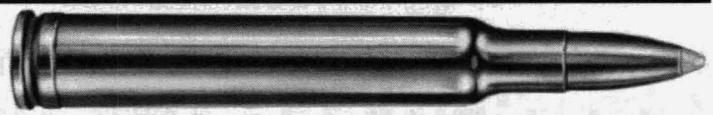
Bullet (grs.)	Powder/grs.		MV	ME	Source
110 HP	IMR 4350	80	3600	3166	Hornady, Sierra
125 SP	IMR 4350	77	3400	3209	Sierra
130 SP	IMR 4064	66	3300	3144	Speer, Hornady
150 SP	IMR 4350	76	3300	3628	Sierra
150 SP	IMR 4895	62	3150	3306	Speer, Sierra
150 SP	IMR 4350	76	3200	3412	Speer, Sierra
165 SP	IMR 4831	76	3200	3753	Speer, Sierra
180 SP	IMR 4350	71	3000	3598	Sierra
190 SP	IMR 4831	74	3150	4187	Speer
200 SP	IMR 4350	68	2950	3866	Nosler
220 SP	IMR 4350	60	2500	3054	Hornady, Sierra
150 SP	FL		3290	3605	Factory load.
180 SP	FL		2960	3501	Factory load.
200 SP	FL		2825	3544	Factory load.
220 SP	FL		2680	3508	Factory load.



Browning BAR Grade I



300 Weatherby Magnum

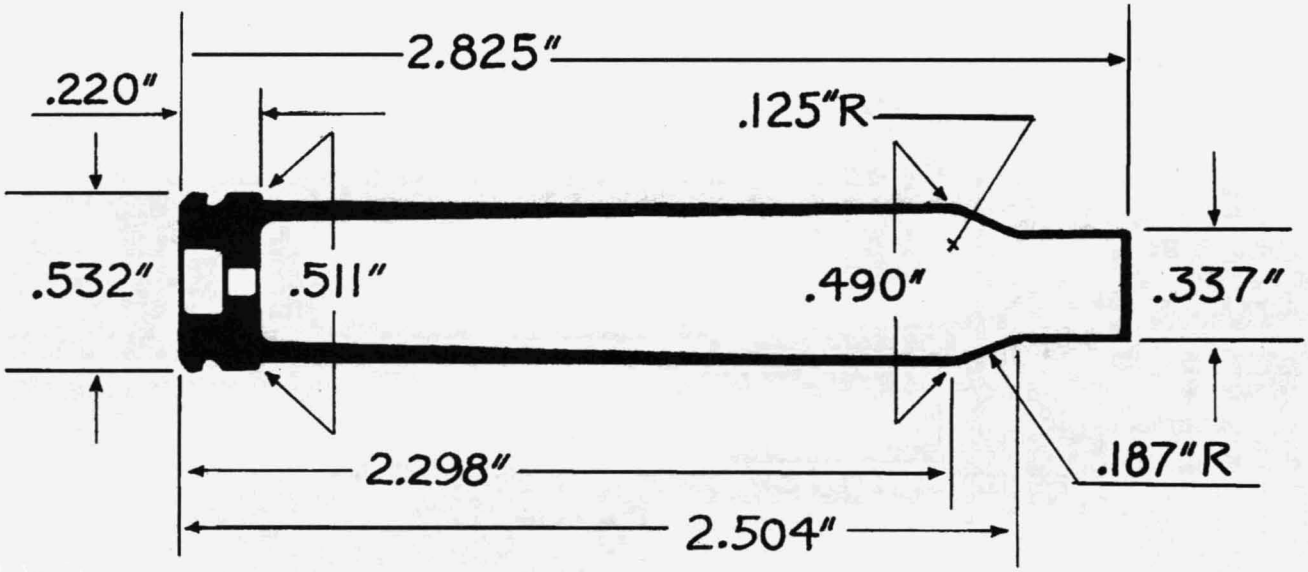


Historical Notes The 300 Weatherby Magnum is the most popular and well-known cartridge of the Weatherby line. At the same time, it is one of the most controversial. It was developed in 1944 as the last of the necked-down or improved Weatherby developments based on the 300 H&H case. Commercial ammunition has been available since 1948, under the Weatherby label. Weatherby brand ammunition is loaded by Norma of Sweden. The Weatherbys were the only U.S. rifles chambered for this round on a commercial basis, but it is a popular caliber among custom rifle makers. In 1989, Remington offered their model 700 Classic in 300 Weatherby. Recently, Remington and PMC have begun offering ammunition in this caliber.

General Comments The 300 Weatherby Magnum is the biggest of the commercial 300 belted magnums. As such, it is capable of delivering the best ballistics. Barrel life can be short, some might classify recoil as severe, and ballistics suffer greatly when shorter barrels are tried. None of these limitations matter to many who use it strictly for big game hunting and seldom fire it more than a few dozen times a year. It can be adapted to long-range varmint shooting if one can develop an accurate enough load, but it is not very flexible in that regard. For the hunter who wants one rifle suitable for any species of non-dangerous big game worldwide, the 300 WM is an excellent choice. However, because of caliber restrictions, local game laws may prohibit its use, even against non-dangerous species. This is another case of archaic regulations, where the law might allow one to use an entirely inappropriate loading from a much less powerful big-bore; where, given the right choice of bullets, the 300 WM would be much more effective and humane.

300 Weatherby Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
110 HP	IMR 4064	79.5	3800	3528	Hornady, Sierra
125 SP	IMR 4831	87.5	3500	3401	Sierra
150 SP	H-380	77	3300	3628	Sierra
150 SP	IMR 4350	80.5	3200	3412	Hornady, Speer
165 SP	IMR 4831	82	3200	3753	Speer, Sierra
180 SP	IMR 4350	76.5	3000	3598	Hornady, Speer, Nosler, Sierra
180 SP	MRP	84	3100	3842	Speer
200 SP	IMR 4350	75	2900	3736	Speer, Sierra
220 SP	H-450	77	2800	3831	Hornady
250 SP	IMR 7828	69	2350	3066	Barnes
150 SP	FL		3600	4316	Factory load.
165 SPBT	FL		3450	4360	Factory load.
180 SP	FL		3300	4352	Factory load.
190 SPBT	FL		3030	3873	Factory load.
220 SP	FL		2905	4122	Factory load.



303 Savage

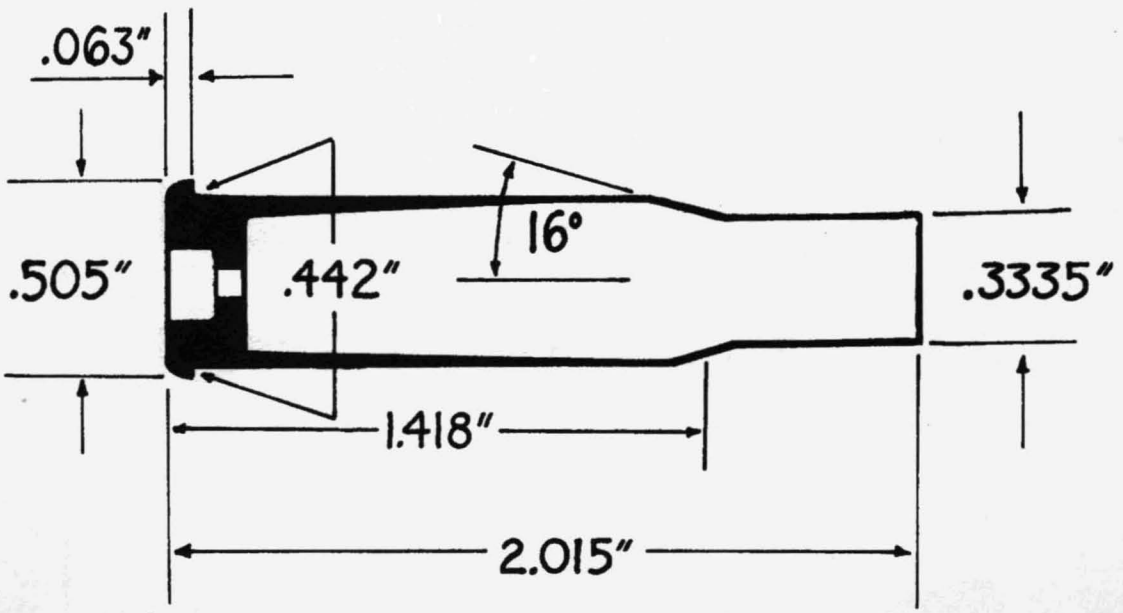
Historical Notes Originally developed as a potential military cartridge in 1895, the 303 Savage was later introduced commercially as one of several calibers for the popular Savage Model 1899 lever action. Savage discontinued this caliber when rifle production was resumed after WWII. In England it is known as the 301 Savage. No new rifles are chambered for this round at the present time. The current Winchester loading uses the original 190-grain bullet weight. They are the only manufacturer of this caliber.

General Comments Dogma holds that the 303 Savage is not a true 303 but instead uses standard 0.308-inch bullets. However, current SAAMI specifications call for a bullet of 0.311-inch. Measurements of bullets on three lots of each of two makes of WWII era factory loads yeilds mixed results. Some were 0.308-inch+, others 0.310-inch+. The 303 is similar to the 30-30 in size, shape and performance, but the two are not interchangeable. With its 190-grain bullet, many old woods hunters swore by it as a brush cartridge. With the relatively heavy bullet at moderate velocity, it gave good penetration on deer-size animals. However, it is ballistically no more powerful than the 30-30 so its use should be restricted to deer at short ranges. Unfortunately, Savage never took advantage of the fact that the 99 rifle is particularly suited to the use of spitzer bullets. Proper loadings of 150-grain spitzers in the 303 could have moved it completely out of the 30-30 class and might have come a long way toward increasing its popularity. As it has always been loaded, it is effective only at close range. This need not have been the case. Many handloaders still use the 303 Savage with 150-grain spitzer bullets loaded to about 2500 fps. It is still no long-range wonder, but such a load gives it a decided edge over any other 30-30-class chambering. Although still loaded commercially, it is rapidly becoming obsolete.

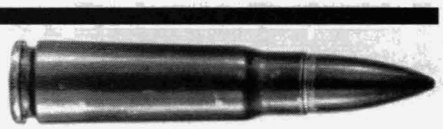
303 Savage Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
150 SP	IMR 4064	36	2400	1919	Lyman
170 SP	IMR 3031	31	2170	1778	Lyman
180 SP	FL		2140	1830	Factory load.
190 SP	FL		1890	1507	Winchester factory load.

Savage Model 99A



7.62x39 (7.62x39mm Soviet)



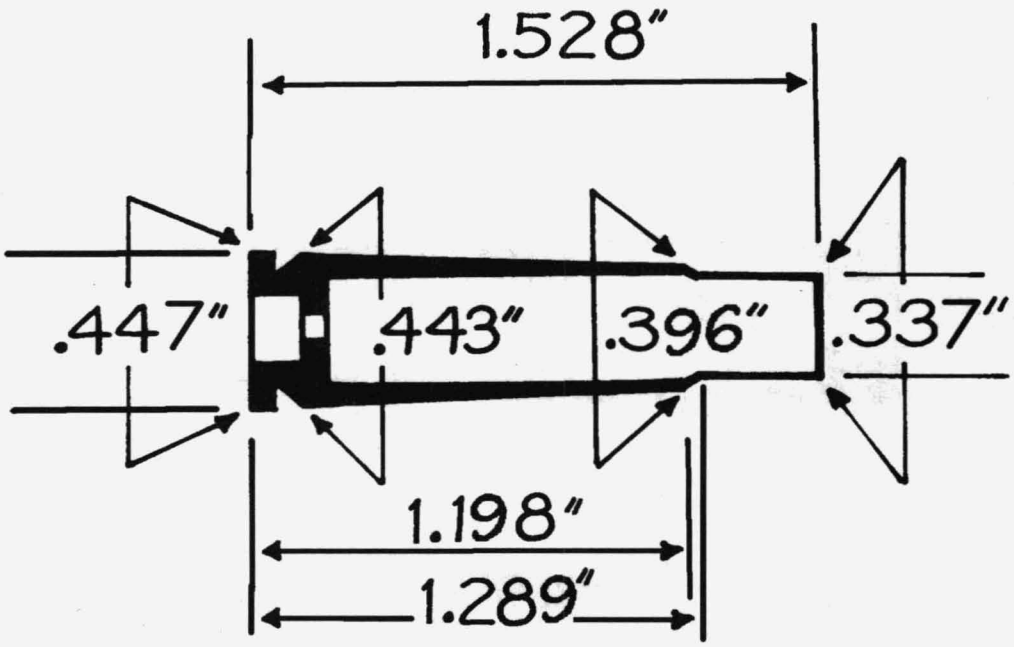
Historical Notes This cartridge is the standard military caliber for the Russian armed forces. It has become a modern favorite of U.S. sportsmen by virtue of the thousands of new and used SKS and AK 47-type carbines being imported and sold at very low prices. Ruger, Sako, and others are now making sporting rifles in this caliber. For example the Ruger Mini Thirty semi-auto carbine and bolt-action M77 rifle are both offered in 7.62x39mm. All major American ammunition manufacturers now offer this caliber with a softpoint bullet, brass case, and non-corrosive Boxer primer. Imported, low cost surplus military ammunition from present and former Communist countries is usually steel cases with corrosive Berdan primers.

General Comments While previous military cartridges generally made suitable hunting calibers with proper bullets, many writers condemn the 7.62x39 out of hand as being unsuited for hunting anything beyond small game. In short, it is very much like the M1 Carbine cartridge—fine for military use but useless for hunting. But at 100 yards, the 125-grain bullet of the 7.62x39 still retains 1129 fps of striking energy compared to the 1356 fps of the 30-30 Winchester. That is only 17 percent less and nearly twice that of the 30 Carbine (600 fps). And what of the 44 Magnum with 988 fps at 100 yards? Still, the 7.62x39 is very definitely a close-range number suitable for deer, javelina and the like. With the best handloads and the proper bullet, it can do even better. It can be loaded to good advantage with 150-grain bullets and then becomes a very good 30-30-class deer rifle. Youthful shooters and women will appreciate its low recoil and mild report. Aftermarket bullet manufacturers now offer suitable bullets. Bore diameter is nominally .311-inch but .308-inch diameter bullets can be used with good results and most reloading dies will accommodate this by including expander balls for both bullet sizes.

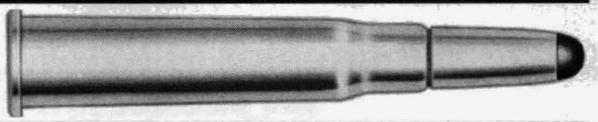
7.62mm Soviet Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
110 SP	IMR 4727	42	2500	1527	Speer
125 SP	RL-7	26.5	2400	1599	Hornady, Sierra
130 SP	IMR 4198	25	2250	1462	Speer
135 SP	IMR 4227	22.5	2200	1451	Sierra
150 SP	IMR 4198	22	2100	1469	Hornady
123 SP	FL		2300	1445	Federal factory load.
123 SP	FL		2365	1527	Winchester factory load.
125 SP	FL		2365	1552	Remington factory load.

Century International RI112A
Single Action Type 56 SKS



303 British



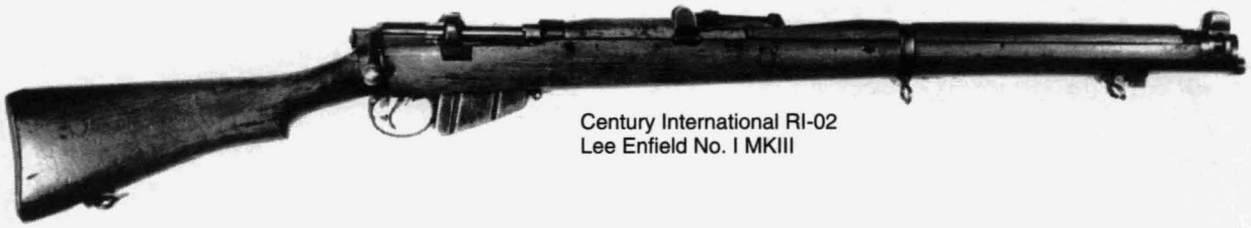
Historical Notes The 303 British was the official military rifle cartridge of England and the British Empire from its adoption in 1888 until the 7.62 NATO came along in the 1950s. Original loading was a 215-grain bullet and a compressed charge of blackpowder—smokeless powder became the propellant in 1892. Manufacture in the U.S. began about 1897. Remington chambered their Lee bolt-action magazine rifle for this cartridge and Winchester did likewise in their Model 95 lever action. No American rifle has chambered the 303 British since 1936. However, Winchester, Federal and Remington continue to load this popular caliber.

General Comments The 303 British has always been popular in Canada and other parts of the British Empire. In the U.S. it has not been as widely used because of its performance similarity to the 30-40 Krag. However, since the end of WWII, the importation of large numbers of British Lee-Enfield military rifles has altered this situation. At the present time, the 303 is more popular than the 30-40 Krag. Norma imports 130- and 180-grain loads that greatly increase the flexibility and usefulness of this cartridge for the American hunter. The 215-grain bullet has always had a good reputation for deep penetration and is a favorite for moose and caribou in the Canadian backwoods. The 303 is suitable for anything the 30-40 Krag is in the way of game. In Australia, a number of popular sporting cartridges are based on necking-down and/or reforming the 303 case.

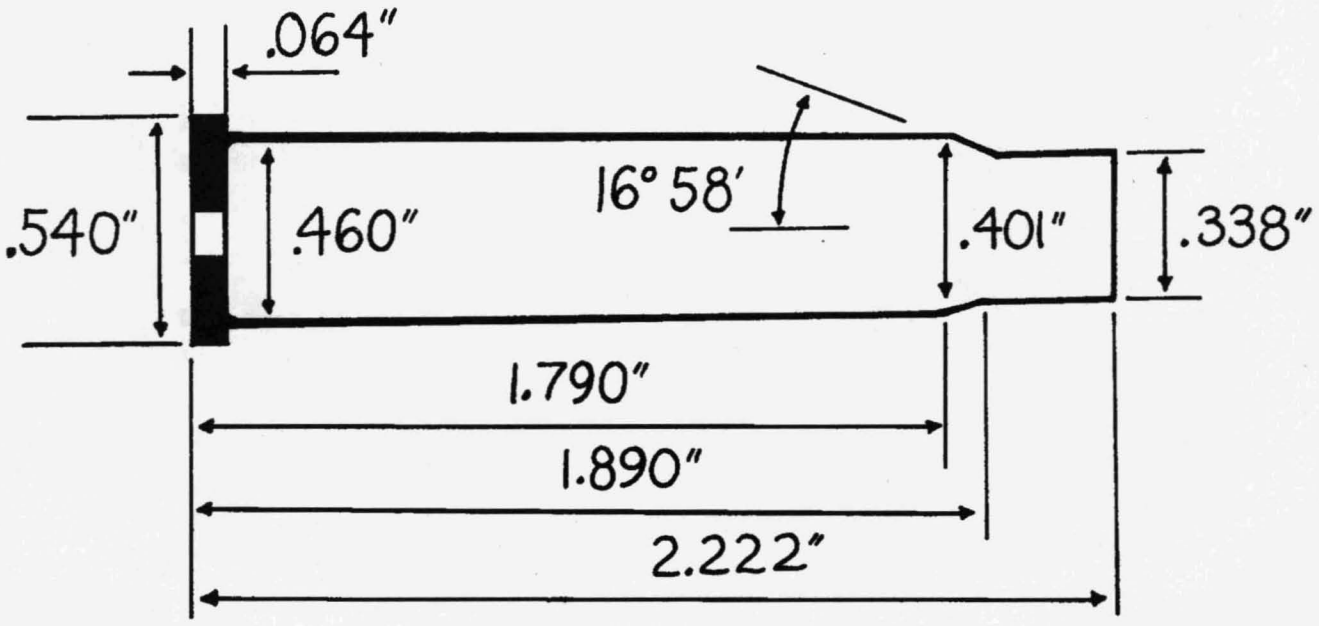
(Editor's Note: Although often classed with the 30-40 Krag, this cartridge is loaded to higher pressures and delivers superior ballistics. Foreign factory loads place it very close ballistically to the 308 Winchester and measurably above any factory 30-40 load, though handloads for the 30-40 in the Model 95 Winchester can match the 303 British.)

303 British Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
150 SP	IMR 4064	43	2600	2252	Speer, Hornady
150 SP	IMR 4895	42	2400	1919	Sierra, Speer
150 SP	IMR 4064	43	2600	2252	Speer, Sierra
180 SP	IMR 4895	42	2400	2303	Sierra
180 SP	IMR 4350	46	2400	2303	Speer, Hornady
130 SP	FL		2789	2246	Factory load.
150 SP	FL		2690	2400	Factory load.
180 SP	FL		2460	2420	Factory load.
215 SP	FL		2180	2270	Factory load.



Century International RI-02
Lee Enfield No. I MKIII



32-20 Winchester (32-20 WCF)

Historical Notes Introduced by Winchester in 1882 for their Model 73 lever-action rifle, the 32-20 quickly attained considerable popularity as a medium-power cartridge in both rifle and revolver. Practically all American makers have chambered rifles for the 32-20 in lever, slide or bolt action, and most single shot rifles have also chambered it. Colt, Smith & Wesson and Bayard made revolvers in this caliber. Marlin reintroduced it for their Model 94CL lever action in 1988. Winchester once offered a lighter 100-grain bullet blackpowder load for the 32 Colt Lightning magazine rifle, headstamped .32 C.L.M.R. A similar 100-grain loading specifically for Marlin rifles was headstamped .32-20. Both Remington and Winchester still offer factory loaded ammunition in this caliber.

General Comments Although semi-obsolete, the 32-20 still enjoys modest popularity with farmers, ranchers, trappers and pot hunters. It can be reloaded easily and at moderate cost. In addition, it delivers good killing power on small and medium game at ranges out to 100 yards without destroying all the edible meat.

Winchester once advertised it as a combination small game and deer cartridge. It is much too underpowered for deer-size animals. It is, nonetheless, a useful small game and varmint cartridge at short ranges, and it is quite accurate in a bolt-action or solid-frame single shot.

The author has had considerable personal experience with the old 32-20, having owned and hunted with several rifles of this caliber. These included (in chronological order), a Winchester Model 1892 lever action, Savage Model 23C bolt action, Remington Model 25A slide action and a rechambered Greener single shot Cadet rifle. The only one I still have is the Remington slide action, which is one of those things, along with my wife, that I just won't part with.

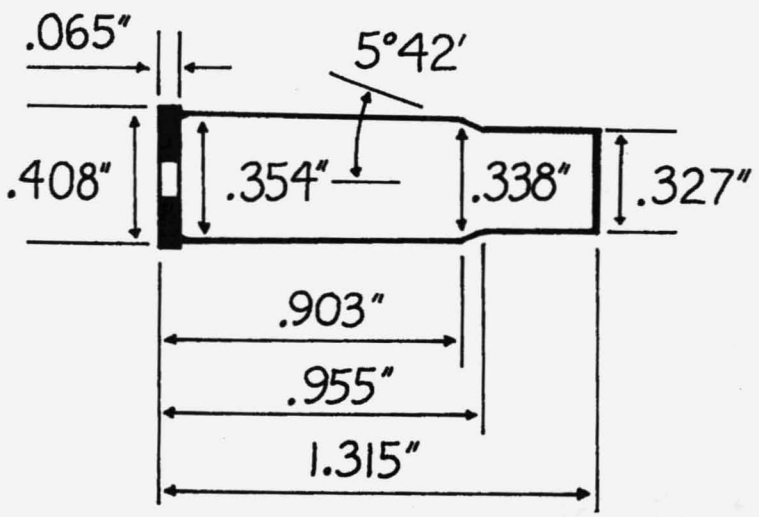
The Savage bolt action with a scope sight would shoot very consistently into 1 to $1^1/_4$ inches at 100 yards. This was a very nice little varmint and small game combination at ranges of 100 to 125 yards. I used this in the immediate post WWII era when nothing else was available, and it worked out very well within its range limitations. I have also used the 25-20, but always considered the 32-20 a better all-around caliber in this class. It's a better killer on just about anything at practical ranges.

In a strong single-action revolver, the 32-20 can be loaded to 1050 to 1100 fps from a 6-inch barrel, which makes a very effective field gun. Trouble is, the cartridge is too long for most modern revolver cylinders. The 32 H&R Magnum is shorter and will serve to fill the requirement for a high-performance 32-caliber handgun round. The 357 Magnum revolver cartridge chambering in a rifle will out perform the 32-20 by a substantial margin. In any event, the author has always liked the 32-20 for certain purposes, although by today's standards it is a bit on the obsolete side. The 32-20 is the basis for the 25-20 and the 218 Bee.

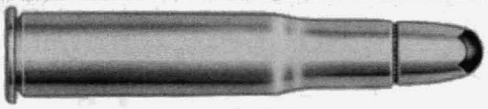
32-20 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
85 SP	2400	12.5	2100	833	Rifle only—Hornady
85 SP	IMR 4227	17	2300	999	Rifle only—Hornady
85 SP	H-110	14	2100	833	Rifle only—Hornady
110 SP	IMR 4227	15	2000	977	Rifle only—Hornady
110 SP	H-110	15.5	2100	1077	Rifle only—Hornady
110 SP	2400	10.5	1700	706	Rifle only—Hornady
80 SP	FL		2100	780	Factory load.
100 SP	FL		1210	325	Factory load.

WARNING: Do not use rifle loads in revolvers; pressures develop beyond what the average handgun is designed to withstand.



32 Winchester Special (32 WS)



Historical Notes Introduced in 1895 for the then-new Winchester Model 1894 lever action, the 32 Special was an original smokeless powder design. Because it is a rimmed shell, it has never been used in anything but lever-action and single shot rifles. Remington brought out a rimless version to function in their bolt and semi-auto rifles. Winchester and Marlin were the principal American companies to chamber the 32 Special. Federal, Remington and Winchester continue to offer factory loaded ammunition in this caliber.

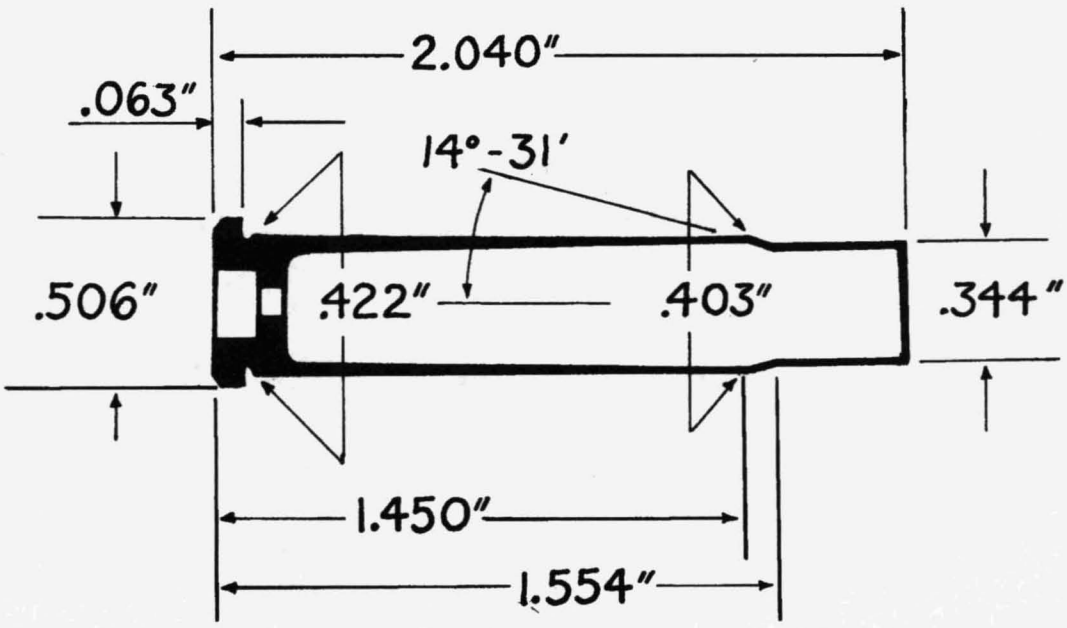
General Comments In their 1916 catalog Winchester had this to say about the 32 Special: "The 32 Winchester Special, which we have perfected, is offered to meet the demand of many sportsmen for a smokeless powder cartridge of larger caliber than the 30 Winchester and yet not so powerful as the 30 Army." They go on to explain that the 32 Special meets these requirements and the 1916 ballistics chart shows it generating 10.6 percent more energy than the 30-30 at the muzzle and retaining an edge to any reasonable hunting range.

Today, it is still loaded to higher velocity, and if loaded to equal pressure, it easily beats the 30-30 by over 100 fps. However, bullet selection is limted. Speer's 170-grain flat point, the most streamlined available, actually has a higher ballistic coefficient than most 170-grain 30-30 bullets. For those whose 32 Special rifle has a truly shot-out barrel, Hornady's 170-grain round-nose 0.323-inch bullet works wonderfully. There has been a mountain of bunk written as to how the 32 Special answered the demand of handloaders who wanted to use blackpowder. Since the same rifle was originally chambered for the 32-40 at about one-half the price of the nickel steel 32 Special version, this seems fantastic. They would have us believe that the man wanting to save money on ammunition would for no reason spend the price of two rifles for the privilege. Much ink has also been spilled claiming the 32 Special just wouldn't shoot straight after the barrel got a bit of wear. I have experimented with two 32 Special carbines, a very early Winchester and a 1936 Marlin. With bullets that fit, both shoot inside 3 inches at 100 yards with open sights. The Winchester had been so abused that its rifling hardly showed until we thoroughtly cleaned it. The bore is pitted but it shoots just fine.

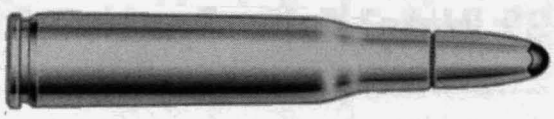
32 Winchester Special Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
170 SP	RL7	31.0	2283	1965	Lyman
170 SP	W748	36.2	2240	1890	Winchester
170 SP	FL		2250	1910	Factory load.

Winchester Model 64 Deer Rifle



8mm Mauser (7.92mm Mauser/ 8x57mmJ/8x57mmI/ 8x57mmS/8x57JS)



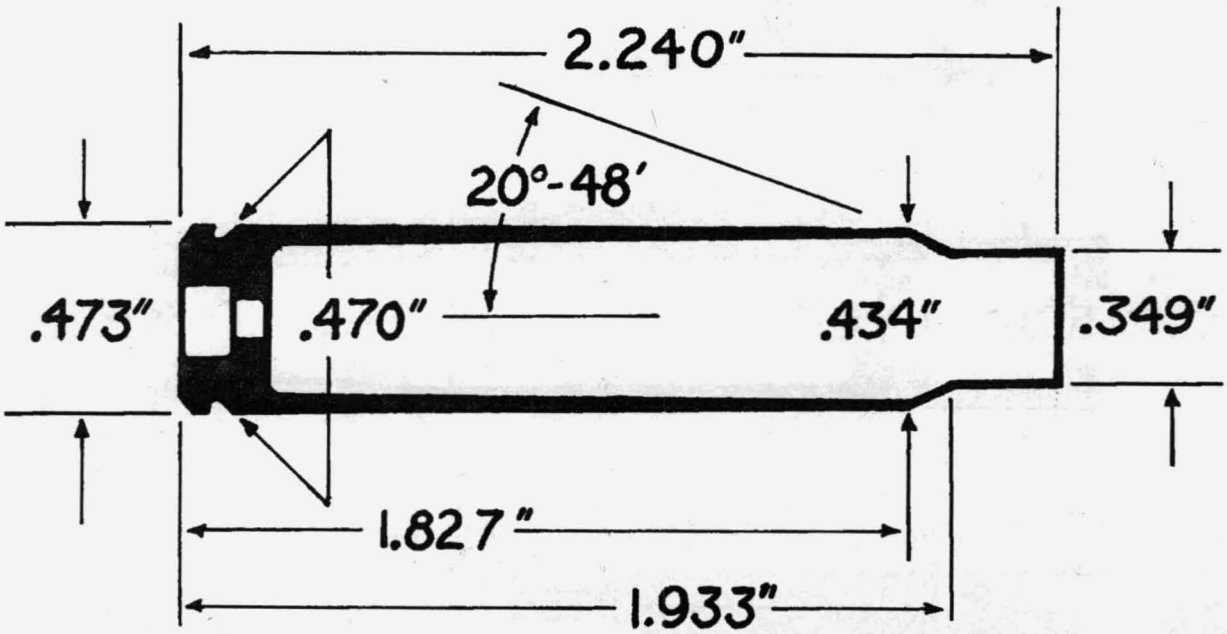
Historical Notes The 8mm or 7.92 Mauser was the German military rifle cartridge through both world wars. It was officially adopted in 1888 with a bullet diameter of .318-inch. In 1905, the bullet diameter was increased to .323-inch. In Europe, the 8mm Mauser and several other 8mm cartridges are available in both sizes. The larger size is always designated as S or JS bore. In the U.S., ammunition companies load only the .323-inch diameter or "S" bullet. The 8mm Mauser is widely chambered in European sporting rifles, but American gunmakers have not adopted it as a standard sporting caliber. The "J" or "I" in the name denotes infantry ammuntion. The German capital "I" was mistaken for a capital "J" by U.S. military interpreters after WWI and the "J" misnomer came into common use here thereafter.

General Comments The 8mm Mauser had not been very popular in the U.S. prior to WWII. However, the large number of obsolete, surplus 8mm military rifles sold here since the end of WWII has increased its use substantially. American cartridge companies only put out one loading; the 170-grain bullet at 2360 fps or so. As loaded by Norma and by other European companies, such as RWS, it is in the same class as our 30-06. It is adequate for any North American big game if the proper bullets and full loadings are used. A large variety of good .323-inch bullets is now available for the individual handloader, and this has increased the usefulness of the 8mm Mauser for the American shooter.

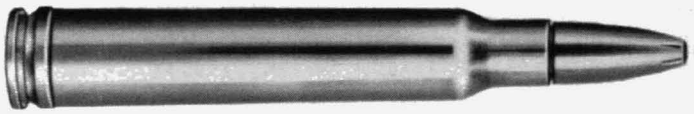
8mm Mauser (8x57mm JS) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
125 SP	H-4198	44	3100	2668	Hornady
125 SP	IMR 3031	49	3100	2668	Hornady
150 SP	IMR 4320	53.5	2900	2802	Hornady
150 SP	IMR 3031	49	2750	2519	Speer
175 SP	IMR 3031	45.5	2600	2627	Sierra
200 SP	IMR 4831	54	2400	2559	Speer
220 SP	IMR 4831		2200	2365	Hornady
159 SP	FL		2723	2618	European factory load.
170 SP	FL		2360	2100	U.S. factory load.
196 SP	FL		2526	2778	European factory load.
198 SP	FL		2625	3031	European factory load.
200 SP	FL		2320	2390	European factory load.
227 SP	FL		2330	2737	European factory load.

WARNING! Many J-bore (.318-inch) rifles still exist and will fire S-bore (.323-inch) cartridges, creating dangerous pressures. When in doubt, check bore diameter CAREFULLY!



8mm Remington Magnum



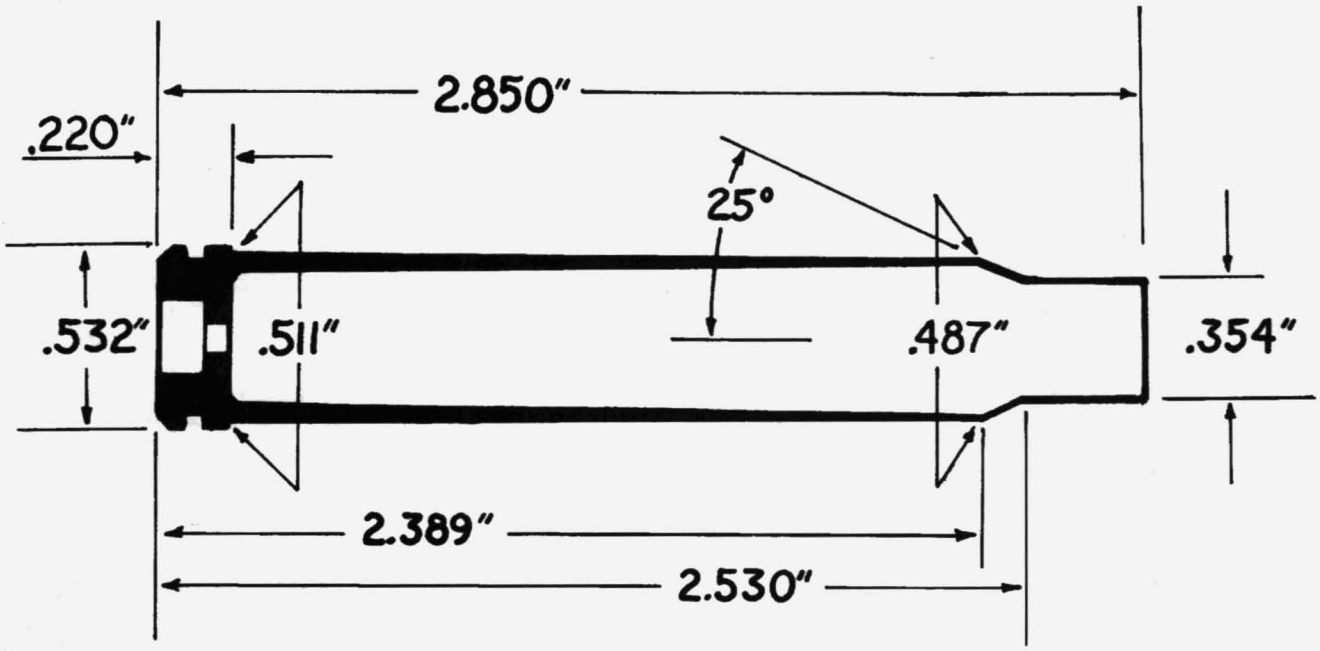
Historical Notes This cartridge was a Remington development announced in 1978 for their Model 700 BDL bolt-action rifle. The 8mm Magnum is something of a departure from the usual belted, short magnum configuration favored by Remington in the past, a design which will work through the standard-length bolt action. The 8mm Magnum is based on the full-length 375 H&H case blown out, thus requiring a .375-inch longer bolt travel than the standard 30-06 length action.

Again, this is not an entirely original design since it was preceded by similar developments in years past. The 8x68mm (S) Magnum, for example, originated in Germany around 1940, and a number of 8mm wildcat magnums such as the 8mm Ernst, 8x62 Durham, 323 Hollis, 8mm PMM, etc., date back to the late 1950s and early 1960s. However, this is the first commercial 8mm magnum cartridge introduced by an American company. Remington originally offered two loadings: a 185-grain bullet at a muzzle velocity of 3080 fps and a 220-grain at 2830 fps. The 220-grain load has since been dropped. There is a good selection of 8mm (.323-inch diameter) bullets available for handloading this cartridge.

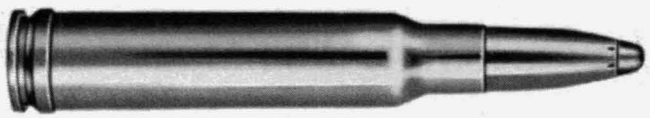
General Comments Comparing either handloaded or factory ballistics for the 338 Winchester Magnum and the 8mm Remington Magnum, one can easily see why the latter failed to garner any great following. Any minuscule ballistic advantage it might have just doesn't justify the increased cartridge length and recoil resulting from a heavier powder charge. Add to that a limited bullet selection and the 8mm Remington Magnum dims even further. With lighter recoil and potentially flatter trajectories, the various 300 Magnums have it beat on that side; with heavier bullets shooting almost as flat and delivering more energy the 338 Winchester Magnum and the 340 Weatherby Magnum have it beat on the other side. This is a classic example of a cartridge that fails to fill any useful niche. Do to its large powder capacity, this cartridge is another that is particularly sensitive to barrel length.

8mm Remington Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
125 SP	IMR 4064	76	3600	3598	Hornady
150 SP	IMR 4350	79.5	3300	3628	Speer, Hornady, Sierra
175 SP	IMR 4831	80	3100	3735	Speer, Sierra, Hornady
200 SP	IMR 4831	78	3050	4132	Nosler, Speer
220 SP	IMR 4831	76	2800	3831	Sierra, Hornady
250 SP	IMR 7828	72	2550	3611	Barnes
185 SP	FL		3080	3896	Remington factory load.
220 SP	FL		2830	3912	Remington factory load.



338 Winchester Magnum

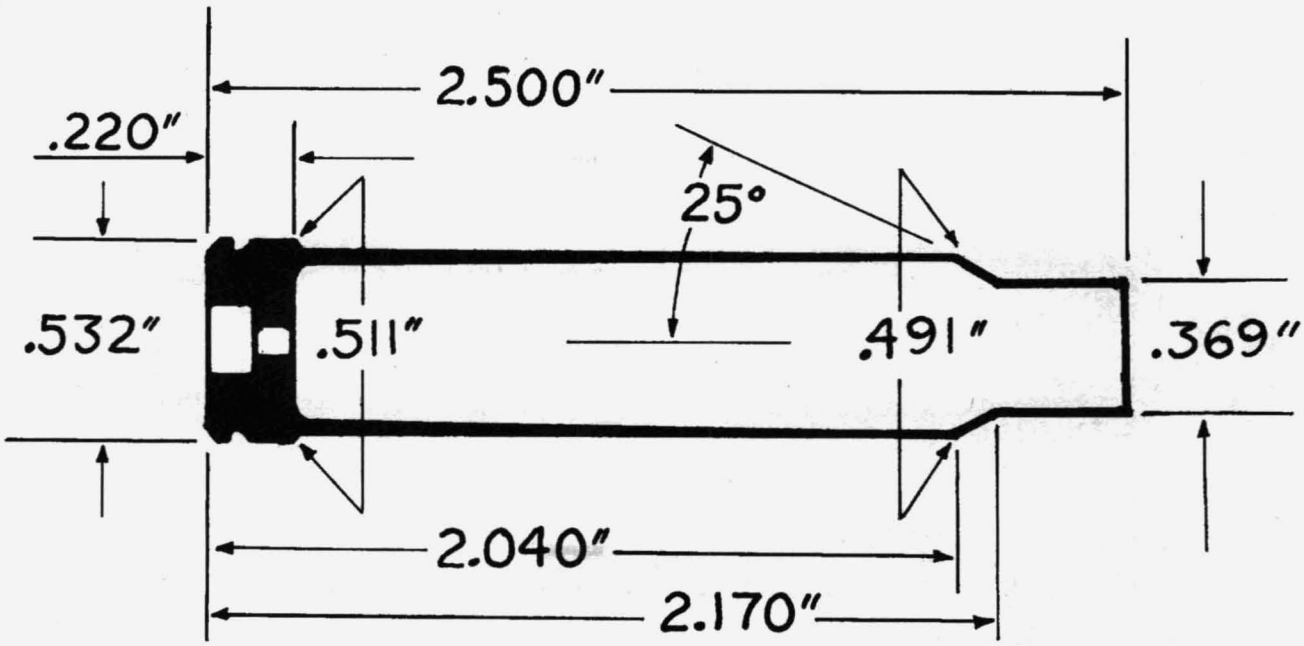


Historical Notes Announced in 1958, the 338 is another of the series based on the 458 Winchester necked-down. Initially available only in the Winchester Model 70 "Alaskan" bolt-action rifle, Remington adopted it for their 700 Series bolt action. Some of the European rifle makers also chamber it, as does Ruger for their Model 77 and No. 1 rifle and many custom and semi-custom rifles. Browning's autoloader also chambers it.

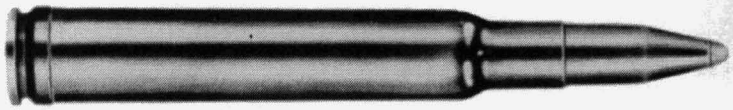
General Comments Designed to cover the heaviest of North American big game, the 338 has also done well in Africa on the larger varieties of plains game. Although slightly less powerful than the 375 H&H Magnum, the 338 is better suited for North American hunting conditions and game. It is a well-balanced cartridge for anything from elk through moose and grizzly bear under almost any situation. It could also serve very well for deer or antelope, even though it is overly powerful for this class. Like the 300 WM, the 338 Winchester would make an excellent one-gun cartridge for the worldwide hunter who has to travel light. The 338 is automatically barred in some African countries in which the 375 is the minimum caliber. Lately, the 338 has enjoyed a renewed and well-deserved popularity. Winchester, Remington and Federal all load this caliber.

338 Winchester Magnum Reloading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
175 SP	IMR 4895	67.5	3200	3980	Barnes
200 SP	IMR 4831	76.5	3000	4000	Hornady, Speer
200 SP	IMR 4350	71.5	2900	4048	Speer, Hornady
210 SP	IMR 4350	73	2900	3923	Nosler
225 SP	IMR 4831	72	2800	3918	Hornady
250 SP	IMR 4831	71	2700	4048	Speer, Sierra
250 SP	IMR 4350	70	2700	4048	Sierra
275 SP	IMR 4831	68	2500	3817	Speer
275 SP	IMR 4064	58	2400	3518	Speer
300 SP	IMR 7828	70	2500	4164	Barnes
200 SP	FL		2960	3890	Factory load.
225 SP	FL		2780	3860	Factory load.
250 SP	FL		2660	3921	Factory load.



340 Weatherby Magnum



Historical Notes The growing popularity of the 338 Winchester Magnum for elk and larger game undoubtedly influenced the development of the 340 Weatherby. First announcement of the new caliber came in 1962. John Amber had one of the first 340 WM rifles and reported 100-yard groups of 2 inches or less—quite good for such a heavy-caliber hunting rifle.

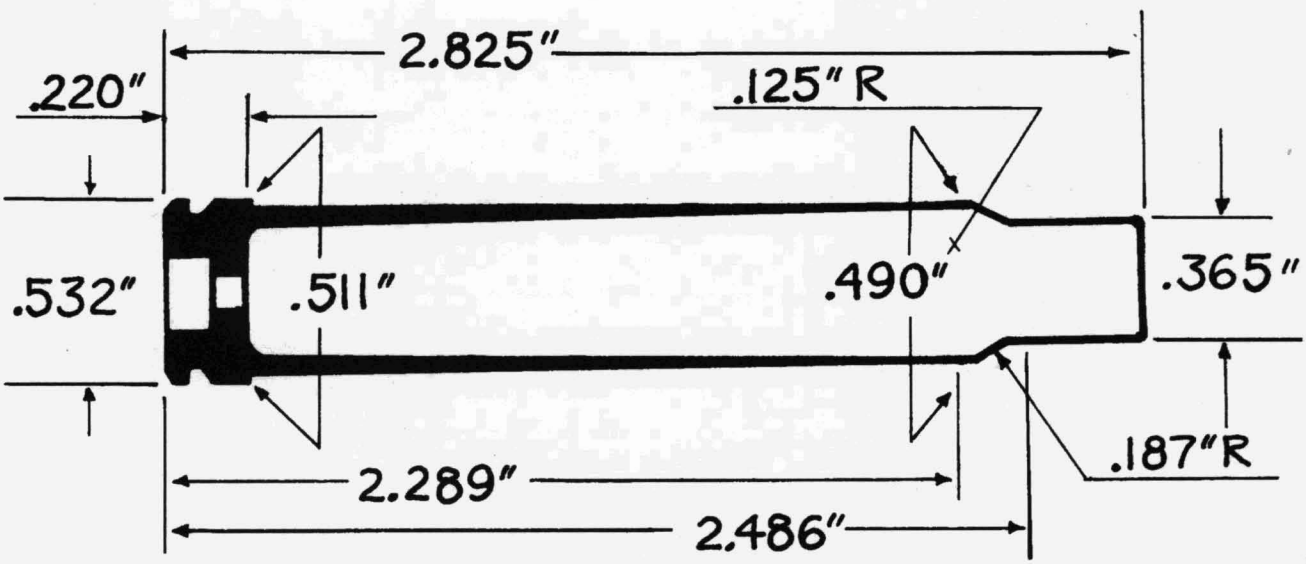
General Comments With its larger case, the 340 Weatherby develops higher velocity with any given bullet weight than the 338 Winchester. Velocity of 3260 fps with the 200-grain bullet and 2980 with the 250-grain is impressive. This means around 4700 fpe with either bullet. This should be quite effective on African game. A 210-grain Nosler bullet loading is also available with an MV of 3250. All of these figures derive from 26-inch barrels. The cartridge is suitable for all North American big game and most African species as well. Weatherby ammunition is loaded by Norma of Sweden. Handloaders will find that case life with Weatherby (Norma) cases is very limited with top handloads due to soft case heads. This problem can be eliminated by reforming 8mm Remington Magnum cases but these require a significant reduction in charge due to much reduced capacity. Nevertheless, such loads can surpass any safe load in Norma cases because Remington cases can safely withstand somewhat higher pressures and because the lost powder space wasn't really necessary anyway. Ballistics are greatly handicapped if shorter barrels are used.

340 Weatherby Magnum Loading Data and Factory Ballistics

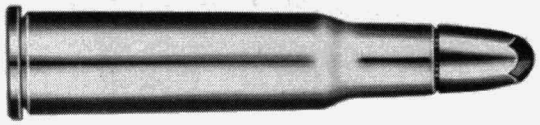
Bullet (grs.)	Powder/grs.		MV	ME	Source
175 SP	IMR 4350	85.5	3250	4105	Barnes
200 SP	IMR 4350	82	3000	3998	Speer, Hornady
200 SP	IMR 4350	84	3200	4549	Hornady
210 SP	IMR 4350	83.5	3200	4776	Nosler
225 SP	IMR 4831	83	3000	4498	Hornady
250 SP	IMR 4350	77	2800	4353	Sierra, Speer, Hornady
250 SP	IMR 4831	80	2800	4353	Sierra, Hornady, Speer
275 SP	IMR 4350	76	2600	4129	Speer
275 SP	IMR 7828	88	2750	4619	Speer
300 SP	IMR 7828	77.5	2550	4333	Barnes
200 SP	FL		3260	4719	Weatherby factory load.
210 SP	FL		3250	4924	Weatherby factory load.
250 SP	FL		2980	4931	Weatherby factory load.

Federal 215 primers used in all cases.

Weatherby Fibermark



348 Winchester



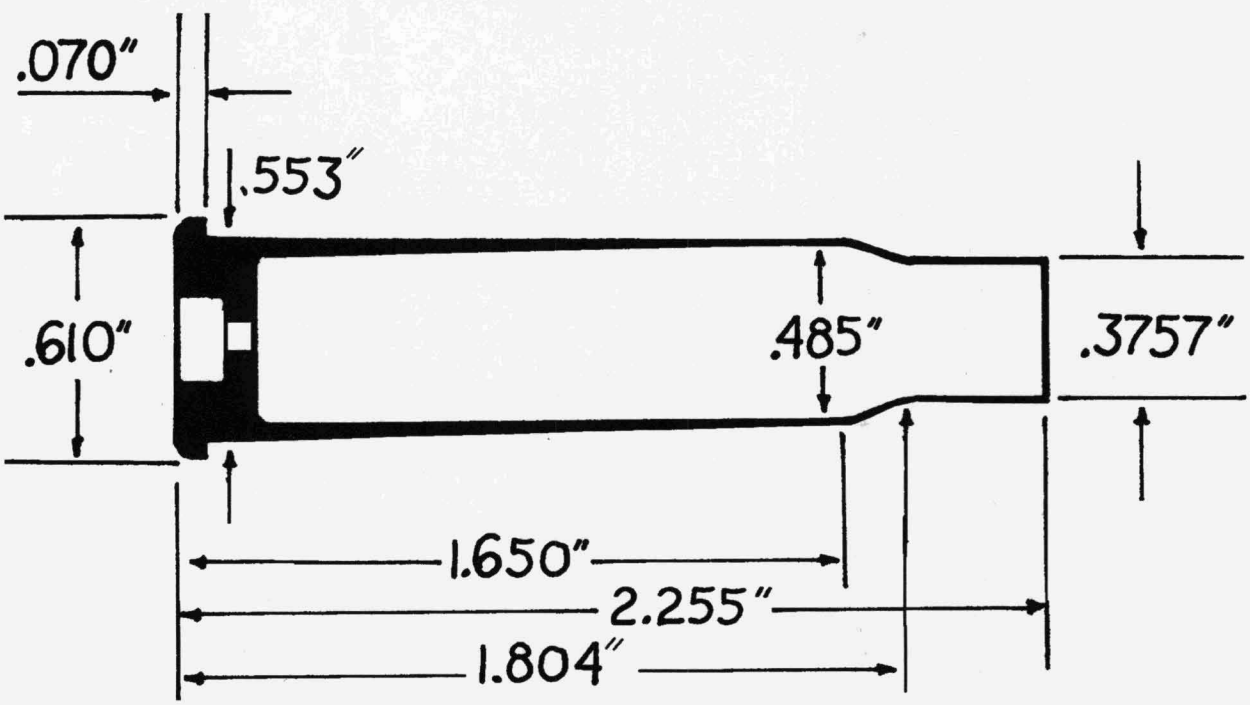
Historical Notes Developed by Winchester for their Model 71 lever-action rifle and introduced in 1936, the 348 is a modernized version of the 33 Winchester. No other rifle has ever been commercially available for this cartridge and the Model 71 was discontinued in 1958. In 1987, Browning marketed a limited number of reproduction Model 71s that were made in Japan. At this writing, only Winchester still loads the 348, and the 200-grain bullet load is the lone survivor. The Model 71 was the smoothest lever action ever built.

General Comments One of the more powerful rimmed cartridges available for the lever-action rifle, the 348 was supposedly made obsolete by the newer 358 Winchester and the more modern Model 88 lever-action rifle (now also discontinued). The 348 is an excellent woods and bush cartridge for any North American big game. Due to the flat-point bullets required by the tubular magazine of the Model 71 rifle, it is not a particularly good long-range cartridge. The 150-grain bullet has very poor ballistic properties due to its short, flat shape, and the 200- or 250-grain bullets are preferred for anything beyond 100 yards. Winchester dropped the 150-grain and 250-grain loads in 1962 but still offers the 200-grain loading. Remington no longer loads the round. The 348 is the basis of an entire list of improved cartridges. Perhaps the best of these, a somewhat improved 45-caliber version, which is very close to 458 Winchester Magnum performance, is still prized as among the best combination ever invented for use in Alaska against heavy game in close quarters.

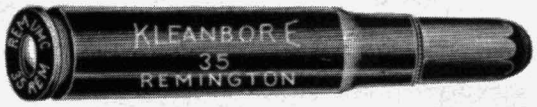
348 Winchester Reloading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
200 SP	H-4895	53	2500	2776	Hornady
200 SP	IMR 4350	60.5	2500	2776	Hornady
200 SP	IMR 4064	51	2400	2559	Hornady
250 SP	IMR 4350	55	2300	2937	Barnes
150 SP	FL		2890	2780	Factory load
200 SP	FL		2520	2820	Winchester factory load
250 SP	FL		2350	3060	Factory load

M-71 Fancy



35 Remington



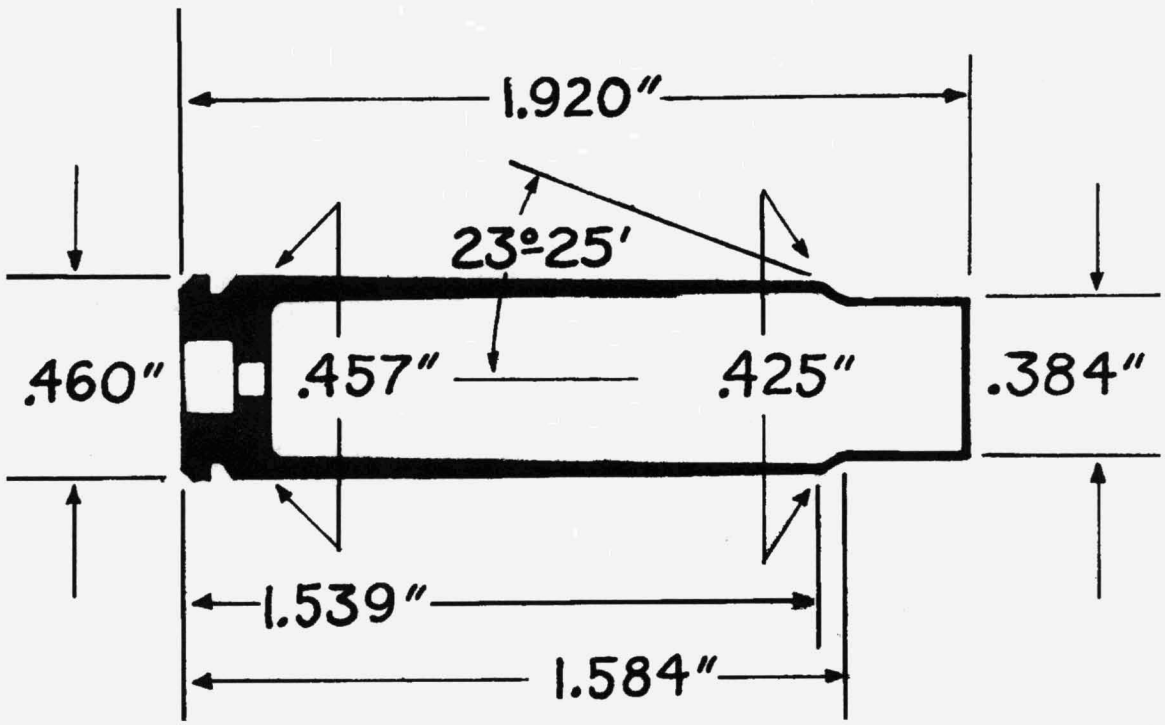
Historical Notes Introduced with the Remington Model 8 semi-automatic rifle in 1906, the 35 Remington was later also chambered in the Remington Models 14 and 141 slide action, the Model 81 semi-auto, Model 30 bolt action, and for a short time, in the Winchester bolt-action Model 70. At one time, the Marlin 336 lever, Mossberg 479 lever and Savage 170 slide-action rifles were offered in 35 Remington. Currently, only the Marlin is still available in rifles; the Remington XP-100 and T/C pistols are chambered for the 35 Remington.

General Comments The 35 Remington is the only one of the Remington rimless line of medium-powered cartridges still alive. It has proven itself over the years as a reliable short-range woods cartridge on deer or black bear. It has far better knockdown power than the 30-30 under any conditions and at any range. The velocity and energy figures are not very different from the 30-30, but the larger, heavier bullet has greater shock and makes a more severe wound. The 200-grain bullet is the only one that should ever be used on big game. The 35 Remington, with its moderate recoil, is a good cartridge for light rifles or carbines at short ranges of 150 yards or less. It was originally the Remington counter to the much more powerful 35 Winchester. When I was a boy, my "hunting uncle" used a Model 8 Remington rifle in 35 Remington caliber with great success. However, I don't think he ever chanced a shot at much over 150 yards, and that probably had a great deal to do with it. Remington, Winchester and Federal offer ammunition in this caliber.

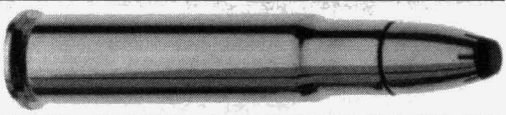
35 Remington Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
125 SP	W680	32	2400	1599	Speer
140 HP	RL-7	40	2500	1943	Speer
158 SP	IMR 3031	37	2200	1698	Hornady, Speer
180 SP	IMR 4895	37	2050	1680	Speer
200 SP	IMR 3031	36	2000	1777	Hornady, Sierra
220 SP	IMR 4064	36	1850	1672	Speer
150 SP	FL		2300	1762	Factory load.
200 SP	FL		2080	1921	Factory load.

For light loads for small game or varmint shooting at short range, use any 150-160-gr. lead, gascheck or half-jacketed 38 revolver bullet and 15 grs. of 2400. MV will be about 2200 fps.



356 Winchester



Historical Notes The 356 Winchester is a rimmed cartridge developed concurrently with the 307 Winchester for the Winchester Model 94 XTR Angle Eject lever-action carbine. Development of both cartridges began in 1980, and guns and ammunition were available on the market early in 1983. Marlin introduced their lever-action Model 336ER in 356-caliber at about the same time as the Winchester hit the market. The Winchester Model 94 XTR is a beefed-up version of the original Model 94 lever action to allow the use of higher pressure cartridges. The angle-eject feature is an additional modification to eject spent cartridge cases out to the side instead of straight up. This feature allows center mounting of a scope sight, something not possible with the original 1894 action. This was accomplished by repositioning the extractor and ejector and lowering the right side wall of the receiver slightly.

The 356-caliber designation is to avoid confusion with the rimless 358 Winchester. In fact, the 356 is little more than a rimmed 358 and uses the same diameter bullets. The 356 and the 358 are not identical since the 356 not only has a rim, but also the bullet is seated deeper to reduce the overall length and the case is heavier. It's possible to chamber 358 cartridges in 356 rifles, but firing them is an unsafe practice that could damage to the gun and cause serious injury to the shooter.

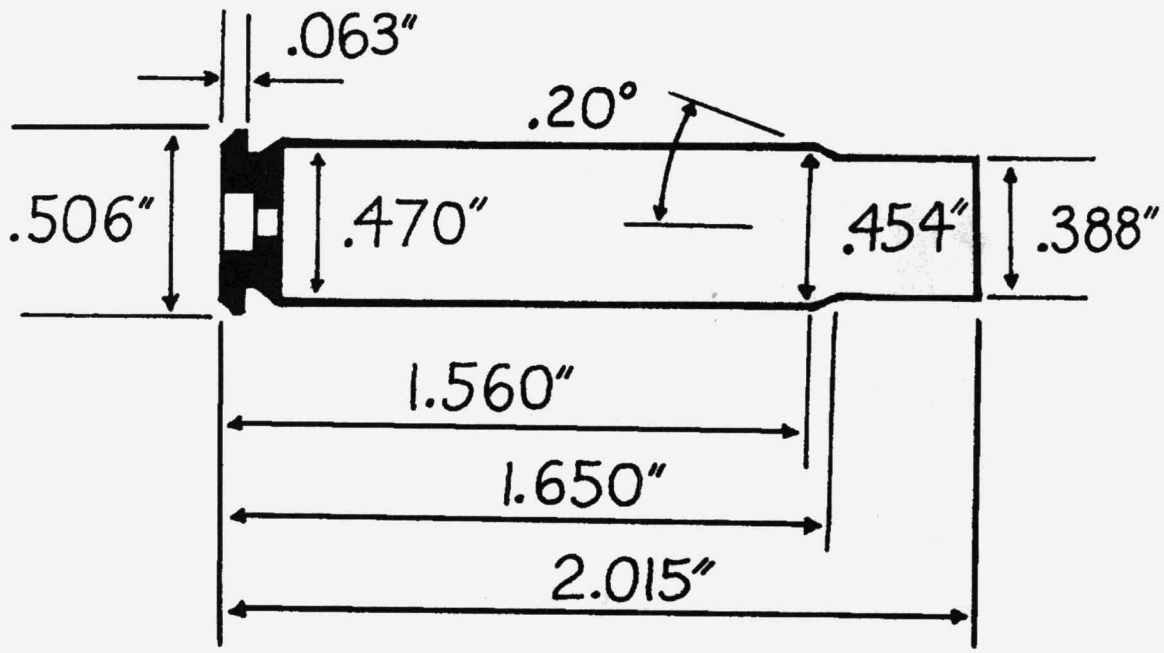
General Comments The ballistics of the 356 are slightly below the older rimless 358. Although it has been reported that the 356 Winchester and 307 have thicker case walls than the corresponding rimless 308 and 358 cartridges and, therefore, reduced internal volume, measurements do not verify this. However, the 356 delivers performance superior to the 35 Remington by a significant margin. Factory-published ballistics data show that the 35 Remington 200-grain bullet has a muzzle velocity of 2080 fps, whereas the 356 Winchester delivers 2460 fps with the same bullet weight, both from a 24-inch barrel.

While the 35 Remington is largely a short-range woods or brush cartridge for deer or black bear, the 356 Winchester would be adequate for larger game up to elk at longer ranges. One should consider though that both the Winchester and Marlin lever-action carbines with their short 20-inch barrels are intended primarily as light, handy guns for use in heavy brush or timber. A hunter armed with one of the 356 carbines could probably take on just about anything likely to be encountered in the continental U.S. at short to moderate ranges. The 358 Winchester never achieved great popularity, and it will be interesting to see how well the 356 is received over the next decade or so. Winchester is the only commercial manufacturer of this caliber.

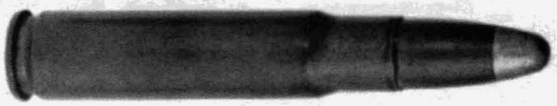
356 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
158 SP	H-322	49	2600	2372	Speer
180 SP	H-322	48	2600	2703	Speer
180 SP	H-335	48	2500	2500	Speer
180 SP	IMR 4320	47	2300	2115	Speer
220 SP	IMR 4064	46	2300	2585	Speer
220 SP	H-335	43	2250	2474	Speer
220 SP	IMR 4895	46	2250	2474	Speer
200 SP	FL		2460	2688	Factory load.
250 SP	FL		2160	2591	Factory load.

In tubular magazine rifles, load only flat-point bullets.



358 Winchester

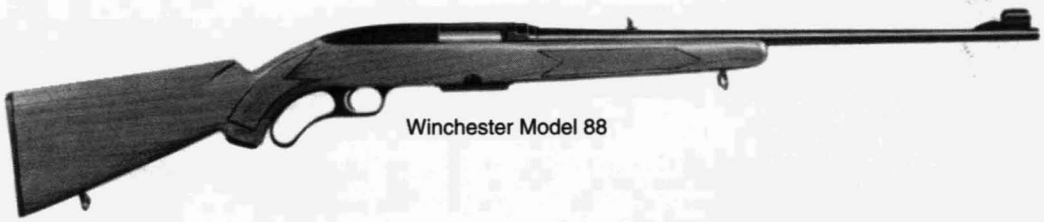


Historical Notes Introduced in 1955 by Winchester for its Model 70 Lightweight bolt-action and Model 88 lever-action rifles, the 358 Winchester is based on the 308 Winchester case necked-up. It is known in Europe as the 8.8x51mm. Many European rifle makers chamber the round. In the U.S., only the Browning BLR lever action is currently chambered for this cartridge. The Model 99 Savage was also once available in 358.

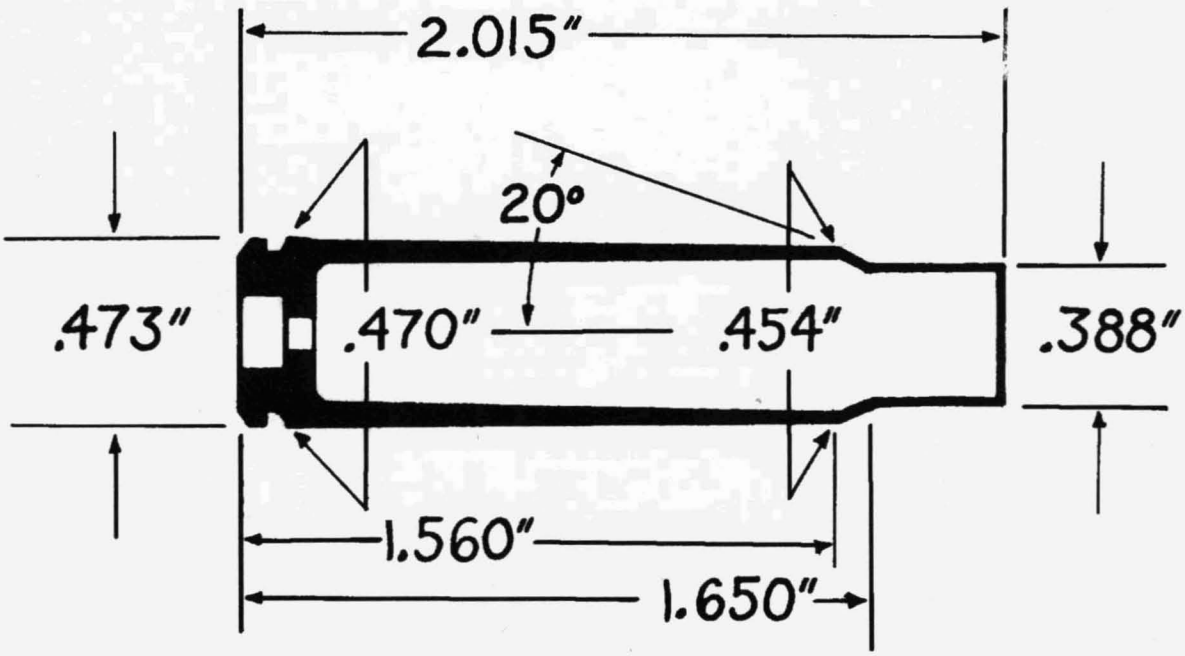
General Comments The 358 Winchester is one of the best commercial (non-magnum) 35-caliber cartridges turned out by any American manufacturer. It is a big improvement over the 35 Remington, slightly more powerful than the old 35 Winchester, and more useful than the 348 Winchester. As the 308 Winchester is a shortened and scaled-down version of the 30-06, by the same token the 358 is a scaled-down 35 Whelen. With its spitzer-pointed bullets, the 358 is a good medium- to long-range cartridge with capabilities out to 250 yards on big game. Although a good woods number, it is definitely out of the short-range, deer-only class. In fact, the 358 is adequate for any North American big game. With the 250-grain bullet, it is better than the 30-06 on heavy game in thick cover. The 358 in a bolt-action rifle with a good scope sight is as accurate as any hunting cartridge available. Performance can be improved by handloading. Winchester is the only remaining manufacturer of this caliber.

358 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
158 SP	RL-7	48	2850	2850	Speer
180 SP	IMR 3031	51	2700	2914	Speer
200 SP	IMR 4320	50.5	2500	2776	Hornady, Sierra
200 SP	H-4198	40.5	2500	2776	Hornady
220 SP	BL-C2	49	2500	3054	Speer
250 SP	IMR 3031	41.5	2200	2687	Hornady, Speer
250 SP	IMR 4064	44	2250	2811	Speer
300 SP	IMR 4895	43	2200	3225	Barnes
200 SP	FL		2490	2753	Factory load.
250 SP	FL		2250	2810	Factory load.



Winchester Model 88



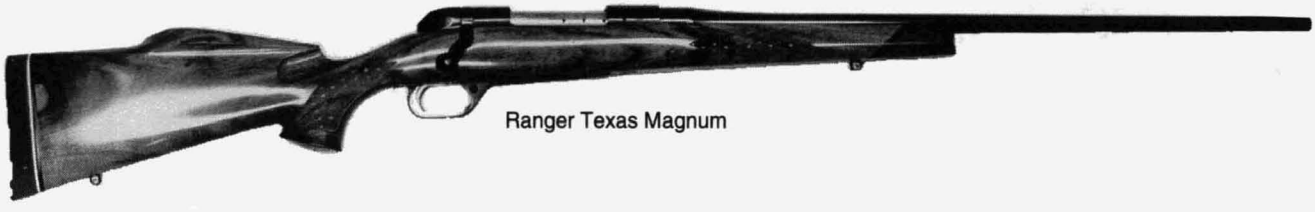
35 Whelen

Historical Notes Facts uncovered in recent research suggest that Col. Townsend Whelen may, after all, have been intimately involved in the creation of this cartridge which has generally been heretofore attributed to James Howe of Griffin & Howe, whom it was said developed it and named it after the famous writer, hunter and gun authority. The 35 Whelen is simply the 30-06 case necked up without any other change. Ackley championed an improved version, which features less body taper and a sharper shoulder. The improved version has two significant advantages. First is about 10 percent more usable capacity, providing a similar increase in ballistics. The second is the more distinct shoulder which completely solves the poor headspacing problem 35 Whelen rifles have, resulting from a too narrow, steeply sloping shoulder. One is hard pressed to explain why Remington chose to standardize the inferior version when they adopted the 35 Whelen as a factory chambering in 1987. In addition to numerous custom rifles, the 35 Whelen is now offered in several factory bolt actions, Remington's pump action and Ruger's single shot.

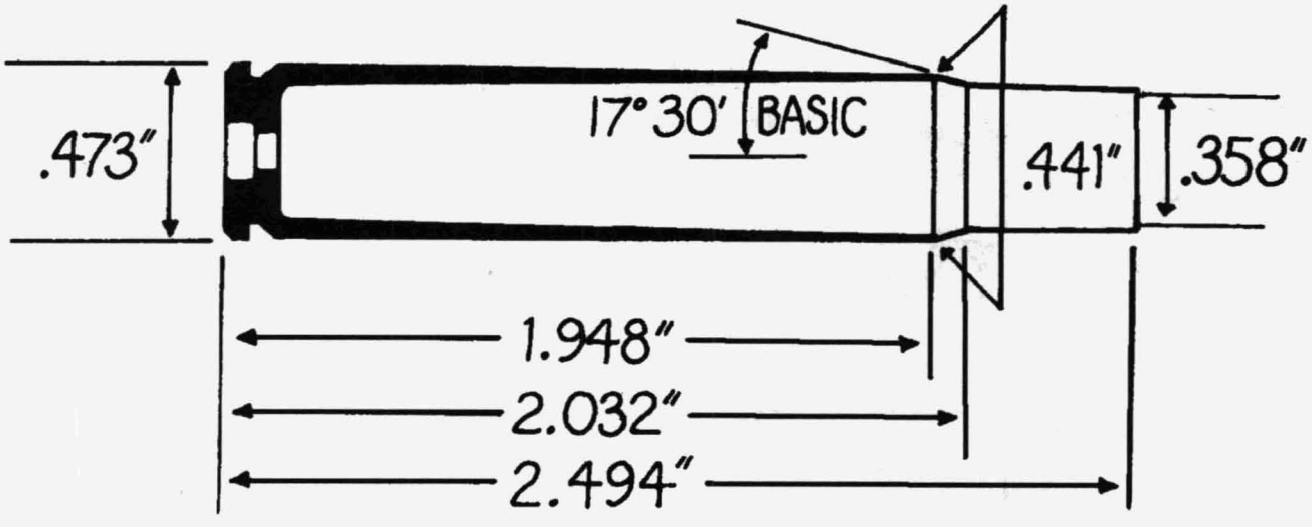
General Comments Remington has been active in adding popular wildcats to their line of commercial cartridges. The 35 Whelen is another example. The author has had considerable past experience with the 35 Whelen, and it is an excellent cartridge for any North American big game and most African species as well. A slide-action rifle of this caliber increases the potential of this type of rifle for those who favor it. The 35 Whelen is one of the best balanced and most flexible medium bores for North American big game. There is a large variety of 35-caliber bullets available to the handloader, ranging from 110 to 300 grains in weight. Practically all of the reloading tool manufacturers furnish dies and cases are easy to make. The popularity of the 35 Whelen has waxed and waned over the years, reaching a peak during the 1920s and again shortly after WWII. Only Remington manufactures this caliber.

35 Whelen Loading Data and Factory Ballistics

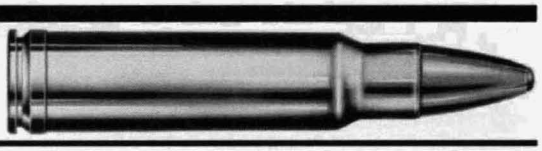
Bullet (grs.)	Powder/grs.		MV	ME	Source
180 SP	IMR 4895	59	2700	2914	Hornady
180 SP	IMR 4320	56	2700	2914	Nosler
200 SP	IMR 4064	58.5	2600	3003	Hornady
225 SP	IMR 4320	56	2500	3123	Sierra
250 SP	IMR 4895	52.5	2500	3470	Hornady
250 SP	IMR 4064	54.5	2400	3198	Hornady
250 SP	RL-15	55	2400	3198	Hornady
300 SP	BL-C2	57	2500	4164	Barnes
200 SP	FL		2675	3177	Remington factory load.
250 SP	FL		2400	3197	Remington factory load.



Ranger Texas Magnum



350 Remington Magnum

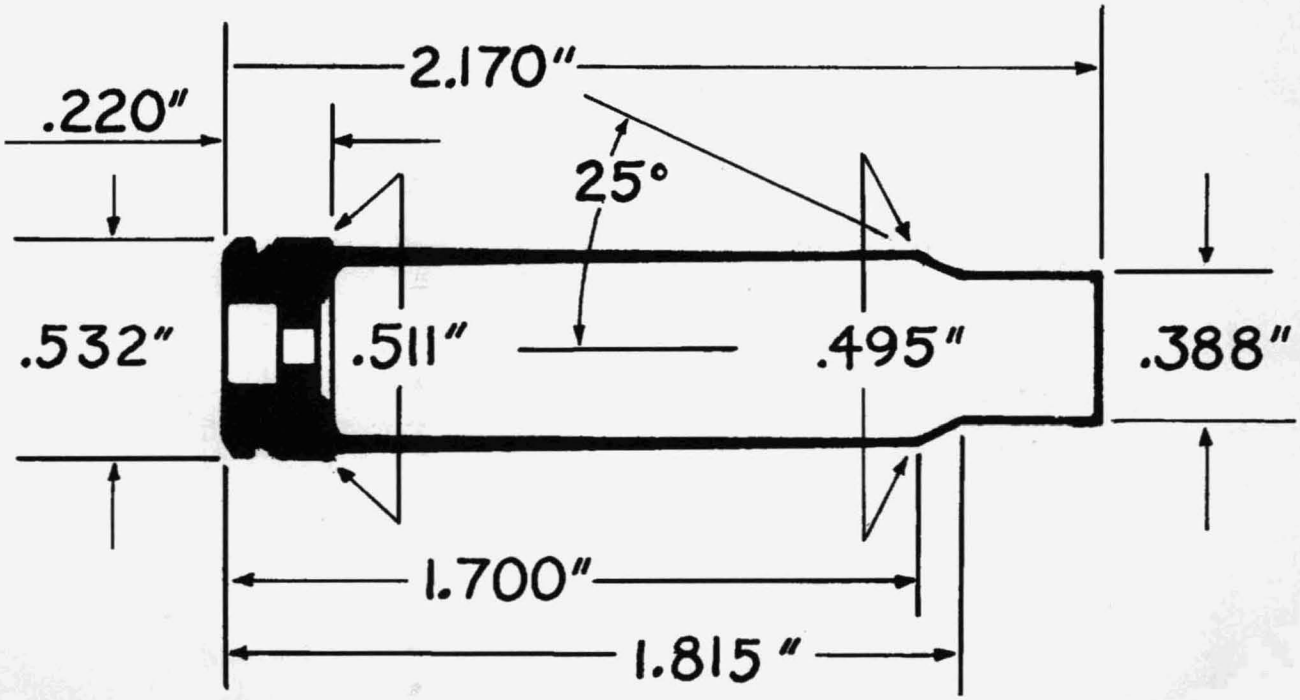


Historical Notes The 350 Remington Magnum first appeared in the 1965 Remington catalog concurrently with the Model 600 Magnum bolt-action carbine that chambered it. The original carbine had an 18-inch barrel but in 1968 this was lengthened to 20 inches as the Model 660 Magnum carbine. By 1971, the Model 600 and 660 Magnum carbines had been discontinued, but the 350 Magnum was continued as a standard chambering for the Model 700 bolt-action rifle until 1974. For a short time, the Ruger Model 77 bolt-action rifle was available in 350 Magnum. At the present time, no factory rifles are regularly chambered for this cartridge, but ammunition is still loaded by Remington. The cartridge is unique in having a somewhat short, fat-belted case with the same capacity as the 30-06. This allows for its use in short-action rifles that can be made a bit lighter and handier than those based on the standard-length bolt action.

General Comments With bullets of moderate weight, the 350 Remington Magnum can about duplicate 35 Whelen ballistics but can be chambered in short bolt-action rifles. This is a significant advantage for those preferring a light handy rifle with plenty of punch. Also, many find the short-throw bolt to be much easier to master and use. For those preferring heavier bullets, the round-nose design doesn't take up so much of the powder space and, therefore, can safely develop better muzzle energy. For use where shots will not be long these may be the best choice. For those with 350 Remington Magnum rifles in full-length actions, heavy spitzers can sometimes safely be seated to exceed the nominal 2.80 inches length for the cartridge and increased muzzle energy can be achieved. Here though, it is hard to see any advantage over the 35 Whelen, which generally feeds smoother from a magazine holding one additional cartridge. The 350 Remington Magnum is adequate for any North American big game at short to medium ranges.

350 Remington Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
125 HP	IMR 4895	60	2850	2255	Speer
158 SP	IMR 3031	58	2850	2850	Speer
180 SP	IMR 4064	62	2900	3362	Speer
200 SP	IMR 4320	60	2700	3238	Hornady, Sierra
220 SP	IMR 4895	60	2650	3431	Speer
250 SP	IMR 4895	53	2350	3066	Speer, Nosler
300 SP	IMR 4064	52	2300	3525	Barnes
200 SP	FL		2710	3261	Factory load.



375 Winchester

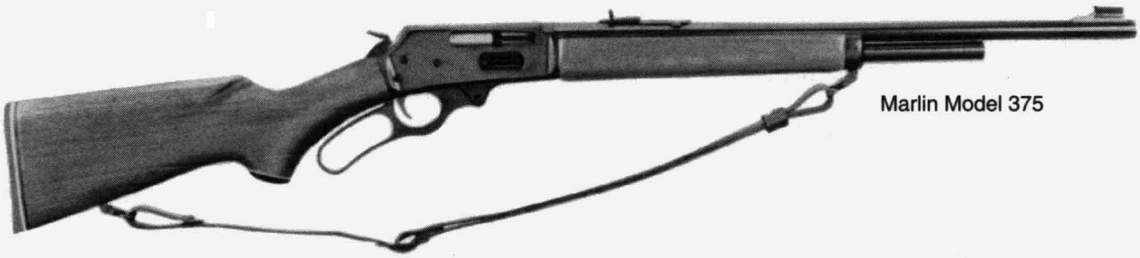
Historical Notes Developed by Winchester, the 375 was announced in 1978 as a new cartridge for their Model 94 Big Bore lever-action carbine. The gun is a strengthened version of the standard Model 94 action and can be distinguished by the beefed-up rear quarter of the receiver as opposed to the flat sides of the regular Model 94. The cartridge is based on a shortened (about $^1/_{10}$-inch) 38-55 case, although 375 Winchester brass is heavier and stronger than that of the 38-55. Two carbines were initially available in this caliber, the Winchester Model 94 Big Bore and the Ruger Number 3 single shot. It is a rimmed case and not well suited to Mauser-type bolt actions. Two bullet weights are offered: a 200-grain at 2200 fps muzzle velocity and a 250-grain at 1900 fps, as advertised by Winchester.

General Comments The 375 Winchester fills a gap in the line of cartridges available for the popular Winchester Model 1894 lever-action series. Many hunters who live in heavily-wooded areas prefer large- or medium-caliber rifles firing heavy bullets as the best combination for their particular hunting environment. Such a combination was not available for the Winchester Model 1894. The 375 helps meet the competition offered by lever actions chambered for the 35 Remington and the 444 Marlin. Comparisons will be made between this 375 and the other popular woods or brush cartridges such as the 35 Remington, 44 Magnum, 444 Marlin and the 45-70. Ballistically, the 444 Marlin with its 240-grain bullet and 2400 fps muzzle velocity has the edge on all the others in the group. However, all of these cartridges have one common failing, and that is that they are used in lever-action rifles with tubular magazines. This requires a flat-pointed bullet so that under recoil, one cartridge won't set off the one ahead of it. These blunt bullets have very poor aerodynamic form and offer high air resistance. No matter what the initial velocity, they all slow down quite rapidly. The result is that at 200 yards or less they all end up with about the same energy, which varies from 1000 foot pounds to 1100 foot pounds. All of these brush cartridges, then, are at their best at ranges of 150 yards or less.

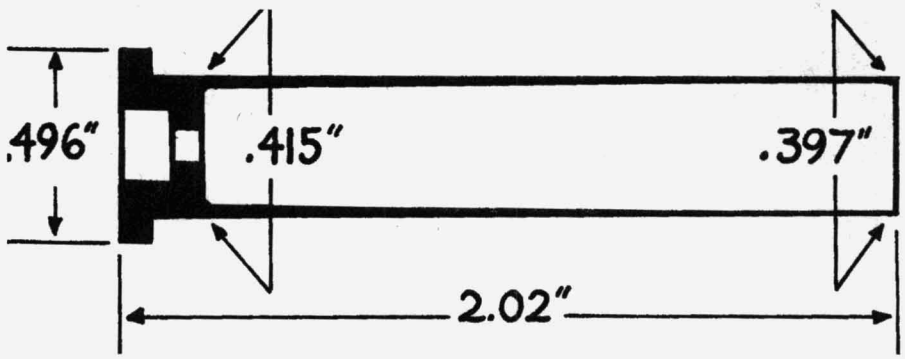
Certainly the 375 Winchester is a fine deer or black bear cartridge and would probably also do well on heavier game such as moose or brown bear. Within its range limitations, it would also serve as a good meat-getter on thin-skinned African species. The 375 cartridge can be chambered in 38-55 rifles, but must never be fired in any rifle except those specifically marked for it because it develops much higher pressure than the older 38-55. To fire it in any of the old blackpowder rifles would almost certainly result in a wrecked gun and serious injury to the shooter. Winchester is the only commercial manufacturer of this caliber.

375 Winchester Loading Data and Factory Ballistics

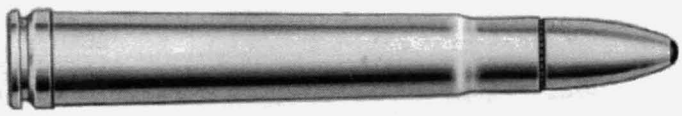
Bullet (grs.)	Powder/grs.		MV	ME	Source
200 SP	IMR 4198	33	2100	1962	Sierra
220 SP	IMR 4198	32	2000	1955	Hornady
220 SP	RL-7	38	2200	2365	Hornady
235 SP	IMR 4198	32	2000	2088	Speer
235 SP	RL-7	35	1950	1985	Speer
255 SP	IMR 3031	36	1900	2045	Barnes
200 SP	FL		2200	2150	Winchester factory load.
250 SP	FL		1900	2005	Winchester factory load.



Marlin Model 375



375 Holland & Holland Magnum (375 H&H Magnum)



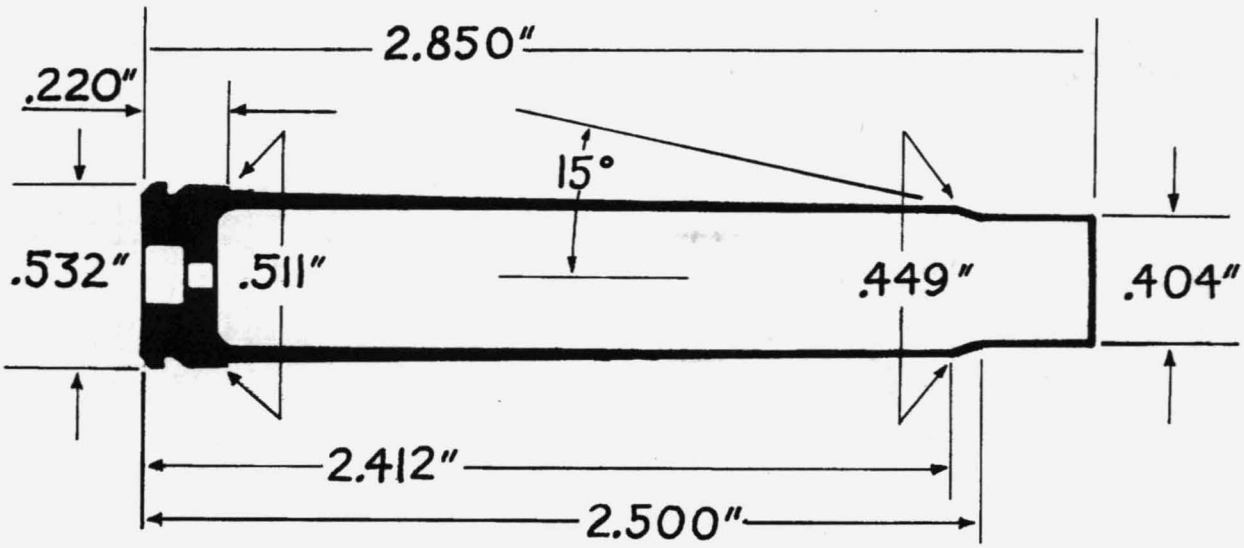
Historical Notes Originated by the British firm Holland & Holland in 1912, this is one of the original belted, rimless, magnum-type cartridges. It has been used as the basis for numerous wildcats and some of the Weatherby cartridges. H&H furnished it in a magnum Mauser action and Griffin & Howe chambered rifles for it beginning about 1926. The Western Cartridge Company first offered it in 1925. At present, Federal, Remington and Winchester load the 375. The first commercial rifle of American make to chamber the round was the Model 70 Winchester in 1937; Weatherby rifles were at one time available in 375 H&H as was the Remington Model 725 "Kodiak." At present, several American manufacturers list the 375 H&H as standard including Ruger, Winchester and Remington.

General Comments Long considered the best all-round African caliber, the 375 H&H is overpowered for North American big game. However, many Alaskan hunters and guides prefer it for moose and grizzly bear. It isn't a very flexible cartridge for the American hunter unless he expects to hunt the heaviest species and spend time in Africa or Asia. John Taylor, in his book *African Rifles and Cartridges,* Georgetown, South Carolina, 1948, rates the 375 as the best of the medium bores for African hunting. It is his candidate for the most effective, "all-round" cartridge. This cartridge was the basis for H&H's latter 300 H&H Magnum and is therefore the great-grandfather of almost all modern belted magnum chamberings. It can certainly be said that it inspired the entire genre.

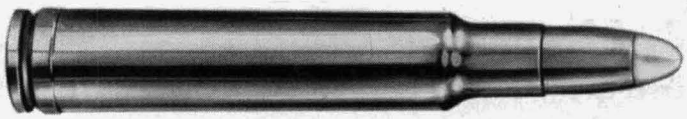
375 Holland & Holland Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
200 SP	IMR 4064	80	3200	4549	Sierra
220 SP	SR4759	42	2300	2585	Hornady
235 SP	IMR 4064	77	3000	4697	Speer
270 SP	RL-15	74	2700	4372	Hornady
270 SP	IMR 4064	70	2600	4054	Hornady
285 SP	IMR 4831	85	2700	4615	Speer
300 SP	IMR 4064	68	2500	4164	Hornady
300 SP	IMR 4350	77	2600	4504	Sierra, Hornady
350 SP	IMR 4320	65.5	2400	4478	Barnes
270 SP	FL		2690	4340	Factory load.
300 SP	FL		2530	4265	Factory load.

Holland & Holland Royal



378 Weatherby Magnum

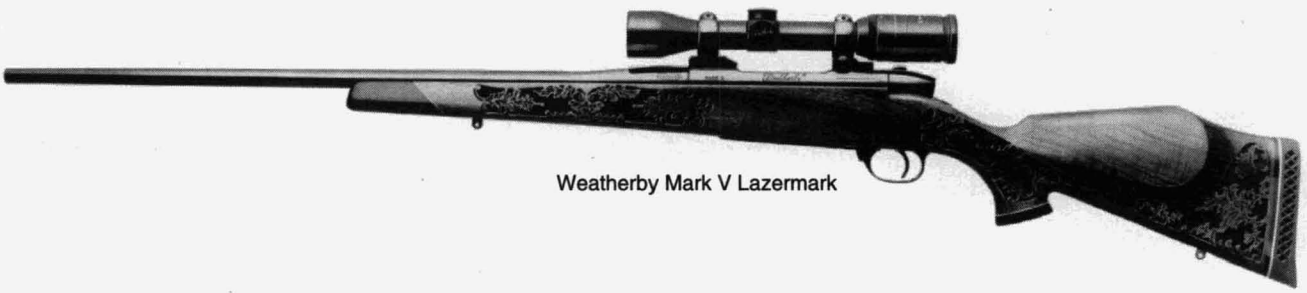


Historical Notes Another development by the late Roy Weatherby dating back to 1953, this is an original design not based on any existing cartridge although it is hard to miss the similarity in all critical dimensions to the 416 Rigby. It was first field-tested in the spring of 1953 by Weatherby who downed an elephant with it, using a single round for the job. The Federal Cartridge Co. 215 Magnum large rifle primer was originally developed for this cartridge as existing primers did not properly ignite the large quantity of powder used. Only the Weatherby line of rifles is commercially chambered for this round.

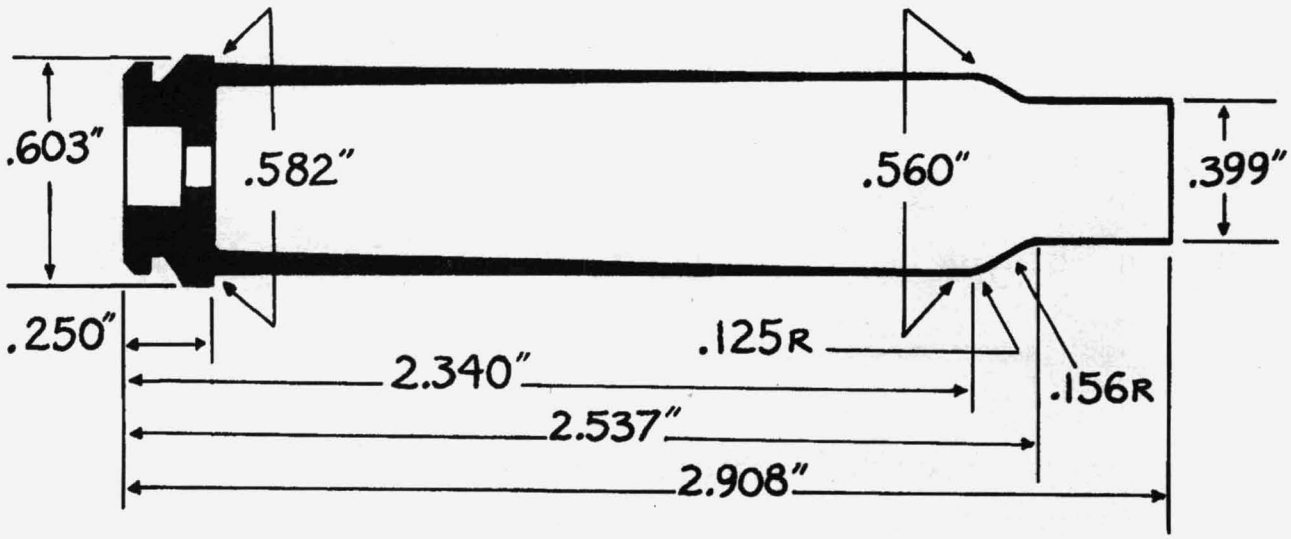
General Comments According to the Weatherby catalog, the 378 WM was designed for deep penetration on heavy, thick-skinned game. It is also intended to furnish an extra margin of insurance when facing dangerous game such as rhino, Cape buffalo, elephant or lion in thick cover. Field reports indicate that it lives up to these expectations. However, for proper performance at the velocities developed, it is necessary to use bullets with a very heavy jacket. Although considerably overpowered for any North American big game, it is nonetheless a fine cartridge for the man who requires optimum stopping power. Recoil of these cartridges is extremely heavy, so one should be sure such power is really needed before selecting anything in this class.

378 Weatherby Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
235 SP	H-4831	115	3200	5345	Barnes
250 SP	H-4831	113	3050	5165	Barnes
270 SP	IMR 4350	108	3100	5763	Hornady
300 SP	H-4831	112	2900	5604	Sierra, Nosler
350 SP	H-4831	102	2650	5459	Barnes
270 SP	FL		3180	6062	Weatherby factory load.
300 SP	FL		2925	5701	Weatherby factory load.



Weatherby Mark V Lazermark



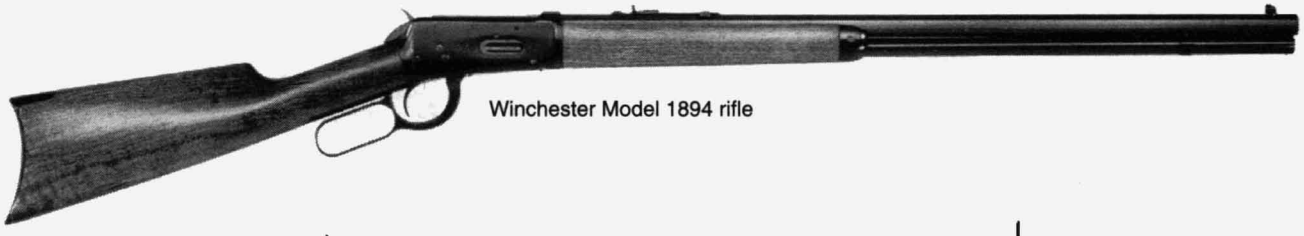
38-55 Winchester (38-55 Ballard)

Historical Notes Like the smaller 32-40, the 38-55 was originally a Ballard-developed target cartridge. The present commercial version was introduced in 1884 as one of the calibers for the Ballard Perfection No. 4, which was originally chambered for the 38-50 Everlasting. According to Satterlee in his *Catalog of Firearms*, 2nd ed., Detroit, 1939, the Union Hill Nos. 8 and 9 were also chambered for the 38-55 Ballard in 1884. The external dimensions of the 38-55 Everlasting and the 38-55 Winchester & Ballard are nearly identical, but the heavier, thicker Everlasting version was a handloading proposition. The implication in Saterlee's book is that the original Everlasting case was introduced when Marlin Fire Arms Co. took over Ballard in 1881. The 38-55 Everlasting is nothing more than a $^1/_{10}$-inch longer case than the 38-50 that Ballard introduced in 1876. The Marlin Model 93 and Winchester 94 lever-action repeaters were available in 38-55, as was the Remington-Lee bolt action, Colt new Lightning slide action, Stevens, Remington and Winchester single shot rifles and also the Savage Model 99. No commercial rifles were available after Winchester dropped the 38-55 from the Model 94 list of calibers in 1940. However, the cartridge has been reintroduced by Winchester in several versions of the Model 94 in recent years. The 225 Winchester, 22 Savage High Power, 25-35 Winchester, 32-40 Winchester, 30-30 Winchester, 32 Winchester Special, 375 Winchester and a host of wildcat cartridges are based on this case.

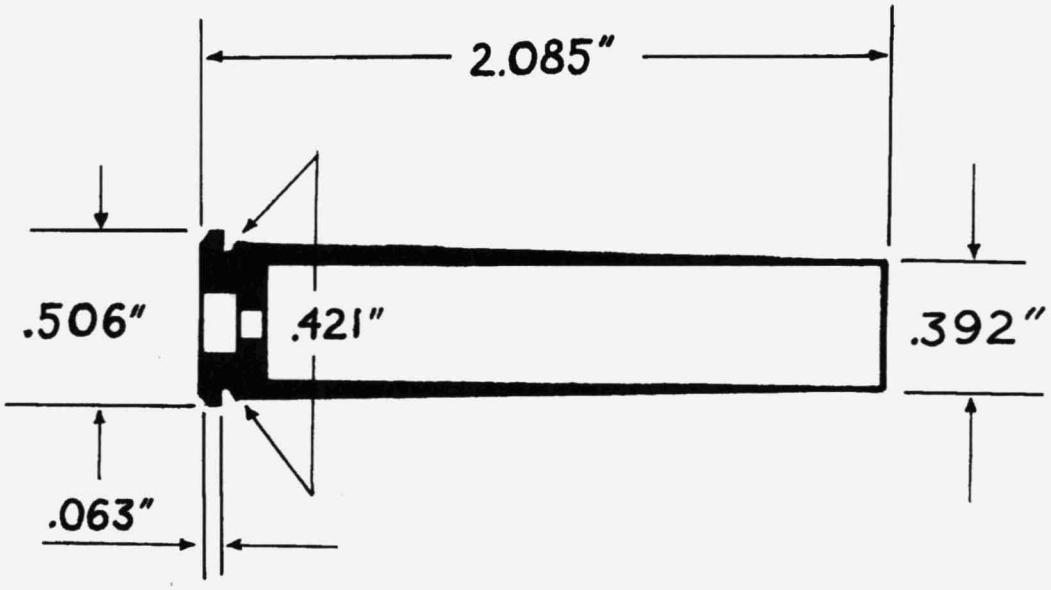
General Comments The 38-55 built up a reputation for fine accuracy at ranges out to 200 yards. It also developed a modest popularity with deer and black bear hunters. It gave good knockdown on deer-size animals with the 255-grain bullet at velocities of over 1500 fps. At one time, factory-loaded cartridges were available with the 255-grain bullet at a muzzle velocity of 1700 fps. At these higher velocities, it is a better deer cartridge than the 30-30. Present factory loading more or less duplicates the old blackpowder ballistics. In old Ballard and Stevens single shot rifles, it is not safe to use loads developing velocities over 1500 fps. Discontinued in 1970, the 38-55 is again listed in Winchester ammunition catalogs. Proper bullet diameter for cast bullets is .379-inch.

38-55 Winchester & Ballard Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
200 FN	XMP5744	25.5	1853	1525	Accurate Arms
220 SP	RL-7	31	1600	1257	Hornady
220 SP	IMR 3031	33	1600	1251	Hornady
220 SP	IMR 3031	34.5	1700	1412	Hornady
220 SP	IMR 4198	26	1600	1251	Hornady
220 SP	RL-7	29.5	1400	958	Hornady
240 Lead	XMP5744	22.0	1601	1365	Accurate
222 FN	XMP5744	23.5	1648	1325	Accurate
255 SP	H-4895	35	1700	1637	Barnes
255 SP	FL		1320	987	Winchester factory load.



Winchester Model 1894 rifle



38-40 Winchester (38-40 WCF)

Historical Notes The 38-40 was developed by Winchester as a companion cartridge to their 44-40 introduced in 1874. It is based on the 44-40 case necked-down to what is actually 40-caliber (.401-inch). It was originally a blackpowder cartridge chambered in the Winchester Model 73 lever action. Shortly after it came out, Colt began chambering revolvers for it. It was later offered in the Remington Model 14½ slide action, Winchester 92 and Marlin 94 lever actions, plus a number of single shot rifles. No rifles have been chambered for the 38-40 since 1937. Winchester loaded a slightly different version especially for the Colt Lightning magazine rifle, headstamped 38 C.L.M.R. Another version was loaded with the same 180-grain bullet as the 38 Winchester, but with 40-grains of blackpowder instead of Winchester's standard load of 38 grains and was headstamped 38-40 instead of 38 W.C.F. This raises the intriguing possibility that the name we now use, 38-40, came from 38 grains of blackpowder and a 40-caliber bore.

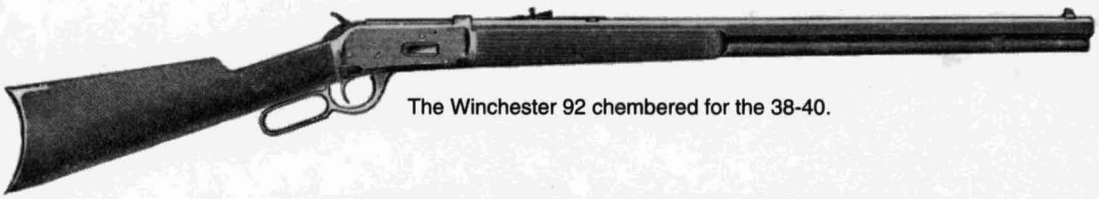
General Comments The 38-40 was at one time a popular medium-power cartridge. Winchester used to load a high-velocity rifle version with a 180-grain bullet at 1775 fps. This was considered a pretty good short-range deer number, but was not intended for old blackpowder rifles or revolvers. It was discontinued because it caused a lot of trouble for people who never read labels. The present factory loading is strictly for revolvers, and it is necessary to handload in order to realize the full potential in a rifle. With proper load and bullets, the 38-40 can be used on small game, varmints, medium-size game or even deer at short range. Rifle loads should not be used in revolvers as they develop pressures beyond safe limits.

The author's experience with the 38-40 is limited to one Remington Model 14½R slide-action carbine that was used for several years before being traded off for something more useful. Although it was a nice, handy little rifle, I was not particularly impressed with the cartridge. The 38-40 is a bit much for most varmint and small game shooting and really not adequate for deer-size animals. In any event, it is quite limited in its effective range on whatever you happen to be using it for. This lack of enthusiasm notwithstanding, the 38-40 enjoyed a certain popularity from its inception until about 1920, after which it declined in sales volume and was finally discontinued in 1937. Actually, there is no great difference in performance between the 38-40 and the 44-40, although some considered the 38-40 a better cartridge for a woman or young boy because it had less recoil. Honestly, neither one has any great recoil, and I could never tell much difference between the two in that regard.

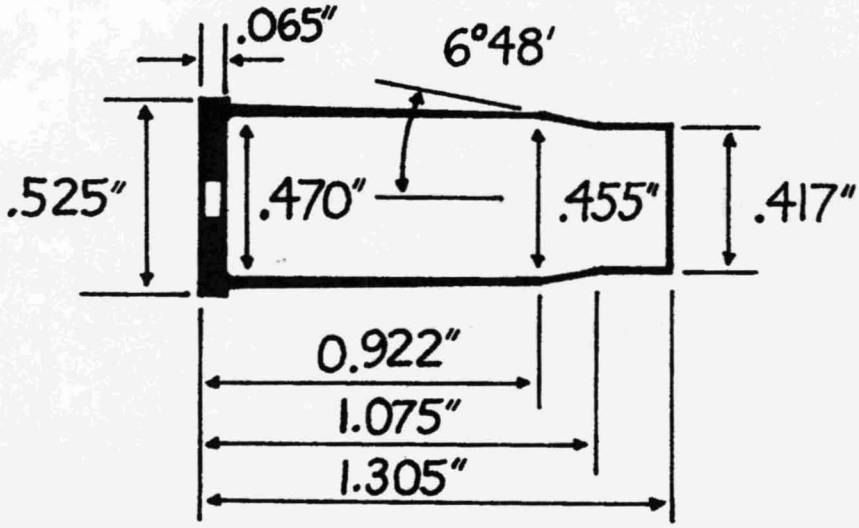
The 38-40 made a better revolver cartridge than it did a rifle cartridge. The present factory load with the 180-grain bullet at 1160 fps (Winchester) can not be considered adequate for deer, and only by handloading can one achieve acceptable performance for much of anything except self-defense.

38-40 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
155 SP	2400	15	1200	496	Hornady
155 SP	IMR 4227	19.5	1200	496	Hornady
180 HP	2400	14.5	1100	484	Hornady
180 HP	Unique	9	1100	484	Hornady
180 HP	IMR 4227	18.5	1100	484	Hornady
200 HP	Unique	8.4	1000	444	Hornady
200 HP	2400	13.5	1050	490	Hornady
180 SP	FL		1160	538	Winchester factory load.



The Winchester 92 chembered for the 38-40.



416 Remington Magnum

Historical Notes Officially announced in November, 1988, the 416 Remington Magnum is the first dangerous game cartridge introduced since the 458 Winchester Magnum back in 1956. The 416 is based on the 8mm Remington Magnum necked-up to 416-caliber. It was initially available with either a 400-grain pointed softpoint or a 400-grain solid bullet loaded to a muzzle velocity of 2400 fps and a muzzle energy of 5115 fpe. The company says that the 400-grain solid is exactly that, turned from solid brass and not a lead core with a heavy jacket. The cartridge is available in the Remington Model 700 Safari bolt-action rifle. Other rifle manufacturers have picked up the 416 Remington. It is available in a variety of bolt and single shot rifles including Ruger. It has proved to be a fairly popular cartridge.

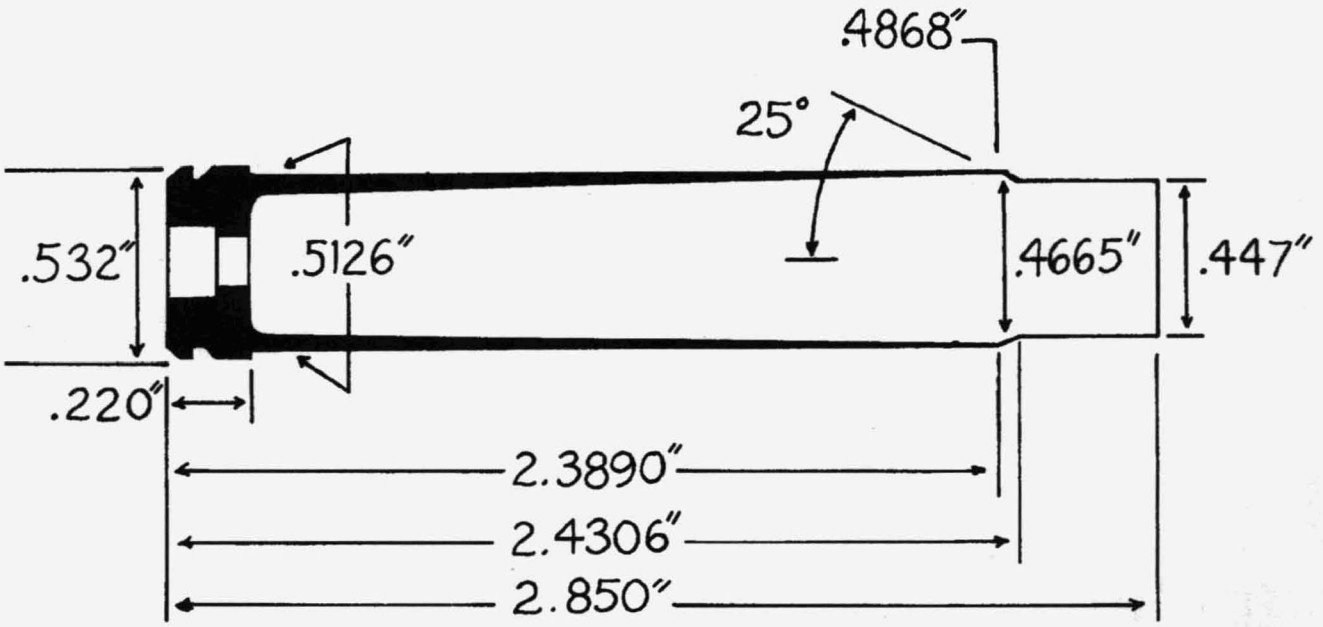
General Comments There has been a persistent call by those who hunt dangerous game for a cartridge to fill the gap between the 375 Holland & Holland Magnum and the 458 Winchester Magnum. The 416 Rigby accomplished this rather well, but both rifles and ammunition became increasingly difficult to obtain until Federal began offering that caliber in the late 1980s. This problem was then solved to some extent by a number of wildcat cartridges such as the 416 Taylor, 416 Hoffman and the 425 Express. These cartridges all more or less duplicated the performance of the 416 Rigby. The 416 Remington does pretty much the same thing. However, the Remington version has one great advantage in that it is available as a commercial loading in a proven commercial rifle. The combination will be much easier and less expensive to come by than a custom rifle and wildcat or proprietary cartridges.

Although the 416 bullet is 100 grains lighter than the 458 Winchester, it starts out with almost 300 fps higher velocity. That, combined with better sectional density and a superior aerodynamic shape, gives it certain ballistical advantages. It not only has a higher initial velocity, but it also increases its retained velocity over the 458 as the range increases. According to the factory figures, it has an 11 percent advantage in muzzle energy, and this increases to 18 percent at 100 yards and 30 percent at 200 yards.

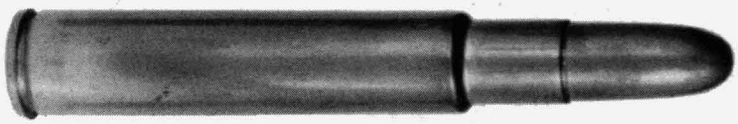
The 416 Remington should be ideal for dangerous game including Cape buffalo, elephant, lion and North American brown bear. It would also do well on moose and elk. The 416 Remington has a trajectory very similar to the 375 H&H and is a better long-range cartridge than the 458 Winchester for use against soft-skinned game. For the man who has to travel light, the 416 would be a good one-gun cartridge choice for use in Africa. To date, only Remington loads ammunition in this caliber.

416 Remington Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
300 SP	H-4895	78	2850	5412	Barnes
350 SP	H-4895	80	2700	5667	Barnes
400 SP	IMR 4064	78	2400	5117	Hornady
400 SP	IMR 4895	76.5	2400	5117	Hornady
300 SP	FL		2530	4262	Remington factory load.
350 SP	FL		2520	4935	Remington factory load.
400 SP	FL		2400	5115	Remington factory load.



416 Rigby

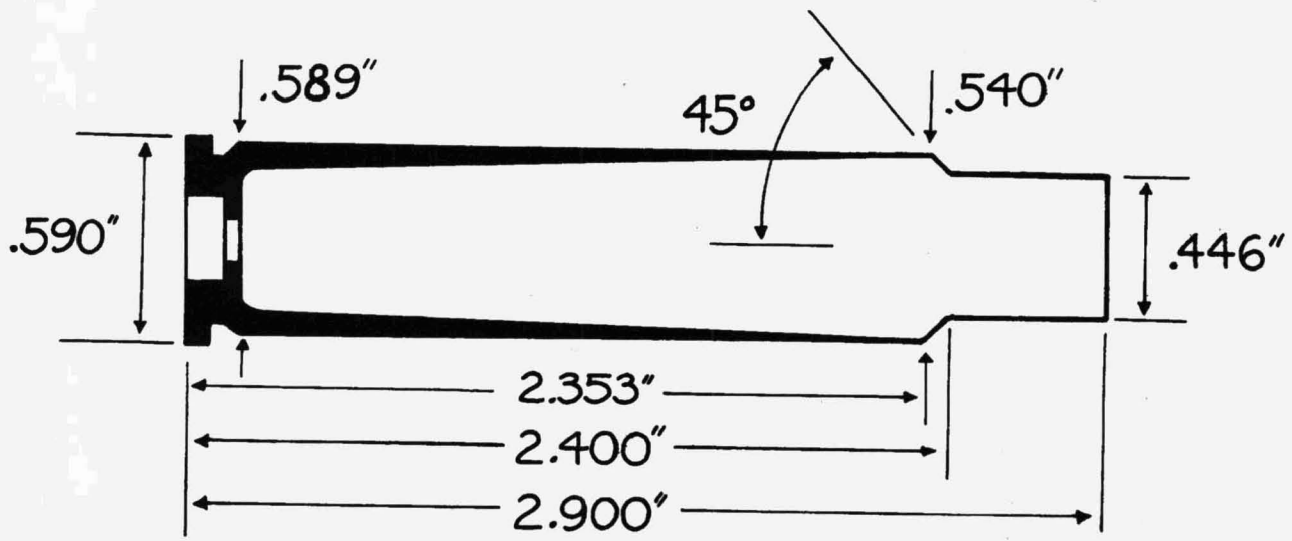


Historical Notes Introduced by John Rigby of London, the 416 Rigby is a good example of a sound design that refuses to die. Throughout its production history, less than 10,000 rifles in this caliber have been made. Rigby continues to make perhaps two dozen a year with other custom gun makers half that. However, most of the older rifles in that caliber continue in service. Rigby does a brisk business refurbishing rifles in this caliber. In 1992, Ruger added this caliber to their rifle product line. At a single stroke, they increased the total number of guns in this caliber by 10 percent in one year and continue to do so. In 1989 Federal Cartridge Co. added the 416 Rigby to their Premium product line. In so doing Federal became the first major American manufacturer to offer this classic African caliber. By their actions, both Ruger and Federal took much of the momentum from the new 416 Remington Magnum cartridge. Their efforts in reintroducing the 416 Rigby have been succesful and sales remain brisk. This only goes to show that not all new product success stories use totally new products.

General Comments The 416 Rigby is a great favorite today of African game wardens and professional hunters alike. It is an excellent choice for the man who wishes to take only one rifle to Africa. Federal ballistics are identical to previous British loads so the point of impact with metal express sights will be the same. Breech pressures of the 416 are only about 40,000 CUP in order to avoid sticky extraction due to high pressures on very hot days. This is strictly good sense based on many years of African experience. Remington has chosen to load their 416 Remington Magnum to pressure levels of 50,000 CUP which makes one wonder if extraction at very high temeratures has been adequately tested. In any case, handloaders should resist the urge to improve the 416 Rigby ballistics for this reason. Bullets and brass for handloading are available from Huntington's in Oroville, CA.

416 Rigby Loading Data and Factory Ballistics

Bullet (grs.)	Powder	(grs.)	MV	ME	Source
300 SP	RL-19	109	2950	5799	Barnes
325 SP	RL-19	106	2900	6071	Barnes
350 SP	H-4350	102	2750	5879	Barnes
400 SP	H-4350	98	2600	6006	Barnes
410 SP/FMJ	FL		2370	5115	Federal factory load.



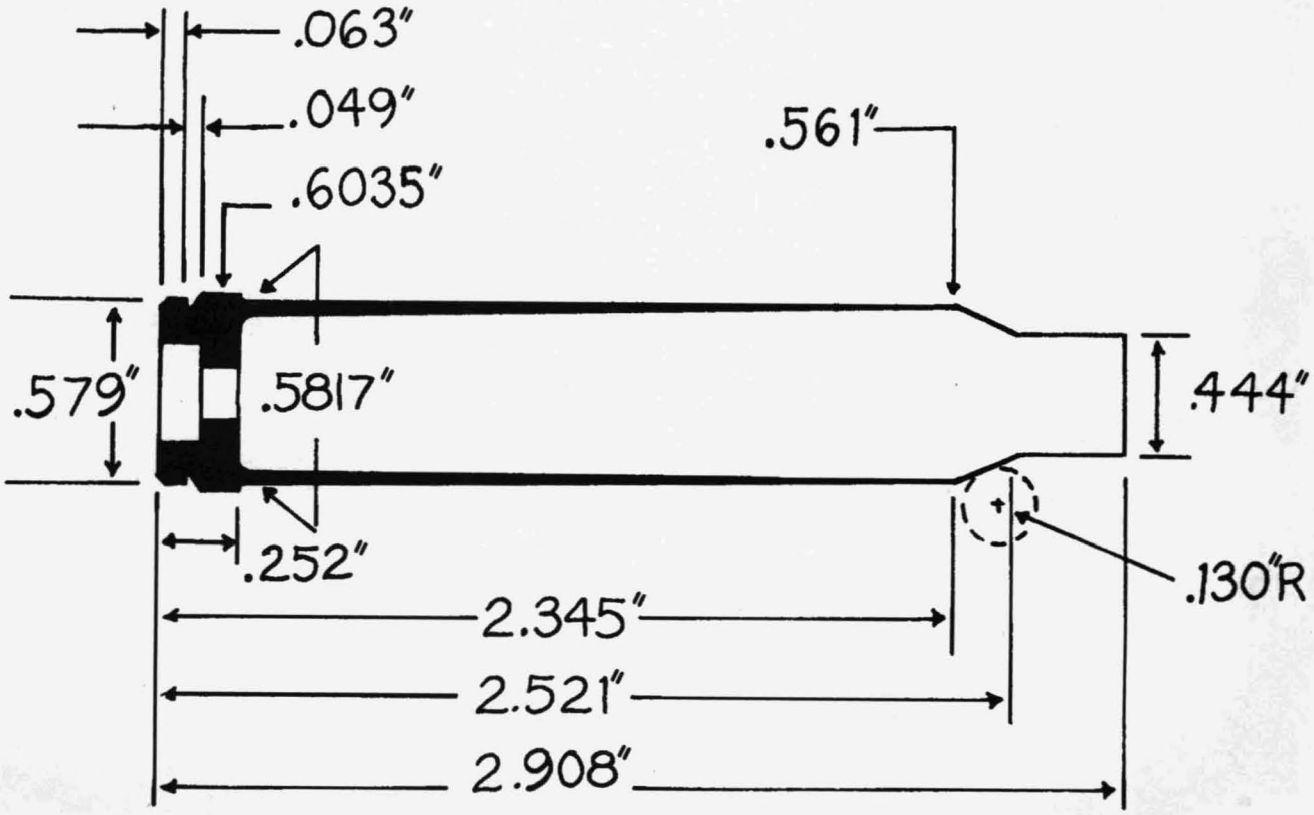
416 Weatherby Magnum

Historical Notes There has been a moderate, but persistent, interest in 40-caliber dangerous game cartridges for a good many years. The demand has been filled by several wildcat cartridges, but the call for a factory 40-caliber has intensified over the past decade. Remington was the first to exploit this potential market with their 416 Remington Magnum in 1988, followed by the 416 Weatherby Magnum in 1989. In the game of cartridge one-upmanship, the Weatherby version was bound to be somewhat more powerful than an ordinary 416.

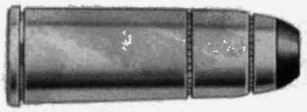
General Comments The 416 Weatherby Magnum has over 300 fps higher initial velocity than the Remington Magnum with the same bullet weight. How useful this will be in the field is difficult to assess, because both cartridges are adequate for the intended purpose, which is to dispatch large and/or dangerous game with a minimum of fuss. On the other hand, Weatherby rifles carry a certain prestige and there is nothing wrong with having a little extra power when the moment of truth arrives. The choice between the two will probably be a matter of personal preference.

416 Weatherby Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
300 SP	IMR 4831	115	3000	5997	Barnes
350 SP	IMR 4831	110	2800	6095	Barnes
400 SP	IMR 4831	110.5	2700	6477	Hornady
400 SP	H-450	119	2700	6477	Hornady
400 SP	IMR 7828	117	2600	6006	Hornady
400 SP	FL		2700	6474	Weatherby factory load.



44-40 Winchester (44 WCF)



Historical Notes This was the original cartridge for the famous Winchester Model 1873 lever-action repeating rifle. Shortly after its introduction, Colt was offering revolvers in 44-40-caliber. At one time or another, just about every American arms manufacturer has offered some kind of gun chambered for this cartridge. The Colt-Burgess lever-action rifle of 1883 was made for the 44-40 and so was the 1885 Colt Lightning slide-action rifle. The Remington Model 14½ slide action used it, as did the Winchester 92 and Marlin 94, both lever-action repeaters. Most of the single shot rifles made in the United States had a 44-40 model at one time or another. In Spain, they manufactured a copy of the Winchester Model 92 in 44-40 caliber for police and civil guard use. No American-made rifles have chambered the round since 1937, but Colt revolvers retained it until 1942. Several foreign-made replicas of the Henry Carbine and the Winchester Model 66 and 73 are currently available in 44-40-caliber.

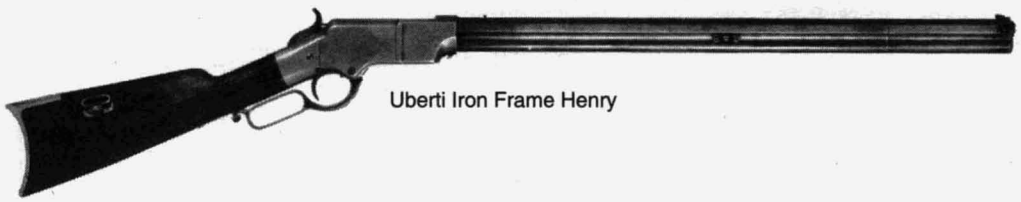
Winchester once loaded a 217-grain bullet in two separate headstamps: 44 C.L.M.R., for the Colt Lightning Magazine Rifle, and 44-40 for Marlin rifles. They also offered a 34-grain blackpowder load behind a 115-grain bullet for the Marble Game Getter rifle headstamped 44 G.G.

General Comments The 44-40 is one of the all-time great American cartridges. It is said that it has killed more game, large and small, and more people, good and bad, than any other commercial cartridge ever developed. In its original blackpowder loading, it was the first effective combination cartridge that could be used interchangeably in rifle or revolver, and was a great favorite in the early days of the American West.

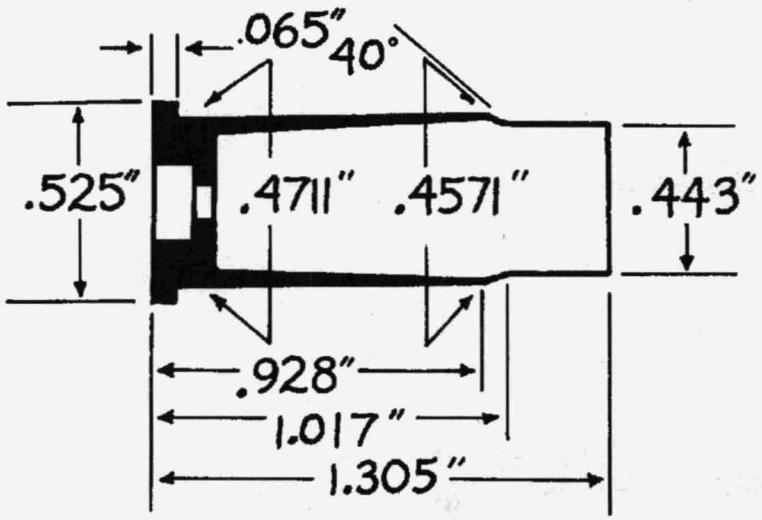
With proper handloads used in strong rifles the 44-40 can safely propel the 200-grain jacketed bullet at 1800 fps. Compared to the standard 30-30 load with a 170-grain bullet at about 2100 fps, this is a superior combination against deer at short range. It was once offered in a high velocity loading specifically designed to take advantage of the Model 92 Winchester's strength. Like many other high-velocity loadings of yesteryear, it had to be discontinued because certain types just insisted on chambering anything that would fit in whatever gun was at hand. The 44-40 was made obsolete in the revolver by the 357 and 44 Magnums, and in the rifle by the 30-30 and similar cartridges that have a flatter trajectory at ranges beyond 100 yards. Present factory loads by Remington and Winchester are intended for revolvers and it is necessary to handload in order to get top performance from the rifle. Many 44-40 rifles have been rebarreled to the 44 Magnum.

44-40 Winchester Loading Data and Factory Ballistics

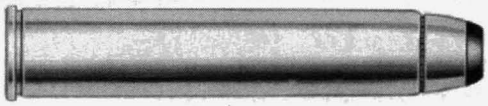
Bullet (grs.)	Powder/grs.		MV	ME	Source
180 SP	2400	18	1250	625	Hornady
180 SP	SR4756	11	1150	529	Hornady
180 SP	2400	16.5	1000	400	Hornady
180 SP	Unique	10.4	1150	529	Hornady
200 SP	IMR 4227	20	1100	537	Hornady
200 SP	2400	15.3	1000	444	Hornady
200 SP	Unique	9.5	1050	490	Hornady
200 SP	FL		1190	629	Factory load.



Uberti Iron Frame Henry



444 Marlin



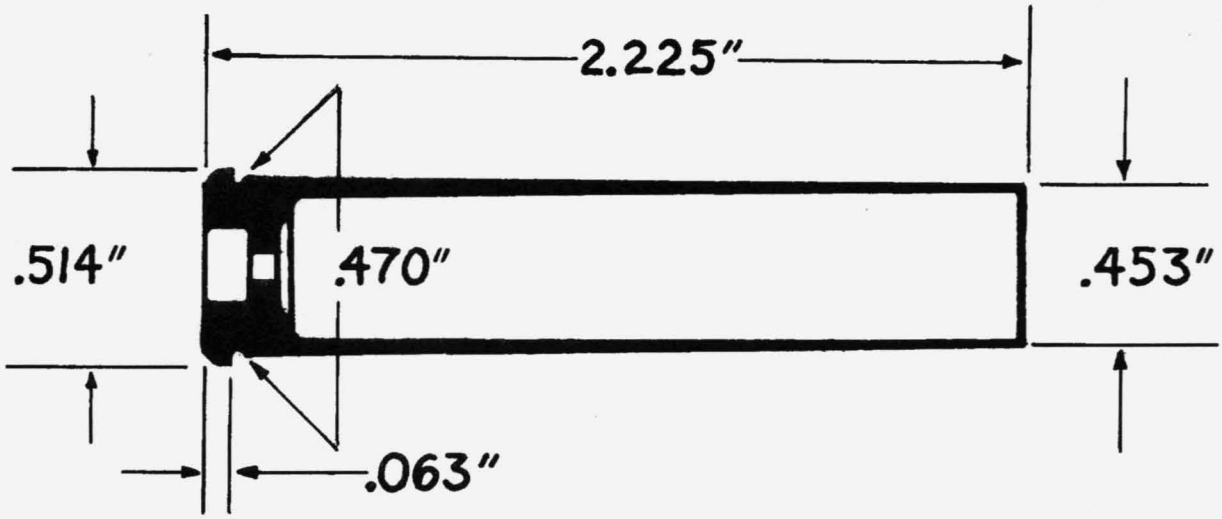
Historical Notes News and data on the 444 Marlin round was released to the public in June, 1964. The cartridge was designed for the Marlin Model 336 lever-action rifle. Initially, the rifle was manufactured with a 24-inch Micro-Groove barrel, two-thirds length magazine and recoil pad. The straight-grip stock had a Monte Carlo cheekpiece. Original ammunition was made by Remington.

The 444 Marlin is amazingly similar to the 44 Van Houten Super. The 44 VH was developed by E.B. Van Houten and "Lucky" Wade of Phoenix, Arizona. It was made by necking-up 30-40 Krag brass, trimming it to 2 inches and turning down the rim slightly. It was designed for the 336 Marlin or 94 Winchester actions. It predates the Marlin round by at least 3 years. Ballistics of the two rounds are nearly identical.

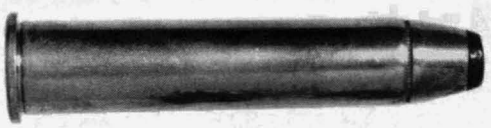
General Comments The 44 Magnum revolver cartridge achieved popularity as a rifle round. Although it makes a good brush buster, anyone using it discovers quite quickly that it has a high trajectory, and its killing power on heavier game such as elk or moose is adequate only at close range. Consequently, there was need for a somewhat more powerful version. The 444 Marlin will extend both the effective range and killing power inherent in the 44 Magnum. The new round fires the same 240-grain softpoint bullet, at 2330 fps as compared to 1850 for the average 44 Magnum rifle. The 444 Marlin is substantially more powerful than the old 30-30 or the 35 Remington at short ranges. It develops about the same energy as the 348 Winchester and slightly more than the later 358 Winchester. However, with its larger diameter bullet it should provide better knockdown power. It is a short- to medium-range cartridge and should be adequate for any North American big game. It would also be effective on most thin-skinned African game, except dangerous varieties. Its advantage over the above-named cartridges is all at ranges out to 150 yards. Beyond that, due to better bullet shape and sectional density, they all catch up to and finally surpass the 444 in retained velocity and energy. The 444 Marlin was formerly available in what had to be a superior all around hunting load with a 265-grain bullet. Remington is the only manufacturer of this caliber.

444 Marlin Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
180 HP	IMR 4198	51	2500	2499	Sierra
220 SP	IMR 4198	49	2350	2698	Sierra
240 HP	IMR 4198	46.5	2300	2820	Hornady, Sierra
240 HP	H-322	53	2300	2820	Hornady, Sierra
250 SP	IMR 4198	47	2250	2811	Sierra
265 SP	H-4198	47	2200	2849	Hornady
275 SP	RL-7	47	2250	3092	Barnes
300 SP	RL-7	46	2150	3080	Barnes
240 SP	FL		2330	2942	Remington factory load.



45-70 Government (45 Government/ 45-70-330/45-70-350/45-70-405/ 45-70-500)

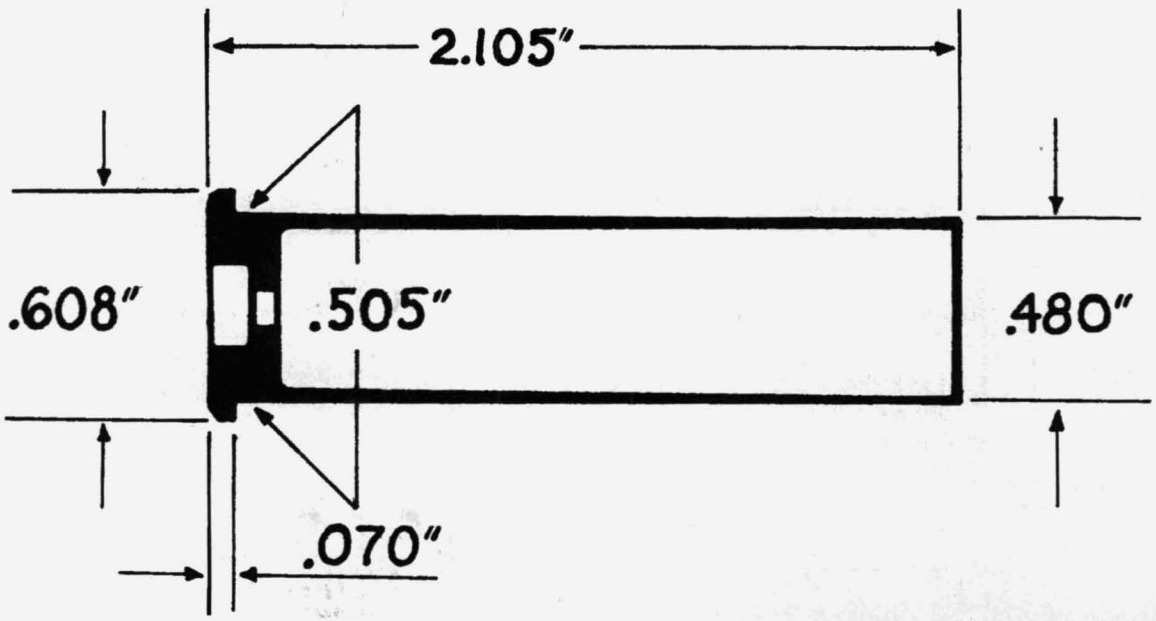


Historical Notes Adopted by the U.S. military in 1873 with the single shot "Trapdoor" Springfield rifle, it continued as the official service cartridge for 19 years. It was then replaced in 1892 by the 30-40 Krag. It was also a popular cartridge for sporting use and many repeating and single shot rifles were chambered for it—the Remington rolling block, Remington-Keene, Remington-Lee, Marlin Model 81, Winchester Model 86 and Hotchkiss, plus many others. Though the Krag officially replaced the 45-70 in 1892, all volunteer Spanish-American War regiments—with the reported sole exception being TR's Rough Riders—were equipped with the Trapdoor 45-70. Many state militias were armed with the 45-70 Springfields well beyond 1900. American companies dropped the 45-70 as a rifle caliber in the early 1930s. However, it has staged a major comeback in popularity, and currently Marlin, Ruger and Browning chamber rifles for the 45-70. Winchester once loaded many versions of the basic 45-70 case with different bullet weights and shapes and with different blackpowder charges. They also loaded one variant of the 45-70-405 Winchester load expressly for the Marlin 1881 lever-action rifle. It featured a differently shaped 405-grain bullet and was headstamped 45-70 Mar.

General Comments "Old soldiers never die," and apparently neither do old military cartridges. The 45-70 has been with us for over 120 years and is still very much alive. As a short-range woods or brush cartridge for anything from deer to grizzly bear, the 45-70 will hold its own with most of our more modern developments. Its greatest fault is the curved trajectory that makes it difficult to place shots beyond 150 yards with any certainty. Unfortunately, the U.S. Springfield and most of the other blackpowder rifles won't stand pressures over 25,000 psi or so. This prevents the use of heavy loads of smokeless powder. In late Model 86 Winchester or other smokeless powder rifles, the 45-70 can be loaded to deliver very impressive knockdown on our heaviest species of big game. Winchester, Remington and Federal offer ammunition in this caliber.

45-70 U.S. Government Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
300 HP	IMR 4198	34	1400	1306	Hornady, Sierra
300 HP	IMR 4227	29	1400	1306	Hornady, Sierra
300 HP	IMR 3031	43	1400	1306	Hornady
300 HP	SR 4759	27	1400	1306	Hornady
Loads for Modern Smokeless Powder Rifles Only					
300 HP	IMR 4198	46	2000	2665	Hornady
300 HP	IMR 4227	43	2100	2938	Sierra
350 SP	IMR 3031	54	1800	2519	Hornady
400 SP	H-322	56	1900	3207	Speer
400 SP	IMR 3031	54	1800	2878	Speer
300 SP	FL		1880	2355	Factory load.
405 SP	FL		1330	1590	Factory load.



458 Winchester Magnum

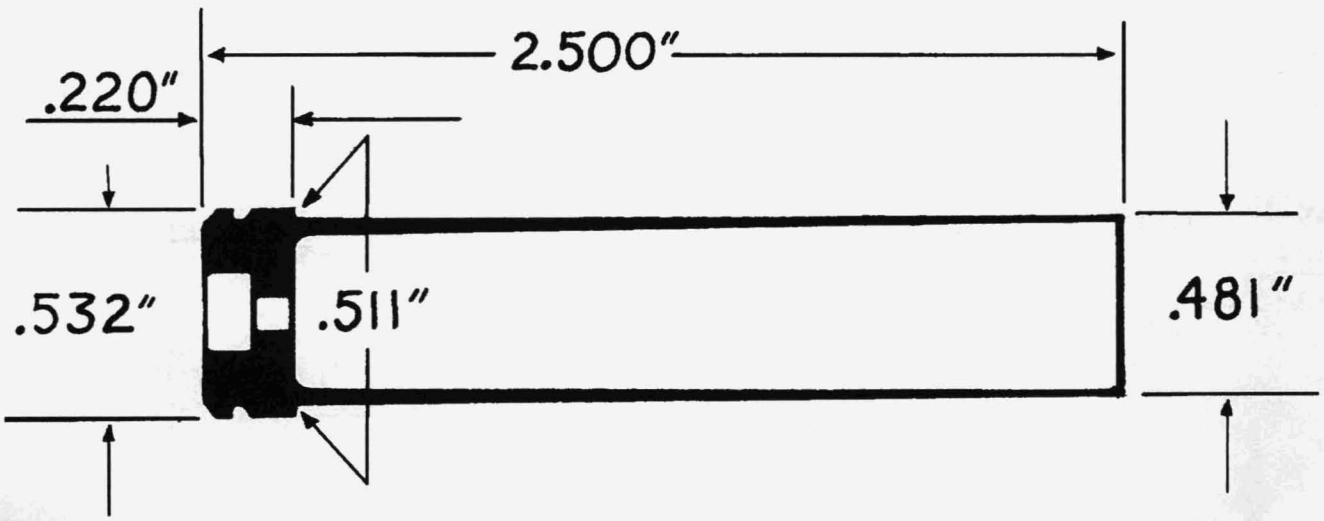
Historical Notes The 458 Winchester Magnum was introduced in 1956 for a dressed-up version of the Model 70 rifle called the "African." The Remington 700 Safari is available in 458 and so are many other American- and European-made rifles such as the A-Square, Dakota 76, BRNO and the Ruger 77. The 458 has become a world standard and many factories and individual makers provide hunting arms for it. Ruger also chambers the 458 in their No. 1 single shot rifle.

General Comments With the increasing number of American sportsmen making the trek to Africa, and with the Weatherby Magnum line of cartridges selling rather well, Winchester decided to get into the act. The result is the fine 458, a caliber suitable for any of the most dangerous game in the world. This cartridge has been tested thoroughly in Africa and has proven itself adequate for the toughest game found there. It is as powerful as most of the oversized English big-bore elephant cartridges. Although overpowered for North American big game, it has nonetheless found favor with many hunters as a woods and brush cartridge when reloaded with lighter than standard factory bullets. With the 300-, 350- or 405-grain bullets, it can be loaded to duplicate the 45-70 at any level, and to cover a wide range of game and hunting conditions. As a factory load, it is not good for anything but the biggest and toughest. But then that is what it was intended for. Federal, Winchester and Remington offer ammunition in this caliber.

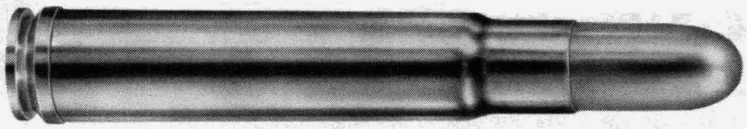
458 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
300 SP	RL-7	58	2100	2938	Hornady
300 SP	IMR 4198	49	2100	2938	Hornady, Sierra
350 SP	IMR 4198	70.5	2500	4859	Hornady
400 SP	IMR 4198	64	2250	4498	Speer
400 SP	IMR 4320	77	2200	4300	Speer
500 SP	IMR 4320	81	2350	6133	Barnes
500 SP	IMR 3031	70	2100	4897	Hornady
350 SP	FL		2470	4740	Factory load.
500 FMJ	FL		2040	4620	Factory load.
510 SP	FL		2040	4712	Factory load.

Winchester Model 70 African



460 Weatherby Magnum

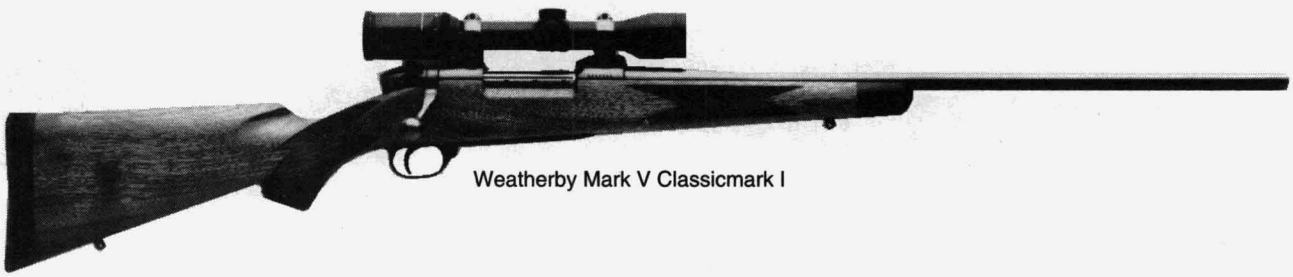


Historical Notes This big, potent caliber was brought out in 1958 for the avowed purpose of providing the world's most powerful commercial rifle cartridge. It was developed by necking the 378 Weatherby case up to 45-caliber. Rifles and ammunition are available only through Weatherby, Inc. on a commercial basis, but custom-made rifles based on Mauser-type bolt actions are occasionally chambered for this round.

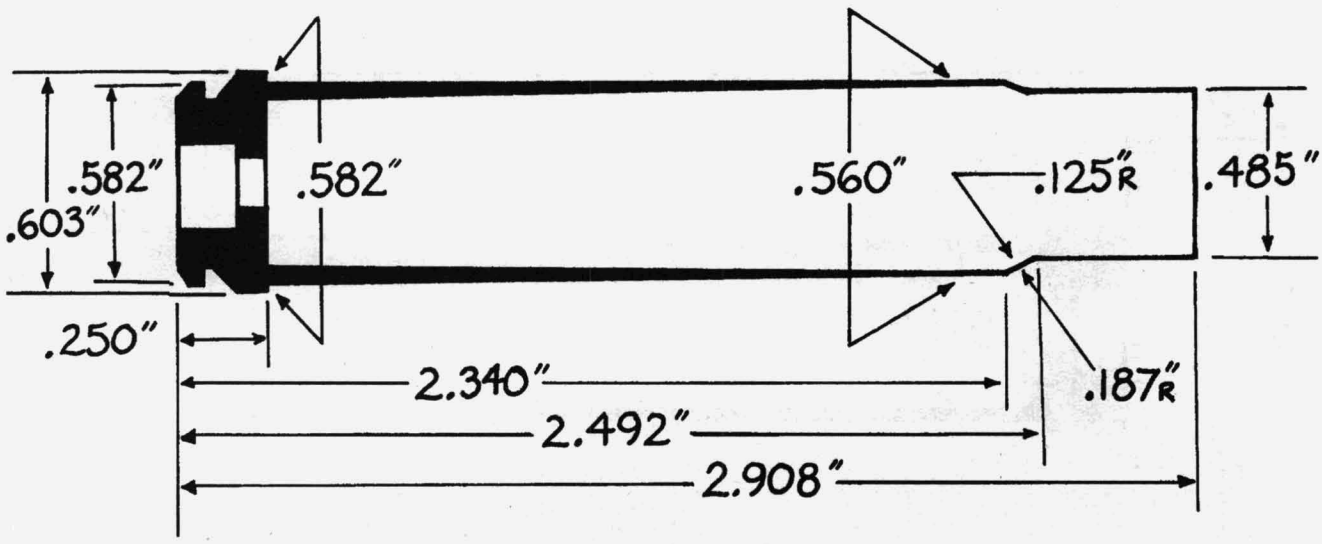
General Comments Until the advent of the 700 Nitro Express, which is just barely in the ranks of commercial cartridges, the 460 Weatherby Magnum was among the most powerful available. Recent factory ballistics have been toned down a bit but it still delivers better than 7500 foot pounds of muzzle energy, which far exceeds most dangerous game loads. The big 460 is overly powerful for any North American big game, but it does provide that ultimate bit of insurance against the dangerous African or Asiatic varieties under adverse conditions. It would, of course, be preferable to be caught slightly over-gunned than to be eaten by a lion or trampled by an elephant. In any event, for the man who insists on the biggest and the most of everything, the 460 Weatherby is the most powerful. Two wildcat cartridges, the 450 and 475 Ackley are in the same class as the 460 WM insofar as energy is concerned. The 475 A&M Magnum reportedly develops a muzzle energy of some 10,000 foot pounds. However, none of these are commercial cartridges.

460 Weatherby Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
300 SP	IMR 4320	112	3000	5997	Barnes
350 SP	IMR 4064	111	2900	6538	Hornady
500 SP	IMR 4350	123.5	2650	7799	Hornady
500 SP	IMR 4320	108	2550	7221	Hornady
500 SP	IMR 3031	99	2500	6941	Hornady
500 SP	H-4831	125	2650	7799	Barnes
500 SP/FMJ	FL		2600	7507	Weatherby factory load.



Weatherby Mark V Classicmark I



470 Nitro Express (470 NE)

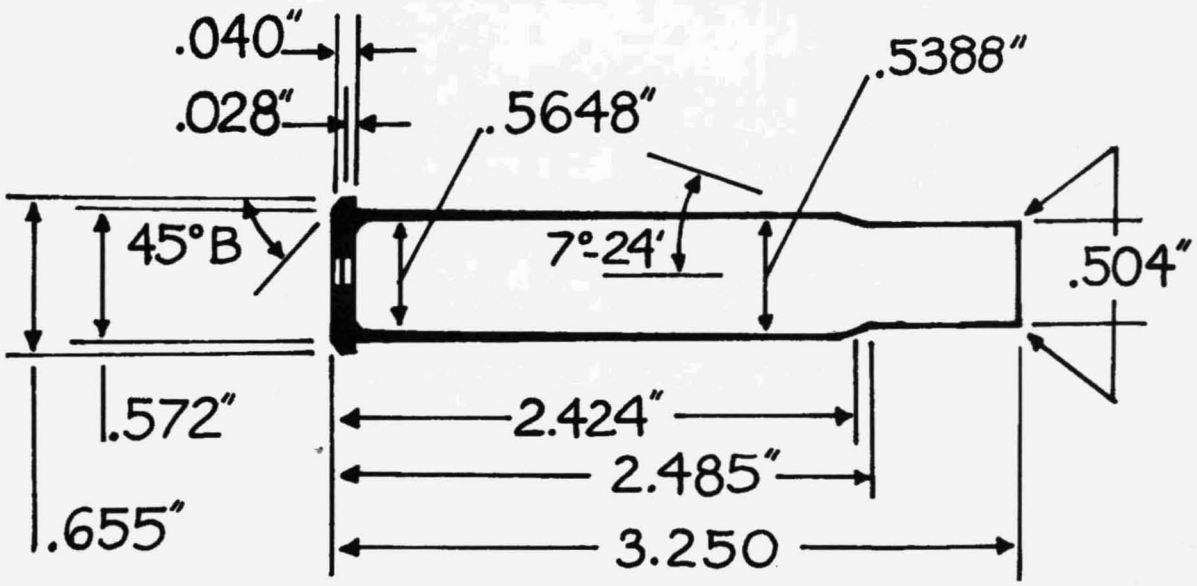
Historical Notes Since its introduction in 1907, the 470 Nitro Express has proven to be one of the most popular and long lived of the British Nitro Express cartridges. Guns in this caliber are not excessively heavy and recoil, while heavy, is acceptable. This makes a good combination for the hunter who wants to use one caliber for all African game without fear of being undergunned. For this reason, most guns in this caliber are the tried and true double rifles. H&H, Purdey, J. Rigby & Co., Westley Richards, Powell and a few others still make double rifles in England. Production of such rifles is also abundant in Europe with Beretta of Italy, Francotte of Belgium, and Heym of Germany offering models priced from $10,000 on up. The 5130 fpe of muzzle energy generated by the 500-grain steel jacketed solid bullet is the stuff from which myths are made in the hot stove league.

General Comments In 1989 Federal Cartridge Co. added this caliber to their Premium product line making it the first British Nitro Express caliber offered by a major American manufacturer. Ammunition in this caliber is again being made in the U.K. by Kynoch. Ballistics are identical to previous British loads so the point of impact with metal sights will remain the same. The 470 is generally too powerful for most North American game but works well on medium-to-large game worldwide. Many 470 shooters reload the cartridge because of the high cost of factory ammo. For those who do or wish to, components are available from Huntington's in Oroville, CA.

470 Nitro Express Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
500 SP/FMJ	FL	2150	5130	Federal factory load.

Custom Ruger No. 1



50 Browning Machine Gun (50 BMG)

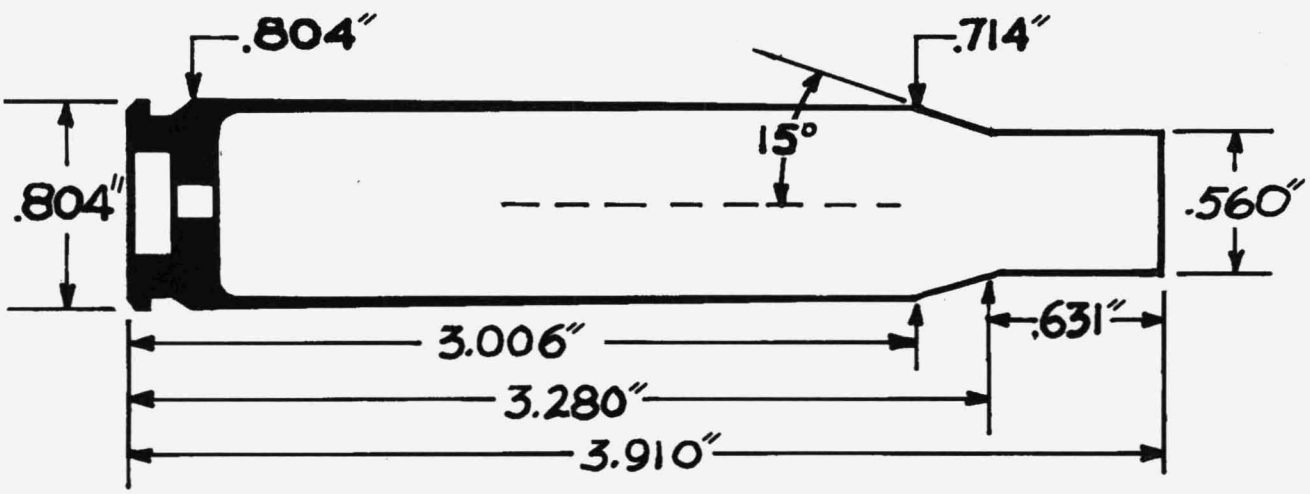
Historical Notes The 50 BMG was invented by its namesake and adopted into United States Military service in 1918 for John M. Browning's famous heavy machinegun. Browning's attentions in this area were prompted by a battlefield need recognized during WWI. There have been other developments and at least once the Pentagon was considering dropping the 50 BMG in favor of more modern and generally bigger chamberings. However, the 50 BMG has remained. The advent of saboted loads, generating 4500 fps muzzle velocities with devastating armor-penetration capabilities, and its performance in the recent Gulf War has seemed to cement its continued existence as a stable part of NATO's arsenal. Battlefield use is against lightly armored vehicles to ranges of a mile or more, and used against the unprotected, it is effective to several times that range.

General Comments There has long been interest in the 50 BMG as a quasi-sporting round. Today, the only significant sporting use for this chambering is long-range accuracy shooting with some competitions exceeding one mile. The 1000-yard 50-caliber record, as of this writing, is a five shot group of just over 3 inches on centers. Several bolt-action rifles are currently or have recently been, available for the big fifty. The 50 BMG easily launches the 750-grain bullets available for it at 2700 fps. The lighter 647-grain bullets available can be launched at 3000 fps. For obvious reasons sporting rifles chambered for the big fifty uniformly feature muzzlebrakes and weigh twenty pounds or more. Regardless, recoil is still a bit harsh.

The only commercial ammunition that has ever been available for the 50 BMG is from PMC. Components and specialized tools and equipment to handload this cartridge are available to the advanced reloader.

50 Browning Machine Gun Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
750	H870	225.0	2769	12,775	Barnes
800	AA8700	215.0	2675	12,720	Barnes
660	FL		3080	13,910	PMC Factory Load



CURRENT AMERICAN RIFLE CARTRIDGES
Centerfire Sporting
Dimensional Data
(SAAMI Maximum Cartridge Data)

Cartridge	Case type	Bullet dia.	Neck dia.	Shoulder dia.	Base dia.	Rim dia.	Case length	Ctge. length	Twist	Primer
17 Remington	C	.172	.198	.355	.374	.377	1.79	1.86	9	S
22 Hornet	A	.223	.242	.274	.294	.345	1.40	1.72	16	S
218 Bee	A	.224	.241	.331	.349	.408	1.35	1.68	16	S
222 Remington	C	.224	.253	.355	.375	.375	1.70	2.15	14	S
223 Remington	C	.224	.249	.349	.373	.375	1.76	2.10	12	S
222 Remington Mag.	C	.224	.253	.355	.375	.375	1.85	2.21	14	S
22 PPC	C	.224	.245	.430	.440	.441	1.52	1.96	1-14	S
225 Winchester	A	.224	.260	.406	.422	.473	1.93	2.50	14	L
224 Weatherby Mag.	E	.224	.247	.405	.413	.425	1.92	2.44	14	L
22-250 Remington	C	.224	.254	.412	.466	.470	1.91	2.33	14	L
220 Swift	G	.224	.260	.402	.443	.472	2.20	2.68	14	L
6mm PPC	C	.243	.260	.430	.441	.442	1.50	2.12	1-12	S
6mm Bench Rest Remington	C	.243	.263	.457	.466	.468	1.52	2.19	12	S
243 Winchester	C	.243	.276	.454	.470	.470	2.05	2.71	10	L
6mm Remington/244 Rem.	C	.243	.276	.429	.470	.472	2.23	2.91/2.825	9/12	L
240 Weatherby	E	.243	.271	.432	.453	.473	2.50	3.06	10	L
25-20 Winchester	A	.257	.274	.329	.349	.405	1.33	1.60	13-14	S
25-35 Winchester	A	.257	.280	.355	.420	.500(.506)	2.04	2.53	8	L
250 Savage	C	.257	.286	.413	.468	.470	1.91	2.52(2.515)	14	L
257 Roberts (+P)	C	.257	.290	.430	.468	.473	2.23	2.74	10-12	L
25-06 Remington	C	.257	.287	.441	.470	.471	2.49	3.00	10-12	L
257 Weatherby Mag.	E	.257	.285	.490	.511	.530	2.55	3.25	12	L
6.5x55 Swedish	C	.264	.297	.435	.480(.477)	.480(.479)	2.16	3.15	7.9	L
264 (6.5mm) Win. Mag.	E	.264	.289	.490	.515(.5127)	.532	2.52	3.29	9	L
270 Winchester	C	.277	.307	.440	.468	.470	2.54	3.28	10	L
270 Weatherby Mag.	E	.277	.305	.490	.511	.530	2.55	3.25	12	L
7-30 Waters	A	.284	.306	.399	.422(.4215)	.506	2.04	2.52	9½	L
7mm Mauser	C	.284	.320	.420(.4294)	.470	.474	2.24(2.235)	3.06	8-10	L
7mm-08 Remington	C	.284	.315	.454	.470	.473	2.04(2.035)	2.80	9	L
7x64 Brenneke	C	.284	.313	.422	.463	.468	2.51	3.21	—	L
284 Winchester	I	.284	.320	.465(.4748)	.495(.500)	.470	2.17	2.75	10	L
280 Remington (7mm R. Ex.)	C	.284	.315	.441	.470	.472	2.54	3.33	10½	L
7mm Remington Mag.	E	.284	.315	.490	.511	.525	2.50	3.24	9½	L
7mm Weatherby Mag.	E	.284	.312	.490	.511	.530	2.55	3.25	12	L
30 Remington	C	.307	.328	.402	.420	.421	2.03	2.525	12	L
30 Carbine	D	.308	.335	—	.355	.360	1.29	1.65	16	S
30-30 Winchester	A	.308	.328	.402	.422(.4215)	.502	2.03(2.039)	2.53	12	L
300 Savage	C	.308	.339	.443(.4466)	.470	.470	1.87	2.62	12	L
30-40 Krag	A	.308	.338	.415(.419)	.457(.4577)	.540	2.31	3.10(3.089)	10	L
307 Winchester	G	.308	.344	.454	.470	.506	2.02(2.015)	2.60(2.56)	12	L
308 Winchester	C	.308	.344	.454	.470	.470	2.01(2.015)	2.75	12	L
30-06 Springfield	C	.308	.340	.441	.470	.473	2.49	3.34	10	L
300 H&H Mag.	E	.308	.338	.447	.513	.530	2.85	3.60	10	L
300 Winchester Mag.	E	.308	.334	.4891	.5126	.530	2.60(2.62)	3.30	10	L
300 Weatherby Mag.	E	.308	.337	.495	.513(.5117)	.530	2.82(2.825)	3.56	12	L
303 Savage	A	.308(.311)	.334(.3322)	.408(.4135)	.439	.501	2.00(2.015)	2.52	12	L
7.62x39mm	C	.311	.340(.337)	.344(.396)	.438(.433)	.440	1.52(1.528)	2.20	9.4	S
303 British	A	.311	.338	.401	.458	.530	2.21(2.222)	3.05(3.075)	10	L
32-20 Winchester	A	.312	.326	.338(.3424)	.353	.405	1.32(1.315)	1 59	20	S
32 Winchester Special	A	.321	.343	.396(.4014)	.422(.4219)	.506	2.04	2.55(2.565)	16	L
8mm Mauser	C	.323	.353(.3493)	.431	.469	.473	2.24	3.17(3.25)	9-10	L
8mm Remington Mag.	E	.323	.351(.3541)	.485(.4868)	.509(.5126)	.530	2.85	3.57(3.600)	10	L
338 Winchester Mag.	E	.338	.369	.480(.491)	.515(.5127)	.530	2.49(2.50)	3.30(3.34)	10	L
340 Weatherby Mag.	E	.338	.366	.495	.513	.530	2.82	3.60	12	L
348 Winchester	A	.348	.379(.3757)	.485	.553	.610	2.26(2.255)	2.80(2.795)	12	L

CURRENT AMERICAN RIFLE CARTRIDGES

Centerfire Sporting (Continued)

Dimensional Data

Cartridge	Case type	Bullet dia.	Neck dia.	Shoulder dia.	Base dia.	Rim dia.	Case length	Ctge. length	Twist	Primer
35 Remington	C	.358	.384	.419(.4259)	.458(.4574)	.460	1.92	2.52	16	L
356 Winchester	G	.358	.388	.454	.4703	.508	2.02(2.015)	2.56	12	L
358 Winchester	C	.358	.388	.454	.4703	.473	2.01(2.015)	2.78	12	L
35 Whelen	C	.358	.388	.441	.470	.473	2.50(2.494)	3.34	12-14	L
350 Remington Mag.	E	.358	.388	.495	.5126	.532	2.17	2.80	16	L
375 Winchester	B	.375	.400	—	.415(.4198)	.502	2.02	2.56	12	L
375 H&H Mag.	E	.375	.402	.440(.4478)	.521	.530	2.85	3.60	12	L
378 Weatherby Mag.	E	.375	.403	.560	.584	.580	2.92	3.69	12	L
38-55 Win. & Ballard	B	.379	.392	.3938	.422	.506	2.12(2.085)	2.51	18	L
38-40 Winchester	A	.401	.416	.438(.4543)	.465	.520	1.30	1.59	36	L*
416 Rem. Mag.	E	.416	.447	.487	.509	.530	2.85	3.60	14	L
416 Rigby	C	.416	.445(.4461)	.539(.5402)	.589	.586	2.90	3.75	16.5	L
416 Weatherby	E	.416	.444	.561	.584	.580	2.915	3.75	14	L
44-40 Winchester	A	.427/.429	.443	.4568	.471	.525	1.31	1.92	20-36	L*
444 Marlin	B	.429	.453	.4549	.469	.514	2.16(2.225)	2.57	38	L
45-70 Government	B	.458	.475(.480)	.4813	.500	.600(.608)	2.105	2.55	18-22	L
458 Winchester Mag.	F	.458	.478(.4811)	.4825	.513	.532	2.50	3.34	14-16	L
460 Weatherby Mag.	E	.458	.485	.560	.584	.580	2.91	3.75	14	L
470 Nitro Express	A	.475	.504	.528(.5322)	.5728	.655	3.25	3.98	20	L
50 BMG	C	.510/.511	.560	.714	.804	.804	3.91	5.545	16	**

A—Rim, bottleneck B—Rim, straight C—Rimless, bottleneck D—Rimless, straight
E—Belted, bottleneck F—Belted, straight G—Semi-rimmed, bottleneck
H—Semi-rimmed, straight I—Rebated, bottleneck
Primer: S—Small rifle (1.75″) L—Large rifle (.210″) *—Pistol **—Vihtavouri 110/CCI-35
Twist (factory) is given as inches per complete revolution, e.g., 12=1 turn in 12″, etc.
Unless otherwise noted, all dimensions are in inches.
Data in parenthesis is SAAMI maximum

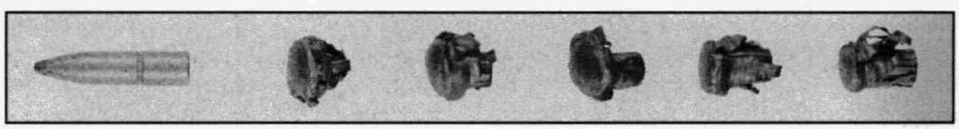
1961 Ballistics

WINCHESTER C.F. RIFLE CARTRIDGES—BALLISTICS AND PRICES

CARTRIDGE	BULLET Wt. Grs.	Type	VELOCITY—FT. PER SEC. Muzzle	100 yds.	200 yds.	300 yds.	ENERGY—FT. LBS. Muzzle	100 yds.	200 yds.	300 yds.	MID-RANGE TRAJECTORY 100 yds.	200 yds.	300 yds.	PRICE For 20
218 Bee Super Speed*	46	H.P.	2860	2160	1610	1200	835	475	265	145	0.7	3.8	11.5	$6.90
219 Zipper Super Speed	56	H.P.	3110	2440	1940	1550	1200	740	465	300	0.6	2.9	8.3	3.60
22 Hornet Super Speed*	45	S.P.	2690	2030	1510	1150	720	410	230	130	0.8	4.3	13.0	6.70
22 Hornet Super Speed*	46	H.P.	2690	2030	1510	1150	740	420	235	135	0.8	4.3	13.0	6.70
220 Swift Super Speed	48	P.S.P.	4110	3490	2930	2440	1800	1300	915	635	0.3	1.4	3.8	3.85
222 Remington	50	S.P.	3200	2660	2170	1750	1140	785	520	340	0.5	2.5	7.0	3.15
243 Winchester Super Speed	80	S.P.	3500	3080	2720	2410	2180	1690	1320	1030	0.4	1.8	4.7	4.30
243 Winchester Super Speed	100	S.P	3070	2790	2540	2320	2090	1730	1430	1190	0.5	2.2	5.5	4.30
25-20 Winchester High Velocity Super Speed*	60	H.P.	2250	1660	1240	1030	675	365	205	140	1.2	6.3	21.0	6.20
25-20 Winchester†*	86	Lead	1460	1180	1030	940	405	265	200	170	2.6	12.5	32.0	5.35
25-20 Winchester*	86	S.P.	1460	1180	1030	940	405	265	200	170	2.6	12.5	32.0	5.90
25-35 Winchester Super Speed	117	S.P.	2300	1910	1600	1340	1370	945	665	465	1.0	4.6	12.5	3.70
250 Savage Super Speed	87	P.S.P.	3030	2660	2330	2060	1770	1370	1050	820	0.6	2.5	6.4	4.00
250 Savage Super Speed	100	S.T.Exp.	2820	2460	2140	1870	1760	1340	1020	775	0.6	2.9	7.4	4.00
257 Roberts Super Speed	87	S.P.	3200	2840	2500	2190	1980	1560	1210	925	0.5	2.2	5.7	4.45
257 Roberts Super Speed	100	S.T.Exp.	2900	2540	2210	1920	1870	1430	1080	820	0.6	2.7	7.0	4.45
257 Roberts Super-X	117	S.P.	2650	2280	1950	1690	1820	1350	985	740	0.7	3.4	8.8	4.45
264 Winchester Magnum	100	S.P.	3700	3260	2880	2550	3040	2360	1840	1440	0.4	1.6	4.2	5.85
264 Winchester Magnum	140	Power Pt.	3200	2940	2700	2480	3180	2690	2270	1910	0.5	2.1	4.9	5.85
270 Winchester Super Speed	100	S.P.	3480	3070	2690	2340	2690	2090	1600	1215	0.4	1.8	4.8	4.75
270 Winchester Super Speed	130	S.T.Exp.	3140	2850	2580	2320	2840	2340	1920	1550	0.5	2.1	5.3	4.75
270 Winchester Super Speed	150	S.P.	2800	2400	2040	1750	2610	1920	1380	1020	0.7	3.0	7.8	4.75
7x57 m/m Mauser Super Speed	175	S.P.	2490	2170	1900	1680	2410	1830	1400	1100	0.8	3.7	9.5	4.75
30-30 Winchester Super Speed	150	H.P.	2410	2020	1700	1430	1930	1360	960	680	0.9	4.2	11.0	3.75
30-30 Winchester Super Speed	150	S.T.Exp.	2410	2020	1700	1430	1930	1360	960	680	0.9	4.2	11.0	3.75
30-30 Winchester Super Speed	170	S.P.	2220	1890	1630	1410	1860	1350	1000	750	1.2	4.6	12.5	3.75
30-30 Winchester Super Speed	170	S.T.Exp.	2220	1890	1630	1410	1860	1350	1000	750	1.2	4.6	12.5	3.75
30-30 Winchester Super Speed	170	F.P.	2220	1890	1630	1410	1860	1350	1000	750	1.2	4.6	12.5	3.75
30 Remington Super Speed	170	S.T.Exp.	2120	1820	1560	1350	1590	1280	870	645	1.1	5.3	14.0	3.75
308 Winchester Super Speed	110	S.P.	3340	2810	2340	1920	2730	1930	1340	900	0.5	2.2	6.0	4.75
308 Winchester Super Speed	150	S.P.	2860	2570	2300	2050	2730	2200	1760	1400	0.6	2.6	6.5	4.75
308 Winchester Super Speed	150	S.T.Exp.	2860	2570	2300	2050	2730	2200	1760	1400	0.6	2.6	6.5	4.75
308 Winchester Super Speed	180	S.P.	2610	2390	2170	1970	2720	2280	1870	1540	0.8	3.1	7.4	4.75
308 Winchester Super Speed	180	S.T.Exp.	2610	2390	2170	1970	2720	2280	1870	1540	0.8	3.1	7.4	4.75
308 Winchester Super Speed	200	S.T.Exp.	2450	2210	1980	1770	2670	2170	1750	1400	0.8	3.6	9.0	4.75
30-40 Krag Super Speed	180	S.P.	2470	2120	1830	1590	2440	1790	1340	1010	0.8	3.8	9.9	4.75
30-40 Krag Super Speed	180	S.T.Exp.	2470	2250	2040	1850	2440	2020	1660	1370	0.8	3.5	8.5	4.75
30-40 Krag Super Speed	220	S.T.Exp.	2200	1990	1800	1630	2360	1930	1580	1300	1.0	4.4	11.0	4.75
30-06 Springfield Super Speed	110	S.P.	3310	2830	2400	2010	2680	1960	1400	985	0.5	2.2	5.9	4.75
30-06 Springfield Super Speed	150	S.P.	2970	2620	2300	2010	2930	2280	1760	1340	0.6	2.5	6.5	4.75
30-06 Springfield Super Speed	150	S.T.Exp.	2970	2670	2400	2130	2930	2370	1920	1510	0.6	2.4	6.1	4.75
30-06 Springfield Super Speed	180	S.P.	2700	2330	2010	1740	2910	2170	1610	1210	0.7	3.1	8.3	4.75
30-06 Springfield Super Speed	180	S.T.Exp.	2700	2470	2250	2040	2910	2440	2020	1660	0.7	2.9	7.0	4.75
30-06 Springfield Wimbledon Cup	180	F.P.B.T.	2700	2520	2350	2190	2910	2540	2200	1900	0.6	2.8	6.7	6.05
30-06 Springfield Super-X	180	M.C.B.T.	2700	2520	2350	2190	2910	2540	2200	1900	0.6	2.8	6.7	6.05
30-06 Springfield Super Speed	220	S.P.	2410	2120	1870	1670	2830	2190	1710	1360	0.8	3.9	9.8	4.75
30-06 Springfield Super-Speed	220	S.T.Exp.	2410	2180	1980	1790	2830	2320	1910	1560	0.8	3.7	9.2	4.75
300 Savage Super Speed	150	S.P.	2670	2350	2060	1800	2370	1840	1410	1080	0.7	3.2	8.0	4.60
300 Savage Super Speed	150	S.T.Exp.	2670	2390	2130	1890	2370	1900	1510	1190	0.7	3.0	7.6	4.60
300 Savage Super Speed	180	S.P.	2370	2040	1760	1520	2240	1660	1240	920	0.9	4.1	10.5	4.60
300 Savage Super Speed	180	S.T.Exp.	2370	2160	1960	1770	2240	1860	1530	1250	0.9	3.7	9.2	4.60
300 H. & H. Magnum Super Speed	150	S.T.Exp.	3190	2870	2580	2300	3390	2740	2220	1760	0.5	2.1	5.2	6.00
300 H. & H. Magnum Super Speed	180	S.T.Exp.	2920	2670	2440	2220	3400	2850	2380	1970	0.6	2.4	5.8	6.00
300 H. & H. Magnum Match	180	F.P.B.T.	2920	2740	2550	2380	3400	3000	2600	2260	0.6	2.4	5.7	7.10
300 H. & H. Magnum Super Speed	220	S.T.Exp.	2620	2370	2150	1940	3350	2740	2260	1840	0.7	3.1	7.7	6.00
303 Savage Super Speed	190	S.T.Exp.	1980	1680	1440	1250	1650	1190	875	660	1.3	6.2	15.5	4.05
303 British Super Speed	215	S.P.	2180	1900	1660	1460	2270	1720	1310	1020	1.1	4.9	12.5	4.75
32-20 Winchester High Velocity Super Speed*	80	H.P.	2100	1430	1090	950	780	365	210	160	1.5	8.5	24.5	7.10
32-20 Winchester (Oilproof)†*	100	Lead	1290	1060	940	840	370	250	195	155	3.3	15.5	38.0	5.35
32-20 Winchester (Oilproof)*	100	S.P.	1290	1060	940	840	370	250	195	155	3.3	15.5	38.0	6.60
32 Winchester Special Super Speed	170	S.P.	2280	1870	1560	1330	1960	1320	920	665	1.0	4.8	13.0	3.85
32 Winchester Special Super Speed	170	S.T.Exp.	2280	1870	1560	1330	1960	1320	920	665	1.0	4.8	13.0	3.85
32 Remington Super Speed	170	S.T.Exp.	2220	1840	1530	1280	1860	1280	885	620	1.1	5.0	13.5	3.85
32-40 Winchester	165	S.P.	1440	1250	1100	1030	760	570	445	390	2.4	11.0	28.0	3.70
8x57 m/m Mauser Super Speed	200	S.P.	2320	1990	1720	1500	2390	1760	1310	1000	0.9	4.4	11.5	4.75
338 Winchester Magnum	200	Power Pt.	3000	2690	2410	2170	4000	3210	2580	2090	0.5	2.4	6.0	6.30
338 Winchester Magnum	250	S.T.	2700	2430	2180	1940	4050	3280	2640	2090	0.7	3.0	7.0	6.30
338 Winchester Magnum	300	Power Pt	2450	2160	1910	1690	4000	3110	2430	1900	0.8	3.7	9.5	6.30
348 Winchester Super Speed	150	S.T.Exp.	2890	2460	2060	1710	2780	2020	1410	975	0.6	2.9	7.9	5.65
348 Winchester Super Speed	200	S.T.Exp.	2530	2220	1940	1680	2840	2190	1670	1250	0.9	3.6	9.0	5.65
348 Winchester Super Speed	250	S.T.Exp.	2350	1970	1660	1410	3060	2150	1530	1100	0.9	4.4	11.5	5.65
35 Remington Super Speed	200	S.P.	2100	1710	1390	1160	1950	1290	865	605	1.2	6.0	16.5	4.30
35 Remington Super Speed	200	S.T.Exp.	2100	1710	1390	1160	1950	1290	865	605	1.2	6.0	16.5	4.30
351 Winchester Self-Loading (Oilproof)*	180	S.P.	1850	1560	1310	1140	1370	975	685	520	1.5	7.8	21.5	8.05
351 Winchester Self-Loading (Oilproof)*	180	F.P.	1850	1560	1310	1140	1370	975	685	520	1.5	7.8	21.5	8.05
358 Winchester Super-Speed	200	S.T.	2530	2210	1910	1640	2840	2160	1610	1190	0.8	3.6	9.4	4.95
358 Winchester Super Speed	250	S.T.	2250	2010	1780	1570	2810	2230	1760	1370	1.0	4.4	11.0	4.95
375 H. & H. Magnum Super Speed	270	S.P.	2740	2460	2210	1990	4500	3620	2920	2370	0.7	2.9	7.1	6.50
375 H. & H. Magnum Super Speed	300	S.T.Exp.	2550	2280	2040	1830	4330	3460	2770	2230	0.7	3.3	8.3	6.50
375 H. & H. Magnum Super Speed	300	F.P.	2550	2180	1860	1590	4330	3160	2300	1680	0.7	3.6	9.3	6.50
38-40 Winchester (Oilproof)*	180	S.P.	1330	1070	960	850	705	455	370	290	3.2	15.0	36.5	7.85
38-55 Winchester	255	S.P.	1320	1160	1050	1000	985	760	625	565	2.9	13.0	32.0	3.75
44-40 Winchester (Oilproof)*	200	S.P.	1310	1050	940	830	760	490	390	305	3.3	15.0	36.5	8.25
45-70 Government	405	S.P.	1320	1160	1050	990	1570	1210	990	880	2.9	13.0	32.5	5.00
458 Winchester Magnum Super Speed	500	F.P.	2125	1910	1700	1520	5010	4050	3210	2570	1.1	4.8	12	12.15
458 Winchester Magnum Super Speed	510	S.P.	2130	1840	1600	1400	5140	3830	2900	2220	1.1	5.1	13.2	7.95

†Inside Lubricated H.P.—Hollow Point O.P.E.—Open Point Expanding S.P.—Soft Point P.S.P.—Pointed Soft Point F.P.—Full Patch S.T.—Silvertip M.C.B.T.—Metal Case Boat Tail
*50 per Box F.P.B.T.—Full Patch Boat Tail H.C.P.—Hollow Copper Point

Courtesy Western-Winchester



Bullet upset performance of the 264 Winchester Magnum 140 gr. Power Point at ranges of 100, 200, 300, 400 and 500 yards.

Chapter 3

OBSOLETE AMERICAN RIFLE CARTRIDGES

(Centerfire Sporting—Blackpowder and Smokeless)

CHAPTER 3 covers obsolete rifle cartridges no longer loaded by American ammunition manufacturers or no longer chambered in commercially available rifles. A few of these are still available out of dealers' old stocks. Both smokeless powder and blackpowder cartridges are included. The total number of old blackpowder sporting cartridges is quite large, and many of these are now collectors' items.

Some authorities are bound to disagree with a few of the cartridges placed in the obsolete category. The Newton cartridges, for example, have been kept alive over the years by wildcat experimenters, and it might be argued they belong in that classification. A wildcat cartridge is usually defined as one that is not loaded, chambered or available on a commercial basis. Strictly speaking, this would make wildcats of almost all the cartridges listed in this chapter. However, they have one common, differentiating characteristic—all were at one time available as true commercial cartridges. Furthermore, used rifles and ammunition out of old stock are sometimes still available for the majority of smokeless powder types. They are also listed in old catalogs and ballistics tables, and it might create confusion to call them wildcats.

The cartridges in Chapter 3 can be considered as commercial innovations that have not stood the test of time. This is as true of the Newton cartridges as the others, but in addition, the Newton designs must be recognized as too advanced for their day. If Charles Newton were alive and his cartridges introduced today, they would be hailed as brilliant and modern in every respect. Unfortunately, modern powders and entirely suitable actions were not available back around 1910, nor was the sporting world quite ready to accept high-intensity cartridges. The general big game hunting conditions at that time made the benefits of this development of doubtful value. The trouble with being ahead of the times is that your genius is not appreciated until some future generation. Posthumous recognition must be of precious little comfort to the individual involved. The late Roy Weatherby, on the other hand, arrived on the scene at the right time. He was also a far better promoter and businessman than was Charles Newton. Result? Ultra-velocity Weatherby rifles are a commercial success and his ideas accepted the world over by all but a few diehards.

The principal importance of obsolete commercial cartridges to today's sportsman is that rifles for many of them are still floating around, particularly the smokeless types. It is well to be aware of their existence and disadvantages before some sharpy unloads an obsolete rifle on you. Obtaining ammunition in any of these calibers is going to be an ever-increasing problem. Of course, certain handloaders like to play around with obsolete cartridges just to be different or to try and improve performance. If you belong to this group, well and good, you probably know what you are doing. However, the average sportsman would be better served by cartridges in Chapter 2. Up to this point most of the remarks are aimed at the obsolete smokeless powder cartridges. The true blackpowder types are a different story. Many of the old blackpowder rifles are now quite valuable, and there is a considerable and growing trend toward the use of these old rifles for target shooting and hunting.

Cartridge Development

Blackpowder cartridges discussed in this chapter cover arms development from about 1868 to 1895. Ideas and experiments of this interval were a necessary prerequisite to perfection of modern, high-powered rifles and ammunition. This was also one of the most romantic periods of American history—the consolidation and settling of the western frontier. The first successful, self-contained metallic cartridge produced on a commercial basis in the United States was the 22 rimfire Short, introduced by Smith & Wesson for their small tip-up revolver in 1857. Commercial cartridge production from then until after the close of the Civil War was mostly in the rimfire field. Essential features of the modern centerfire were

covered in patents of George W. Morse, issued in 1856 and 1858. His design had an anvil formed out of a wire soldered to the inside of the case. The primer or cap was supported by a perforated rubber disc within the base of the case. American Col. Hiram Berdan perfected his priming system, with the anvil formed in the bottom of the primer pocket, during 1866. British Col. Edward Boxer developed his self-contained primer and anvil in 1867. Oddly, the Berdan type is used extensively in Europe while the Boxer primer is used by American manufacturers almost exclusively. Frankford Arsenal initiated experiments to develop a satisfactory centerfire system as early as 1858. The Union Metallic Cartridge Co. (now Remington) began manufacturing Berdan centerfire cartridges in 1868, about a year after the company was formed. The first of the American outside primed, Berdan-type cartridges were probably the 50-70 Govt. and 50 Remington Navy rounds. After 1870, development and introduction of improved centerfire cartridges was quite rapid. In 1885 the French chemist, Vielle, developed the first practical smokeless powder, and in 1886 this was adopted for the new French 8mm Lebel military cartridge. The United States military adopted their first smokeless small-bore cartridge in 1892 for the Krag bolt-action rifle. Winchester developed the first smokeless powder sporting round, the 30-30 WCF, during 1895. Blackpowder cartridges did not begin a serious decline in the United States until after about 1910. Both Remington and Winchester were still loading blackpowder in some of the old cartridges as late as 1936 or '37. Several blackpowder cartridges such as the 44-40, 45 Colt, 45-70, 32-40 and 38-55, survived the change to smokeless powder and are, or were, still manufactured, but no longer with blackpowder. Those loaded at present are included with modern cartridges.

Caliber Confusion

Two great sources of confusion with blackpowder sporting cartridges are the method of nomenclature and the manufacturer's habit of sticking his name on any cartridge he made or chambered. Two or three numbers were used to designate a particular cartridge, such as the 45-70 Govt. or the 45-70-500 Govt. The first numeral is the caliber or bullet diameter, the second is the powder charge in grains and the third is the bullet weight in grains. This last was then usually followed by the manufacturer's name. The same cartridge loaded by Winchester was called, in one version, the 45-70-350 WCF. As offered for Marlin rifles of the same caliber, it was called the 45-70-300 Marlin. As a matter of confusing fact, the Sharps Rifle Co. designated this same 45-70 Govt. as the 45-2.1-inch Sharps. Winchester introduced the tapered cased 40-65 WCF, but Marlin loaded it with only 60 grains of powder for their rifle, so named it the 40-60 Marlin. They are nearly identical and are interchangeable. However, Winchester also introduced the 40-60 WCF, a shorter and quite different case than the so-called "40-60 Marlin." The 50-100, 50-105 and 50-110 Winchester are sometimes listed as different cartridges, but they are, in reality, just different loadings of the original 50-110. Confusing! To add a bit more to the mess, consider the "Everlasting" or heavy reloadable-type case that was popular for many years. These were so thick and heavy they didn't always have sufficient volume to hold the original powder charge. Manufacturers got around this by making the case a little longer than standard. This practice gave rise to all kinds of different calibers that are nothing more than a slightly lengthened version of something else. Trying to tie the standard original and the longer reloadable version together is often difficult. We have attempted to unravel as much of this confusion as possible.

Bullet diameter, as listed in most cartridge books, is based on that portion protruding from the case mouth. This is all right for identification purposes, but not much help to the man trying to load ammunition. Bullet diameter, as given here, is that recommended for loading and shooting and is related to average groove diameter. It was obtained by measuring bullets removed from factory ammunition or from old Ideal catalogs or manufacturers' specifications. Ideal catalogs had a reference table listing various cartridges and the loading tool and standard bullet furnished. This is a good index for bullet diameter in any given caliber, but there was considerable variation in old rifle bores. It is a good idea to measure the bore diameter before you order a mould, just to be on the safe side. If you can't figure out the caliber of your rifle, have it checked by a gunsmith or make a chamber cast and measure it. A comparison of the chamber dimensions with the cartridge dimensions in this or other chapters should allow you to determine the caliber of almost any rifle. These cartridge dimensions will also assist in making up ammunition for the old-timers, or determining the caliber of unmarked cases.

Chamber Casting

In making chamber castings one can use lead alloy (not recommended), sulphur, or a low melting point bismuth alloy.

Flowers of sulphur, obtainable at any drugstore, is fairly satisfactory. However, sulphur casts are extremely brittle and prone to breakage while being removed from the chamber or during later handling. The sulphur solution (4 ounces of sulphur, a pinch of lampblack and about a teaspoon of camphor) must be heated very slowly with continuous stirring. When completely molten, it is ready for pouring into the chamber. It should be poured quickly and allowed to cool thoroughly before any attempt to remove the cast is made.

The chamber must be thoroughly cleaned and then lightly oiled before pouring. The bore should be plugged forward of the chamber, thus also giving you a cast of the bore for measurement, with a tightly fitting cork attached to a piece of wire extending from the breech. A finger loop on the end of the wire mandrel aids in removing the cast.

The most satisfactory and durable chamber casts are accomplished with chamber cast metal available from gunsmith supply houses. These are bismuth alloys, and casts made from them can be remelted for repeated use. Oil the chamber and throat as above. One of the typical bismuth alloys used for chamber castings is Cerrosafe, available from Brownells, Montezuma, Iowa. This alloy

has a pouring temperature of 190 degrees Fahrenheit, or 22 degrees below the boiling point of water. Care should be taken that the material is not over-heated, as this prevents its being reused. It shrinks slightly for a few minutes after it hardens, which simplifies removal of large or long casts. Measurements made approximately 1 hour after removal will give the truest dimensions. Surfaces of bismuth alloy casts are very smooth, unlike those of lead alloy which are almost always badly wrinkled.

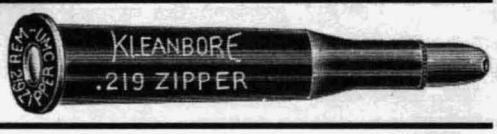
Blackpowder Loads and Shooting

Although there is considerable difference in knockdown or killing power between some of the blackpowder sporting cartridges, there is not much variation in effective range. There are plenty of stories about old buffalo hunters killing game at ranges of 1/2-mile or more, and there may be an element of truth in this. Some of the big-bore match cartridges were used for 1000- and even 1400-yard shooting. Buffalo hunters, generally professionals who had spent years in the field, must have developed a keen ability for estimating distance. On the target range, distance was known and the rifle sighted-in before the match started. Many people can't tell 100 feet from 100 yards in the field and that is why blackpowder rifles, with their rainbow trajectories, are restricted to an effective game range of not much over 150 yards. An experienced hunter or anyone who has practiced with his rifle and knows how to judge distance with reasonable accuracy can, of course, do much better than this. Blackpowder cartridges below about 38-caliber are mostly for small or medium game. Above this are many good short- to medium-range deer and black bear calibers. The big and long 45- to 50-caliber numbers would knock the stuffing out of the largest moose or grizzly bear that ever lived. All you have to do is hit him in the right place.

Loading ammunition for blackpowder rifles requires caution if you intend to use smokeless powder. Velocity and pressure must be kept at the original level in most rifles as a matter of safety. Jacketed bullets and high velocity are out of the question unless you have a modern action and a smokeless steel barrel. A few of the old actions are strong enough to be rebarreled to modern calibers, but most are not. Among the strongest are the Peabody-Martini, Remington rolling block and Hepburn, Sharps-Borchardt, Stevens 44 1/2 and the Winchester single shot. Late models of these are as strong as many modern actions, but early models don't have the improved smokeless steel and caution is advisable. **The weakest of the lot are the U.S. 1866 and 1873 Springfield, Kennedy, Whitney, and the Winchester Models 1873 and 1876. Nothing but very light loads of smokeless powder should be used in these and it is better to stick to blackpowder.** Also, don't use a smokeless charge given for one bullet weight with a heavier bullet as this will raise pressure, perhaps beyond safe limits. Old cartridge cases are often of the folded-head (balloon) type and not very strong and, since blackpowder residue is corrosive to brass, inspect your cases very carefully. It is actually better and safer to use modern-made brass in original or reformed cases if at all possible. Noncorrosive primers don't leave chloride salts in the bore, hence, reduce corrosion, but they also raise pressure, so bear that in mind when working up loads. Shooting blackpowder rifles and cartridges is lots of fun, and there is no reason for it to be any more dangerous than shooting modern rifles. On the other hand, it requires common sense and a knowledge of what you are trying to do. If in doubt, don't!!! Ask a good gunsmith and follow his advice—it's cheaper in the long run.

Shooting old blackpowder rifles has become such a popular pastime that furnishing ammunition for these obsolete guns is a growing business. As a further aid in obtaining ammunition, get a copy of the book, *Cartridge Conversions* by the late Maj. George C. Nonte, Jr. This will tell you how to make, via reforming, most of the non-existent blackpowder cartridges. An article in the 1962, 16th Edition of the *Gun Digest* by Nonte will provide a good introduction to this subject. The Lyman *Reloaders Handbook* and the NRA—*Illustrated Reloading Handbook* (out of print) also have much valuable information on making and loading obsolete cartridges. It is not surprising to see replicas of some of the more popular blackpowder cartridge rifles being manufactured, following the success with percussion replica arms. Bell Basic Brass (formerly Brass Extrusion Laboratories) and now called M.A.S.T. Technologies made 45- and 50-caliber brass cases from which many obsolete blackpowder cartridges could be formed. Further information can be found under individual cartridges in this chapter. Red Willow Tool and Armory and Bertram Bullet Company currently manufacture many obsolete American and British obsolete cartridges. These can be obtained from Huntington's (601 Oro Dam Blvd., Oroville, CA 95965) or The Old Western Scrounger (12924 Hwy. A-12, Montague, CA 96064).

219 Zipper



Historical Notes The 219 Zipper was brought out in 1937 by Winchester for their Model 64 lever-action rifle, which was a modernization of the Model 94. As with the 218 Bee, the lever action did not prove sufficiently accurate for long-range shooting on small targets and in addition did not allow the proper mounting of telescopic sights. Winchester discontinued the Model 64 after WWII. The last commercial rifle chambered for this cartridge was the Marlin Model 336 lever action, discontinued in this caliber in 1961. A number of custom-made single shot and Krag-Jorgensen rifles have been made for the 219 Zipper. It is not and never has been very popular, largely because of the rifles available. It is based on the necked-down 25-35 WCF case. Winchester dropped the 219 Zipper in 1962, and Remington followed shortly thereafter.

General Comments In a good solid-frame single shot or bolt-action rifle, the 219 Zipper is just as accurate as any other high-velocity 22 in its class. Since it was designed for tubular magazines, all factory-loaded ammunition is furnished with flat- or round-nosed bullets, and this causes rapid velocity loss. Although overshadowed by the 222 Remington, it is still an entirely satisfactory small game, varmint or target cartridge when used in a suitable action. It is one of the few American cartridges that will work well in the British Lee-Enfield action, and some of these rifles have been rebarreled and altered to handle the Zipper. It is just as good on any count as the 222 Remington, but is handicapped by being rimmed and hence not suitable for modern Mauser-type bolt-action rifles. The Marlin Model 336 permitted the proper positioning and use of scope sights, and this has added to the usefulness of the Zipper to those who favor the lever action. The Zipper has adequate power for small game and varmints up to, but not including, deer.

219 Zipper Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
45 SP	IMR 4320	30	3600	1295	Hornady
45 SP	BL-C	27	3400	1152	Hornady
45 SP	H-380	30.5	3500	1224	Sierra
50 SP	IMR 3031	26	3400	1284	Sierra
50 SP	H-380	31	3500	1360	Sierra, Hornady
55 SP	IMR 4320	29	3300	1330	Hornady, Sierra
55 SP	H-380	30	3300	1330	Hornady, Sierra
55 SP	IMR 4320	27	3300	1330	Sierra
60 SP	IMR 4064	28	3300	1451	Hornady
60 SP	H-380	31	3300	1451	Hornady
55 SP	FL		3110	1200	Factory load

22-15-60 Stevens

Historical Notes One of a number of cartridges for the Stevens 44 or 44½ series of single shot rifles, this cartridge was introduced by Stevens in 1896. Actual design is credited to Charles H. Herrick of Winchester, Massachusetts. It did not enjoy a particularly long life as most shooters preferred the 25-21 or some of the larger calibers. Many shooters claimed the 22-15 Stevens gave better accuracy than the 22 WCF.

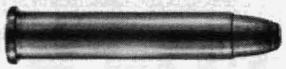
General Comments This is an improved centerfire 22 of substantially better killing power than other 22s of its day. With the heavy 60-grain bullet, it would shoot relatively flat for 125 yards or so. As a target or match cartridge, most of the blackpowder 22s fouled the bore badly and required frequent cleaning. Most shooters preferred the larger calibers of from 25 on up. The 22-15-60 was displaced by the 22 WCF and smokeless powder developments in the rimfire group. Original primer was the 1½ size, the same as our modern Small Rifle or Pistol primer of .175-inch diameter. Charge was 15 grains of FFFFg or FFFg. Lyman No. 22636 or 22637 in 54- to 60-grain weight is the proper bullet if you should have one of these old rifles in shooting condition.

22-15-60 Stevens Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
60 Lead	Unique	3.4	1070*	152	Lyman #22636
60 Lead	FL(FFg	15)	1150	176	Factory load

*Estimated

22 Extra Long Centerfire (Maynard)



Historical Notes The 22 Extra Long centerfire is one of a series of cartridges for the Model 1882 Maynard single shot hunting and gallery rifles. It is, in effect, a centerfire version of the 22 rimfire Extra Long. It originally used the small number 0 primer which has not been manufactured for many years. It was replaced by the longer 22 centerfires and the 22 WCF. Ballard and Stevens rifles were also available in this caliber.

General Comments Powder charge varied from 8 to 10 grains of FFFg or FFFFg black or semi-smokeless powder. Case lengths of $1^{5}/_{32}$ inches to $1^{1}/_{4}$ inches will be encountered. Three or 4 grains of IMR 4756 shotgun powder makes a fairly satisfactory load. Lyman's No. 228151 (45-grain) bullet is proper for this cartridge.

22 Extra Long Centerfire (Maynard) Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
45 Lead	FL (FFFg 8-10)	1100	122	Factory load

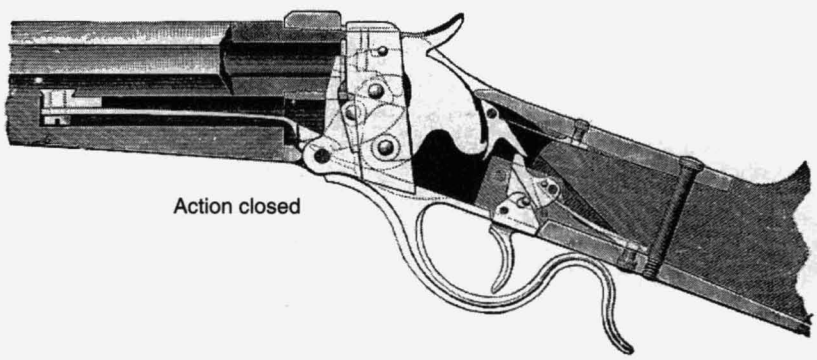
22 Winchester Centerfire (22 WCF)

Historical Notes The 22 WCF was introduced in 1885 as one of the original cartridges for the famous Winchester single shot rifle, first manufactured in that year. It was also chambered in the Remington No. 7 rolling block rifle in 1904. It was actually too long for most of the short repeating actions of the day, although Winchester once cataloged it for the Model 1873, so its use was confined mostly to single shot rifles. It is the predecessor of the 22 Hornet.

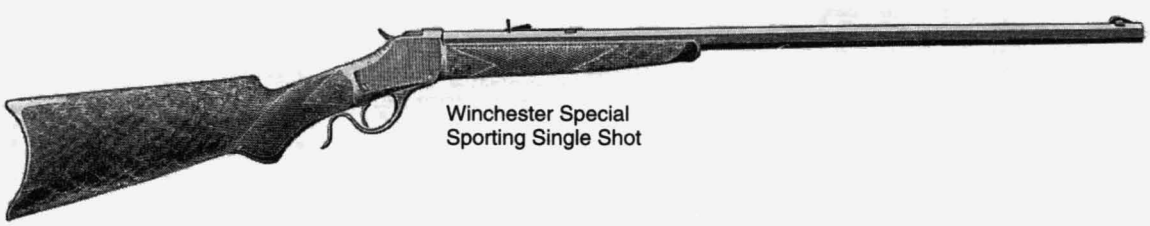
General Comments The 22 WCF enjoyed considerable popularity as a target, small game and varmint cartridge until 1925. Winchester advertised it as a 200-yard cartridge, but with its midrange trajectory of some 13.5 inches, it was more of a 100- to 125-yard number. Although originally a blackpowder cartridge, it was loaded in smokeless version with identical ballistics. In Europe it was stepped up to about 1700-1800 fps and used in drillings or other combination guns. The 22 WCF was discontinued in 1936.

22 Winchester Centerfire Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
45 SP	Unique	4	1500	226	
45 SP	2400	6	1650	273	
45 Cast	FFg	13.0	1560	244	Lyman #228151
45 Lead	FL	(FFFg 13)	1540	240	Factory load

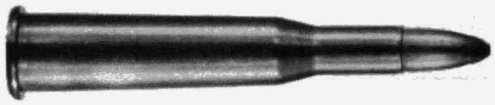


Action closed



Winchester Special
Sporting Single Shot

22 Savage High-Power (22 High-Power)



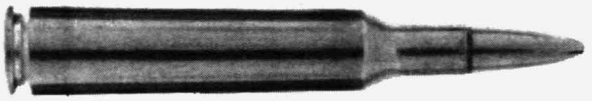
Historical Notes Designed by Charles Newton and introduced as a commercial cartridge by Savage Arms Co. in their Model 99 lever-action rifle about 1912. The cartridge was first called the "Imp." In the United States only Savage produced a commercial rifle in this caliber, although a great many custom rifles were chambered for it. In England the BSA Martini single shot was chambered for it about 1912. In Europe it is known as the 5.6x52Rmm and has been chambered in various drillings or combination rifle and shotgun arms. The 22 Savage is based on the 25-35 case necked-down. It has been obsolete since the 1930s. Norma still manufactures ammunition in this caliber.

General Comments The 22 Savage High-Power enjoyed considerable popularity through the early 1900s. Unfortunately, like some later high-velocity 22s, it did not prove very accurate in some of the lever-action rifles chambered for it. The bullets then available may have held some share of the blame. It was originally advertised as a small game and deer cartridge, but it quickly proved to be rather undependable on the latter. Nonetheless, the 22 Savage was used in Africa and Asia on such unlikely beasts as lion and tiger, with some glowing reports on its effectiveness. It is a perfectly adequate small game and varmint cartridge, but no big game number by any standard. It has been rendered obsolete by new and much improved modern cartridges such as the 222 Remington. For single shot rifles, most modern shooters prefer the 225 Winchester because of the availability of ammunition and cases, plus the fact that the 225 uses standard .224-inch diameter bullets, as opposed to the .228-inch bullets of the 22 Savage.

22 Savage High-Power Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
55 SP	4895	27	2870	1106	
55 SP	3031	30	3260	1291	
55 SP	H-380	29	3200	1249	
70 SP	RL-7	23	2900	1308	Hornady
70 SP	IMR 4198	23	3000	1399	Hornady
70 SP	IMR 3031	27	3100	1494	Hornady
71 SP	FL		2790	1228	Norma factory load

244 Remington



Historical Notes The 244 Remington was introduced by Remington in 1955 in their Model 722 bolt-action rifle. The cartridge is based on the 257 Roberts necked-down to 6mm. It was actually originated as a wildcat by Fred Huntington of Oroville, California. The wildcat version preceded the factory design by several years and was called the 243 Rockchucker. Only Remington chambered the 244 among American manufacturers, but several European-made bolt-action rifles were available in this caliber.

General Comments The 244 Remington is ballistically almost identical to the 243 Winchester. The only notable difference is that Remington made their 6mm rifles with a 12-inch twist (one turn in 12 inches), whereas Winchester adopted a 10-inch twist for their 6mm. The faster twist rate of the Winchester enabled use of 100-grain bullets for deer whereas the slower twist of the Remington did not. The net result is that the 244 Remington will not stabilize spitzer bullets over 90 grains in weight while the 243 Winchester does very well with 100- or even 105-grain bullets. The reason for this is that a quick twist of 1 in 10-inches or better is required to stabilize long, heavy bullets. Remington looked on the 6mm as largely a varmint and small game development and concluded that anything beyond the 90-grain bullet was unnecessary. Winchester, on the other hand, decided the 6mm was very much a big game cartridge and therefore the heavier bullets would be highly desirable. Who was right? It appears as if something like ten 243 Winchester-chambered rifles were sold for one 244 Remington. Remington changed to a 9-inch twist at the last, but too late to rescue the 244 from oblivion. What Remington did to extricate themselves from this dilemma was to change the name of the 244 to the 6mm Remington and make all such rifles with a 1 in 9-inch twist. Remington was the only commercial manufacturer of this caliber. (Since, with lighter bullets, the 6mm Remington is interchangeable with the 244 Remington, then strictly speaking only the headstamp is obsolete.)

244 Remington Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
75 HP	IMR 4831	48	3300	1814	Speer, Hornady
75 HP	IMR 4350	47	3400	1926	Nosler, Sierra
75 HP	H-380	42	3150	1653	Hornady
90 SP	IMR 4831	47	3200	2047	Speer, Sierra, Hornady
90 SP	IMR 4350	44.5	3100	1921	Sierra, Speer, Hornady
90 SP	H-380	39	3000	1799	Sierra, Speer
90 SP	IMR 3031	36.6	3000	1799	Sierra
75 SP	FL		3500	2040	Remington factory load
90 SP	FL		3200	2050	Remington factory load

6mm Lee Navy

Historical Notes The 6mm Lee cartridge (also known as the 236 Navy) was used in the 1895 Lee Straight Pull bolt-action military rifle manufactured by Winchester for the United States Navy. About 15,000 of these rifles were made and used by the Navy on a trial basis. Winchester, Remington and Blake also chambered sporting rifles for this cartridge. No factory-loaded ammunition has been available since 1935.

General Comments The 244 or 6mm caliber was revived in two cartridges introduced by Remington and Winchester in 1955, the 244 (now the 6mm Remington) and 243. The 6mm Lee cartridge died out mainly because it was too far ahead of its time. The powders available in 1895 were not suitable to this small caliber. A few shooters who have old rifles for this round reload and use it for hunting. It is a good varmint, medium game, deer, black bear and antelope cartridge at moderate ranges. It is not as powerful as the 6mm Remington or the 243 Winchester. By increasing the rim to fit the standard Mauser bolt face and necking the case to accept 0.224-inch bullets, Winchester created the 220 Swift.

6mm Lee Navy Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
75 SP	IMR 3031	37	3300	1809	Ackley
95 Cast	Unique	5.0	1200	305	Lyman #244203
100 SP	IMR 4895	34	2680	1595	
112 SP	IMR 3031	30	2650	1895	Ackley
112 SP	IMR 4895	34	2670	1946	
112 SP	FL		2560	1635	Factory load

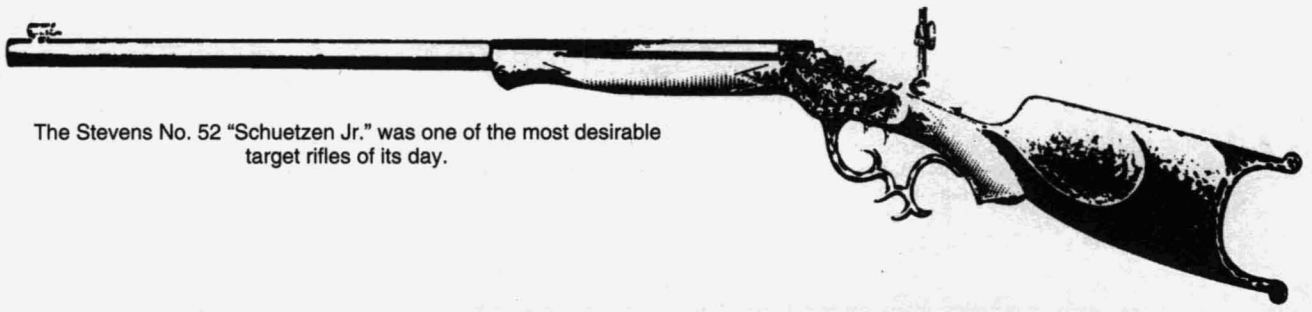
25-20 Single Shot

Historical Notes Designed by J. Francis Rabbeth, a gun writer at the turn of the century who used the pen name of J. Francis, the 25-20 Single Shot first appeared about 1882, and was one of the first centerfire, 25-caliber wildcats. The first commercial cartridges were loaded by Remington (UMC), and shortly thereafter Maynard, Remington, Stevens and Winchester chambered single shot rifles for the round. No commercial rifles have been available in this caliber since the late 1920s and the manufacturers stopped loading this number in the mid '30s. Bell Basic Brass (now M.A.S.T. Technologies and formerly Brass Extrusion Laboratories, Ltd.) turned out at least one run of 25-20 Single Shot brass in 1987 and 1988.

General Comments The 25-20 Single Shot was too long to work through the action of the Winchester Model 1892, so Winchester designed the 25-20 WCF or Repeater version, a shorter, more bottlenecked case. The 25-20 SS is quite accurate and was used almost entirely in single shot rifles. As a varmint or small game cartridge, it is in the same class as the 25-20 WCF. At one time there was a good deal of leftover ammunition on the dealer's shelves, but as this cartridge is the base for forming the once-popular 2R Lovell wildcat, most of this was bought up by 2R fans. Most rifles for this cartridge have been rechambered for the still available 25-20 WCF.

25-20 Single Shot Lading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
60 SP	2400	8.0	1535	310	Ackley
65 Cast	2400	8.0	1620	380	Lyman #257420
86 SP	4227	8.5	1400	370	Ackley
86 SP	FL		1410	380	Factory load

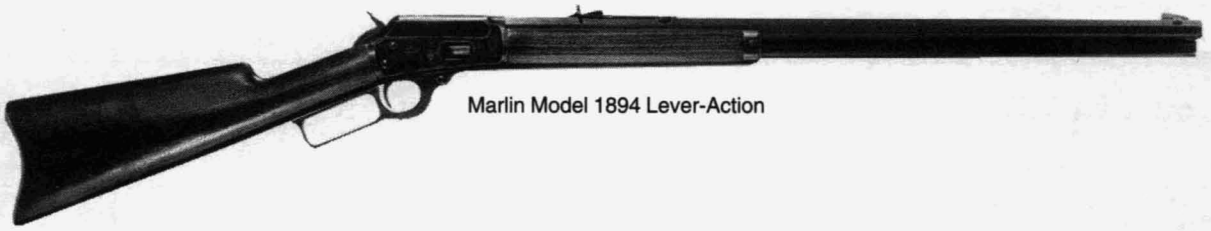


The Stevens No. 52 "Schuetzen Jr." was one of the most desirable target rifles of its day.

25-20 Marlin

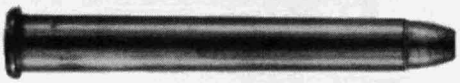
Historical Notes This cartridge was loaded for the Marlin repeating rifle Model 1894. Winchester loaded the 25-20 Marlin beginning around the turn of the century and until about WWI. It is nothing more than a special version of the 25-20 Winchester, except perhaps for the bullet nose shape, seating depth and the 25-20 Marlin headstamp. It is otherwise identical to the current 25-20 Winchester. In 1916 Winchester offered five versions of this cartridge: lead, blackpowder (86 grains, 17 grains); softpoint, smokeless; full-patch, smokeless; high-velocity softpoint; and high-velocity, full-patch.

General Comments Evidently sales of Marlin's Model 1894 rifles generated sufficient demand for special versions of the cartridges for which that rifle was nominally chambered or perhaps cartridges with slightly different bullet shapes or loading lengths were found to function better in it. There must have been some good reason, for Winchester's 1916 catalog shows separate cartridge loadings with the following names: 25-20 Marlin, 32-20 Marlin, 38-40 Marlin and 44-40 Marlin. It is possible the 25-20 Marlin was somehow unique from the 25-20 Winchester because the catalog does not specify adaptation to Winchester rifles, as it does with the others. Also, Winchester showed the same blackpowder load and bullet weight for both the 25-20 Winchester and the 25-20 Marlin. The 32-20, 38-40 and 44-40 were unique loadings.



Marlin Model 1894 Lever-Action

25-21 Stevens



Historical Notes The 25-21 Stevens was developed about 1897 as a shortened version of the slightly older 25-25. First introduced for the 44 Stevens rifles and later available in the 44½ series, it was designed by Capt. W.L. Carpenter of the 9th U.S. Infantry, who also designed the 25-25 Stevens. The Remington-Hepburn was available in various models for the 25-21, and it was a popular target and small game number. Many shooters of the period disliked the bottlenecked case and the 25-21 was intended as a straight case version of the 25-20 SS.

General Comments The 25-21 was noted as a very accurate cartridge, reportedly capable of ½-inch, 100-yard groups. It gave about the same performance as the 25-20 SS, but was much too long for the standard repeating actions. It is easy to reload and quite pleasant to shoot. Use Lyman No. 25720 flatpoint or No. 25727 hollowpoint cast bullets. The former weighs 86 grains, the latter 75 grains. Twenty to 23 grains of FFFg blackpowder can be used or the light smokeless loads listed below.

25-21 Stevens Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
86 Lead	2400	9	1610	498	
86 Lead	Unique	5	1500	434	
88 Cast	Unique	5.5	1440	406	Lyman #257231
86 Lead	FL		1470	415	Factory load

25-25 Stevens

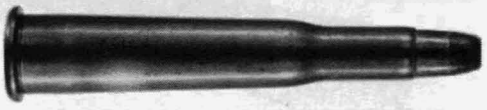
Historical Notes The 25-25 was the first straight shell manufactured for Stevens. Designed by Captain Carpenter in 1895, Stevens introduced it for their Model 44 single shot rifles and for the 44½ series after this action was marketed in 1903. It was also a standard caliber for some of the Remington-Hepburn target rifles. It was fairly popular, but the shorter 25-21 developed practically the same performance and was a little cleaner shooting.

General Comments A very freakish appearing cartridge with its excessive length-to-diameter ratio, it is the 25-21 with about ½-inch added to its overall length. The late Phil Sharpe wrote (*The Rifle in America*, 1938) that the 25-25 gave great extraction trouble and that is why the shorter 25-21 was developed. However, modern users say this is not so, although the 25-25 fouls the bore a little more than the 25-21. It is highly probable the 25-21 was developed because it was found that 20 or 21 grains of powder gave practically the same ballistics as the extra 4 grains or so. You can use any 257 bullet of from 60 to 86 grains weight, the gascheck type preferable with smokeless powder.

25-25 Stevens Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
86 Lead	Unique	5.5	1525	448	
86 Lead	IMR 4198	10.2	1520	446	
86 Lead	FL		1500	434	Factory load

25-36 Marlin



Historical Notes This cartridge, adopted by Marlin in 1895 for their lever-action Model 93 rifle, was designed by William V. Lowe a year or so prior and originally called the 25-37. It was probably inspired by the 25-35 Winchester. The two are very similar but not interchangeable although the 25-35 can be fired in the slightly longer 25-36 chamber. The 25-36 Marlin was loaded in smokeless version and survived until the early 1920s.

General Comments The 25-36 and the 25-35 WCF are similar, however, many rifles for the Marlin cartridge were not strong enough to withstand maximum loads safely. In general, one should not exceed 2000 fps velocity with the 25-36. It is not an adequate deer cartridge, and its use should be confined to small or medium game. Used in the lever action, it did not acquire a reputation for outstanding accuracy.

25-36 Marlin Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
87 SP	IMR 3031	20	2010	770	
117 SP	IMR 3031	20	1800	845	
117 SP	FL		1855	893	Factory load

Marlin Model 1893 Special Lightweight Rifle

256 Winchester Magnum

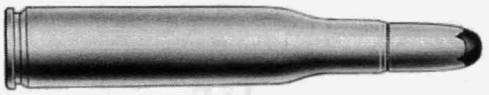
Historical Notes The 256 Winchester Magnum was announced in 1960 as a new handgun cartridge; however, the only handgun that chambered it was the single shot, enclosed-breech Ruger "Hawkeye" introduced in late 1961. The 256 Winchester Magnum is listed as a rifle cartridge because Marlin produced their Model 62 lever-action rifle in this caliber and Universal Firearms made the semi-auto "Ferret" on the M1 Carbine action. The Marlin rifle was available about a year after the Ruger "Hawkeye" and both were discontinued after a relatively short production life. The Thompson/Center Contender, a single shot pistol, was also available for this round. The cartridge is based on the necked-down 357 Magnum revolver case.

General Comments As a rifle cartridge, the 256 is considerably more potent than the 25-20 and several jumps ahead of the 22 Hornet or the 218 Bee. The factory-loaded 60-grain bullet develops over 2760 fps muzzle velocity when fired from a 24-inch rifle barrel. This offers 1015 foot pounds of muzzle energy, which is well above the Hornet or the Bee. The 256 Magnum is an effective varmint cartridge out to ranges of 200 yards. It can be handloaded with heavier 75- or 87-grain bullets to velocities of 2500 and 2230 fps respectively. Although a good varmint and small game caliber, it is not an adequate deer cartridge and most states won't allow its use for this purpose. This caliber is now obsolete. Winchester was the only commercial manufacturer to offer the 256 Winchester Magnum but discontinued it in the early 1990s.

256 Winchester Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
60 SP	H-4227	14	2500	833	Hornady
60 SP	H-4227	16	2800	1045	Hornady
60 SP	2400	14	2600	901	Hornady
75 HP	H-4227	14	2400	958	Hornady
75 HP	IMR 4227	15.5	2500	1041	Sierra
87 SP	IMR 4227	14	2200	935	Sierra
87 SP	H-4227	14	2200	935	Hornady
60 SP	FL		2760	1015	Winchester factory load

25 Remington



Historical Notes The 25 Remington is one of a series of rimless cartridges developed for the Model 8 autoloading rifle and later used in other Remington rifles. It was introduced in 1906. The Remington Model 14 slide action, Model 30 bolt action and the Stevens Model 425 lever action also used the 25 Remington. No rifles have chambered this cartridge since 1942, and the ammunition companies stopped loading it about 1950.

General Comments The 25 Remington is nothing more than a rimless version of the 25-35, but differs slightly in shape. The two are not interchangeable. Since the Remington line of rifles, particularly the Model 30 bolt action, would stand higher pressures than the lever action, it is possible to get slightly better performance out of the 25 Remington. However, the difference is not sufficient to make the rimless version anything but a barely able deer cartridge. It will do for varmints and small to medium game quite well and deer in a pinch, provided the hunter is a good shot. The 30-30 is a better cartridge for anything, and the 25 Remington is hardly in the same class as the 250 Savage or the 257 Roberts.

25 Remington Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
60 SP	H-4895	31	2900	1121	Hornady
60 SP	IMR 4320	32	2900	1121	Hornady
117 SP	H-4895	26.5	2200	1258	Hornady
117 SP	IMR 3031	25.5	2300	1375	Hornady
100 SP	FL		2330	1216	Factory load
117 SP	FL		2125	1175	Factory load

Remington Model 8 Rifle

256 Newton

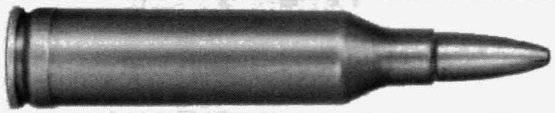
Historical Notes One of several high-velocity, rimless cartridges designed by Charles Newton for his bolt-action rifles, the 256 Newton was introduced in 1913 by the Western Cartridge Company. Until the 264 Winchester Magnum came along in 1958, this was the only American-designed 6.5mm to be offered on a commercial basis. The last of the Newton rifle companies failed in the early 1920s, and Western quit loading Newton cartridges in 1938. The 256 Newton is based on the 30-06 case necked-down.

General Comments The 256 Newton has hung on as a wildcat cartridge and occasional custom rifles are made for it. Cases can be made by necking-down, reforming and shortening 30-06 brass. This is a good cartridge and is adequate for practically all North American big game, but it is not as effective as the 270 Winchester. With modern, slow-burning powders, its performance can be improved over the original factory ballistics.

256 Newton Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
120 SP	IMR 4350	55	2980	2362	
130 SP	IMR 4895	46	2900	2425	
140 SP	IMR 4831	57	2890	2598	
129 SP	FL		2760	2180	Western factory load

6.5mm Remington Magnum



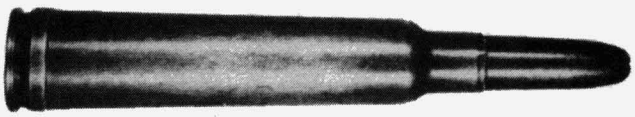
Historical Notes The 6.5mm is a Remington innovation introduced in 1966 for their Model 600 carbine. The 6.5mm Remington Magnum is based on the 350 Remington Magnum case necked down to 6.5mm (.264-inch). The Remington Model 600 carbine had an 18½-inch barrel and the later 660 carbine a 20-inch barrel. Neither of these carbines allowed the cartridge to develop its full velocity potential and both were discontinued. By 1971, only the Remington Model 700 and 40-XB target rifle with 24-inch barrels were cataloged as available in 6.5mm Magnum caliber. For a short time, the Ruger Model 77 was offered in this caliber. All of the rifles referred to are bolt actions. At the present time, no one offers rifles chambered for the 6.5mm Remington Magnum. Remington has discontinued ammunition in this caliber.

General Comments The 6.5mm Remington Magnum has greater case capacity and develops higher velocity than any of the European military 6.5s. It is an excellent cartridge for North American big game and can double as a varmint cartridge by handloading the lighter bullets. Probably one reason it never achieved great popularity was because the rifles it was offered in had short magazines which required deep seating of heavier bullets with a consequent loss in powder capacity and performance. Combined with the short barrels of the Remington Model 600 and 660 carbines, this added up to ballistics well below the 30-06 class of cartridges. In a standard long action that will allow seating heavier bullets farther out, one can approach the performance of the 270 Winchester. With the proper bullet, the 6.5mm Magnum is adequate for North American big game at moderate ranges under normal hunting conditions. Unfortunately, this is another case of a basically good cartridge that didn't catch on. At one time, Remington offered two bullet weights, a 100-grain bullet at an advertised muzzle velocity of 3450 fps and a 120-grain bullet at 3220 fps. The older 6.5mm cartridges gained their reputation with heavier bullets of 140 to 160 grains—the lack of such a factory load is very likely another reason for the demise of the Remington version. Early factory advertised ballistics were based on a longer than standard barrel and were, therefore, unrealistic. This caliber is now obsolete.

6.5mm Remington Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
85 SP	IMR 4350	57	3100	1814	Sierra
100 SP	H-4831	56.2	3200	2274	Hornady
100 SP	H-380	51.5	3100	2134	Sierra
120 SP	IMR 4831	55	3000	2399	Speer
129 SP	H-4831	54	3000	2579	Hornady
140 SP	IMR 4831	52	2750	2352	Speer
160 SP	H-4831		2800	2786	Hornady
120 SP	FL		3210	2745	Remington factory load

275 Holland & Holland Magnum (275 H&H Magnum)



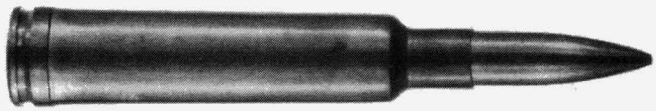
Historical Notes First loaded in Great Britain about 1912, this caliber was introduced in the U.S. by Western Cartridge Co. in 1926. Western loaded this cartridge only with the 175-grain bullet until production was discontinued in 1939.

General Comments The 275 H&H was never particularly popular in this country. It resembled the 280 Ross, but did not give the velocity of the Ross. Its chief advantage over other 7mm calibers was its ability to handle a 175-grain bullet at increased velocity. The Western cartridge loading, with a 175-grain soft-point boattail bullet gave a muzzle velocity of 2690 fps, a muzzle energy of 2810 and a mid-range (iron sight) trajectory at 100 yards of 0.7-inch. Loading data and cartridge dimensions will be found in Chapter 8.

275 H&H Magnum Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
140	4064	48.0	2810	2455	Ackley
160	4350	59.0	3050	3305	Ackley
180	4350	58.0	2850	3245	Ackley
195	4350	52.0	2671	3090	Ackley

7x61mm Sharpe & Hart Super



Historical Notes The 7x61mm was developed in the United States by Philip B. Sharpe and Richard F. Hart. Its design was originally based on a rimless, experimental French 7mm semi-auto military cartridge. It was copyrighted and made available on a commercial basis in the Schultz & Larsen rifle in 1953. Ammunition was loaded and imported by Norma. The final version had a belted case with "Super" added to its name. Loaded ammunition is again available through Norma, who is now offering a 154-grain bullet, instead of the original 160-grain.

General Comments The 7x61mm Sharpe & Hart (now listed as the S&H Super) is very similar to the 275 H&H Magnum, a belted case chambered and loaded in England. It is in the short 7mm magnum class and its performance is the same as a number of other wildcat cartridges, based on the blown out and shortened 300 H&H Magnum case. However, the Sharpe & Hart case has a slightly larger rim and base diameter than the 300 H&H. This cartridge is quite popular in Canada, but its popularity in the United States was limited by competition from the 7mm Weatherby Magnum, the 7mm Remington Magnum and various wildcats. The 7mm S&H is, nonetheless, a fine cartridge for any North American game and most African plains game. The fact that Norma is once again loading ammunition will be good news for those who have rifles of this caliber.

Like any of this ilk, this number can be somewhat hard on its barrel, especially with either careless shooting, not allowing plenty of time between shots for barrel cooling, or inadequate cleaning. And, like all similar chamberings, it loses significant velocity with barrels shorter than 24 inches. Actual ballistics may be closer to the 7mm Weatherby than factory data suggests.

7x61mm Sharpe & Hart Super Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
120 SP	IMR 4350	64	3300	2902	Sierra
140 SP	IMR 4831	63	3100	2988	Sierra
140 SP	IMR 4350	62.5	3200	3184	Hornady, Sierra
150 SP	IMR 4831	64.5	3100	3202	Sierra
160 SP	IMR 4350	58	2900	2989	Hornady, Sierra
175 SP	IMR 4350	60.5	2900	3269	Hornady
154 SP	FL		3060	3200	New Norma factory load
160 SP	FL		3100	3410	Old Norma factory load

280 Rimless (Ross) See Chapter 8.

28-30-120 Stevens

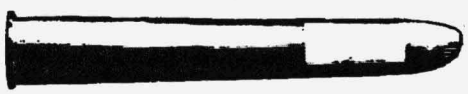
Historical Notes The 28-30 was probably the first American-designed, commercial 7mm cartridge. Introduced by the J. Stevens Arms & Tool Co. in 1900, it was designed by Charles H. Herrick of Winchester, Massachusetts. Both 44 and 44½ Stevens rifles were chambered for the round. It was an early favorite of Harry M. Pope, who made up and fitted barrels to a variety of single shot actions in this caliber. As a match cartridge, it established a reputation for exceptional accuracy.

General Comments Remington made the first factory loads for the 28-30, and these used the 120-grain bullet and 30 grains of Fg blackpowder. By 1918 it was no longer listed in the Remington catalog. Some match shooters who used the 28-30 considered it superior to the 32-40 out to 300 yards. It makes a good 150-yard small game or varmint cartridge. Lyman No. 285222 or 285228 is the proper cast bullet, but one can use any standard 7mm bullet up to 180 grains weight. Don't use jacketed bullets in the old blackpowder barrels as they will wear the bore excessively and the fine accuracy may be destroyed within a few hundred rounds. Gascheck bullets are OK.

28-30-120 Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
135 Lead	Fg	28	1410	602	
135 Lead	IMR 4198	17	1500	605	
120 Lead	FL		1500	605	Factory load

30-30 Wesson

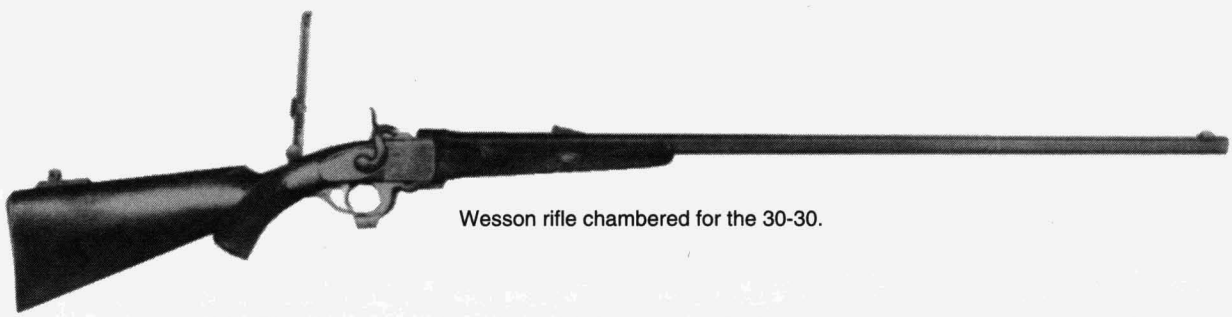


Historical Notes The 30-30 Wesson was used in rifles designed and marketed by Frank Wesson of Worcester, Massachusetts, who operated from the 1860s into the late 1880s. During the Civil War, the government purchased about 150 Wesson military carbines in caliber 44 rimfire. Some of the state militia also purchased Wesson carbines. His sporting rifles were marketed, in rimfire types, as early as 1861. As near as can be determined, the 30-30 Wesson was probably developed sometime around 1880. Frank Wesson was a brother of Daniel B. Wesson, co-founder of the firm of Smith & Wesson. Both Remington and Winchester made bullets and cases of this caliber, and U.S. Cartridge Co. catalogs listed it. Usable cases can probably be fabricated from 357 Maximum cases.

General Comments The most common Wesson rifle was a single shot with a double trigger arrangement. The forward trigger unlatched the breech, allowing the barrel to be tipped up for loading and unloading. Several models were marketed, including sporting and target types. There were, in addition, under-lever, falling block, solid-frame types that are quite scarce, as are the Wesson cartridges. The 30-30 Wesson is not the same as the 30-30 Winchester, and there is nothing to indicate that it had any influence on the design of the 30-30. Smokeless loads would not be advisable in this rifle.

30-30 Wesson Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
165 Lead	FL (Fg 30)	1250	1010	Factory load



Wesson rifle chambered for the 30-30.

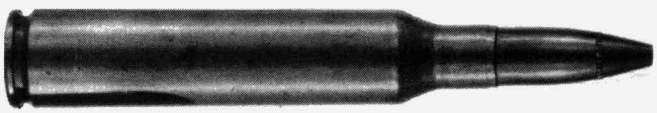
30-03 Springfield
30-03 Government

Historical Notes In 1903 the United States government adopted a new military loading to replace the 30 Army (30-40 Krag), which had been adopted in 1892. Like the 30-40 Krag, this new (30-Caliber, Model of 1903) cartridge featured a 220-grain round-nosed full metal jacket bullet. However, the '03 increased muzzle velocity by about 100 fps, even though the M1903 rifle featured a significantly shorter barrel. The rimless cartridge design, generously borrowed from Mauser, was also an improvement as it featured superior feeding from a box magazine. Nevertheless, as seems to have been typical in that era, the U.S. Army was slow to the task of modernizing. As the 30-03 was standardized, all other world powers were in the process of adopting spitzer bulleted military loadings. The brand new 30-03 became instantly obsolescent. A crash program was instituted and in 1906 a modified version of this basic cartridge was adopted as the 30 Caliber, Model of 1906. That loading featured a lighter spitzer bullet and a shorter case neck. The spitzer bullets had a much shorter bearing surface so the existing rifles were modified by turning back the barrels two threads and recutting the chambers.

General Comments Despite its short life, this cartridge, like the 30-06, found application in John M. Browning's Winchester Model 1895. Considering the ambitious pressure levels that were common in the early days of these chamberings, that was, perhaps, not such a good idea. For the handloader, case life could be extremely limited, owing to case stretching as a result of the rear lockup on those rifles. Compared to the 30-06, the 30-03 offers no advantage as a sporting round. Ammunition was available at least until WWI. By today's standards that is remarkable, for there were very few sporting rifles chambered for this cartridge and very soon after 1906 virtually all the 1903 Springfields had been converted to 30-06.

Winchester Model 1895 rifle.

30 Newton



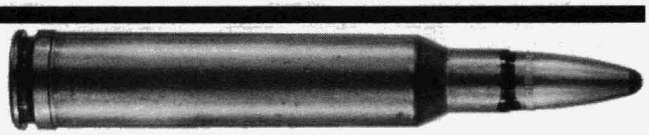
Historical Notes The 30 Newton was originally designed for Fred Adolph, and was called the "Adolph Express" when introduced in 1913. It was not until several years later that Charles Newton produced rifles for his own brainchild, and it received the inventor's name. The Western Cartridge Company produced the 30 Newton cartridge. No commercial rifle other than the Newton ever chambered it. Production of rifles ceased in the early '20s, and Western dropped the cartridge about 1938.

General Comments The 30 Newton is a rimless, magnum-type cartridge similar to the 30-06, but larger in diameter. Neither ammunition nor brass cases are readily available since it has been obsolete for over 50 years. A limited quantity of new brass cases was manufactured right after WWII by Richard Speer. The 30 Newton is powerful enough for any North American big game. The 300 H&H Magnum and 300 Weatherby Magnum outperform it even though its performance can be improved by handloading with modern powders.

30 Newton Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
150 SP	IMR 4320	67	3175	3361	
150 SP	IMR 4831	76	3100	3206	
180 SP	IMR 4320	62	2840	3235	
180 SP	IMR 4831	73	2890	3350	
200 SP	IMR 4350	66	2730	3318	
180 SP	FL		2860	3270	Western factory load

308 Norma Magnum

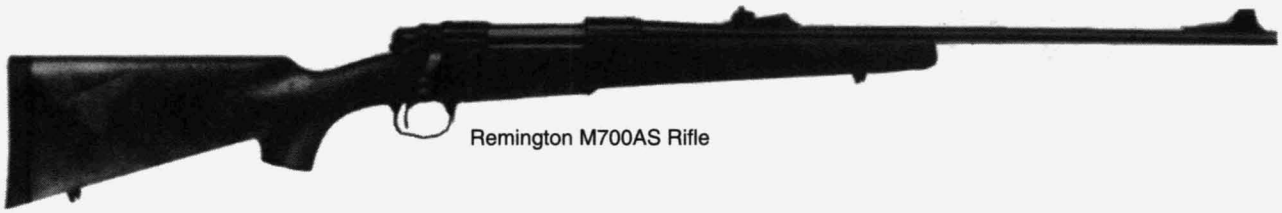


Historical Notes The 308 Norma Magnum was introduced in 1960 by A.B. Norma Projektilfabrik of Amotfors, Sweden. In its original form, this cartridge was something of a semi-wildcat, because only unprimed brass cases were available and no commercial rifles were chambered for it. However, about 18 months after it was introduced, Norma began producing factory ammunition in this caliber. Several European manufacturers chamber the round as standard or on order.

General Comments The 308 Norma Magnum is practically identical to the wildcat 30-338, which is the 338 Winchester Magnum necked-down to 30-caliber. However, the two cases are not interchangeable due to a difference in body length. Almost any standard-length 30-06 rifle can be rechambered to take the 308 Norma cartridge. This cartridge is also similar to a number of 30-caliber wildcat magnums based on the blown-out and shortened 300 H&H case, and known collectively as the 300 short magnum group. The 30 Luft, 300 Apex and Ackley Short 30 Magnum are representative of this class. Needless to say, the 308 Norma Magnum is adequate for any North American big game and should also do well on African plains game. Powder capacity is only a hair greater than the 300 H&H, but the shape of the case is radically different. This is a proprietary cartridge of European origin designed specifically for the American market. It is placed with the American cartridges because most U.S. readers will look for it here. Technically, it belongs in the chapter covering European cartridges.

308 Norma Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
100 SP	H-380	70	3500	2721	Speer
110 SP	IMR 4350	75.5	3400	2824	Sierra, Hornady
125 SP	IMR 4350	76	3400	3209	Sierra, Hornady
150 SP	IMR 4350	72	3200	3420	Hornady, Nosler, Sierra, Speer
150 SP	IMR 4831	73	3150	3306	Nosler, Speer
165 SP	IMR 4350	71	3100	3522	Sierra, Speer, Nosler
180 SP	IMR 4831	73	3000	3598	Sierra
220 SP	IMR 4350	68	2800	3831	Hornady
180 SP	FL		3100	3842	Norma factory load.



Remington M700AS Rifle

32-40 Remington

Historical Notes The 32-40-150 ($2^1/_8$ inches) Remington was one of the calibers for the single shot, rolling block Sporting Rifle No. 1, introduced in 1870. This cartridge appears to have been introduced shortly after the rifle, about 1871-72. The 32-40 Remington was also one of the calibers for the No. 3 Hepburn, and some of the Farrow single shot rifles. Other than this, no one else seems to have adopted it. Remington quit loading it in 1910.

General Comments This is a very odd-looking cartridge with a long tapered shoulder that merges imperceptibly with an elongated neck. It is usually listed as a straight case, but it isn't really straight and isn't exactly necked. It might best be described as a "taper-necked" case. On the dimensional chart it is shown as type "A", or rimmed, bottleneck, but this isn't 100 percent correct. The shoulder diameter is arbitrary since it is difficult to decide just where the shoulder begins. Although called a 32-caliber, the true bullet diameter is .308- or .309-inch, hence it is really a 30-caliber. It was both a hunting and target round of limited popularity. It lost out to the 32-40 Ballard which was available in both single shot and repeating rifles. It was a small to medium game cartridge, but was probably also used to some extent for hunting deer-size animals. Usable cases might be formed from either 30-40 Krag or 303 British brass.

32-40 Remington Loading Data and Factory Ballistics

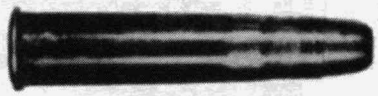
Bullet (grs.)	Powder/grs.		MV	ME	Source
150 Lead	IMR 4198	14.5	1350	607	Lyman #308156
150 Lead	FL		1350	607	Factory load

32-20 Marlin

Historical Notes This cartridge was loaded for the Marlin 1894 repeating rifle. Winchester loaded this cartridge beginning around the turn of the century and until about WWI. It is nothing more than a special version of the 32 WCF (32-20 Winchester). Compared to the Winchester round, it was loaded with a lighter bullet, 100 grains versus 117 grains. With the exceptions of perhaps bullet nose shape, seating depth and headstamp, this loading appears to have been otherwise identical to the 32-20 Winchester. In 1916 Winchester offered three versions of this cartridge: lead, blackpowder (100 grains, 20 grains); softpoint (117 grains) smokeless; and full-patch (117 grains) smokeless. High-velocity loadings were not offered.

General Comments Evidently sales of Marlin's Model 1894 rifle generated sufficient demand for special versions of the cartridges for which that rifle was nominally chambered. Perhaps cartridges with slightly different bullet shapes or loading lengths were found to function better in it. Whatever the reason, the 1916 catalog shows separate cartridge loadings with the following names: 25-20 Marlin, 32-30 Marlin, 38-40 Marlin and 44-40 Marlin. Winchester says this cartridge was adapted to both Winchester and Marlin rifles as were the 38-40 and 44-40 Marlins.

32-30 Remington



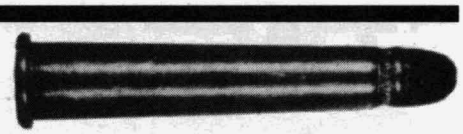
Historical Notes This bottleneck cartridge, similar to the 32-20 WCF, was one of the calibers available for the Remington-Hepburn No. 3 series single shot rifle introduced in 1880. The cartridge was first made in November of 1884. Not a true 32, bullet diameter is .312-inch.

General Comments The Remington-Hepburn was billed as a "long-range hunting and target rifle," but the 32-30 is hardly a long-range cartridge. It is only a notch or so above the 32-20 WCF. It was not a popular caliber, and died out in 1912. Like most other single shot cartridges, this one was too long for the short repeating actions such as the Model 92 Winchester. They were, in addition, too small for the larger actions. This in-between position eliminated them as the repeater gained popularity. Rifles for the 32-30 are comparatively rare today. Ammunition can be made by reforming 357 Magnum or 357 Maximum brass.

32-30 Remington Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
111 Lead	IMR 4198	14	1650	676	Lyman #311316
115 Lead	FFg	35	1430	528	
125 Lead	FL		1380	535	Factory load

32-35 Stevens & Maynard



Historical Notes A match cartridge introduced by J. Stevens Arms & Tool Co. in the mid-1880s, it was one of the calibers available for the New Model Range Rifle Nos. 9 and 10, which first appeared in 1886. These were on a tip-up single shot action and some of the earlier models of this type may also have chambered the 32-35. Later rifles based on the 44 and 44½ under-lever single shot actions were also available in 32-35.

General Comments This was one of the most accurate of the Stevens target cartridges, and many records were established with it. The 32-40 was responsible for its gradual obsolescence. Best accuracy was usually obtained by seating the bullet in the chamber 1/16-inch or so ahead of the case; the case, full of powder with a wad to prevent spilling was then inserted in the chamber behind the bullet. Lyman No. 3117 bullet of 153 grains weight was popular with many riflemen. Correct load of blackpowder was 35 grains of Fg or FFg.

32-35 Stevens & Maynard Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
153 Lead	IMR 4198	14	1410	683	
165 Lead	IMR 4227	11	1380	696	
165 Lead	FL		1400	683	Factory load

32-40 Bullard

Historical Notes This is the smallest caliber of a series designed for the Bullard single shot and repeating rifles. Bullard patents were granted in 1881, and manufacture of their rifles is believed to have started during 1882 or 1883. Exact date of introduction of the individual cartridges is difficult to establish, but all were available by 1887.

General Comments The Bullard lever-action repeating rifle resembled the Winchester, but employed a different rack and pinion mechanism. The loading port in the magazine was located on the bottom rather than the side, as is the Winchester. The single shot was of the under-lever type and quite strong. Although Bullard rifles and cartridges were as good as any of contemporary manufacture, they did not endure beyond 1900. Some Bullard cartridges were made by Remington and Winchester. Performance of the 32-40 Bullard is the same as the 32-40 Winchester and Marlin. Both are scarce items. Usable cases can be easily formed from 357 Remington Maximum brass.

32-40 Bullard Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
150 Lead	IMR 4198	15	1470	719	Lyman #311241
155 Lead	2400	13	1400	674	
150 Lead	FL		1492	750	Factory load

32 Long (CF)

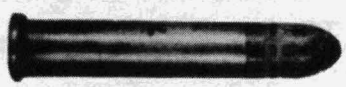
Historical Notes A centerfire, reloadable version of the 32 Long rimfire with an outside-lubricated bullet. It was introduced in 1875 in a variety of light-frame single shot rifles and also the Marlin Models 1891 and 1892. Some of these were constructed so that both rim- and centerfire ammunition could be used by changing the firing pin or hammer.

General Comments The 32 Long was not a satisfactory or effective cartridge. A longer case was soon used, called the "Extra Long," in order to increase range and killing power on small game. Eventually the 32 Long was replaced by such numbers as the 32-20 WCF, 32 Ideal and the 32-35 Stevens. It is very similar to the 32 Colt revolver cartridge. Standard load consisted of 13 grains of FFFg blackpowder and an 80- to 85-grain bullet. Muzzle velocity was only about 800 to 900 fps, depending on load and barrel length. The 32 S&W Long or 32 Long Colt will work in most old rifles of this caliber. Cartridges in this caliber are now collector's items.

32 Long (CF) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
85 Lead	FL	850	136	Factory load

32 Ballard Extra Long



Historical Notes The 32 Extra Long is an elongated version of the 32 Long centerfire, the latter being one of the calibers available for the J.M. Marlin 1876 Ballard No. 2 Sporting Rifle. The 32 Extra Long cartridge appeared in 1879. This was after Marlin Fire Arms Co. began manufacturing Ballard rifles. They introduced (or continued) the Sporting Rifle No. 2 in 1881. Stevens, Remington, Wurfflein and other single shot rifles were also available in this caliber. It was fairly popular, but lost out to the 32-20 WCF. Most companies stopped loading it by 1920. Rifles chambered for this cartrdige will usually chamber and fire both the 32 S&W Long and 32 Long Colt.

General Comments This is essentially a centerfire version of the 32 Extra Long rimfire, and ballistics are practically identical. It was used as a target and small game cartridge throughout the late 1800s. It is very similar in performance to the blackpowder loading of the 32-20 WCF. Most of the old rifles for this cartridge will not safely withstand heavy loads of modern smokeless powder. An outside-lubricated bullet of the same diameter as the case neck was first used.

32 Ballard Extra Long Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
115 Lead	IMR 4198	9	1360	473	
115 Lead	FL	(FFg 20)	1200	372	Factory load

32 Winchester Self-Loading (32 Winchester SL)

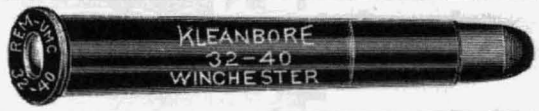
Historical Notes This, the second of two cartridges developed for the Winchester Model '05 self-loading rifle which was introduced in 1905-1906. It became obsolete when the rifle was discontinued in 1920. The case is of the semi-rimmed type similar to the 35 SL which was the original cartridge for the Model '05 rifle. The 32 Winchester SL was probably the prototype of the 30 U.S. Carbine cartridge. The two are very similar except for bullet diameter and the fact that the 30 Carbine cartridge is rimless.

General Comments The 32 Winchester SL cartridge is in the same class as the 32-20 Winchester, strictly a small to medium game number at close range. However, it isn't nearly as flexible as the 32-20 because of the semi-automatic rifle in which it was used. This was never a very popular cartridge. Not only was the cost of ammunition relatively high, but in addition, the cartridge is not well-suited to reloading, even if you could find the empty cases after being ejected from the action. Some might reason this cartridge as the number one candidate for the title: "World's most useless centerfire rifle cartridge."

32 Winchester Self-Loading Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
155 Cast	2400	9.5	1270	556	Lyman #321298
165 SP	2400	12.0	1450	775	
165 SP	IMR 4227	12.5	1440	760	
165 SP	FL		1400	760	Winchester factory load

32-40 (32-40 Ballard/ 32-40 Winchester)



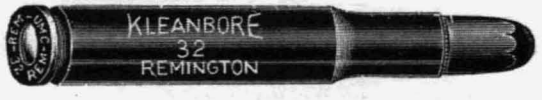
Historical Notes Originally developed as a blackpowder match or target cartridge for the single shot Ballard Union Hill Rifle, Nos. 8 and 9, the 32-40 was introduced in 1884 loaded with a 165-grain lead bullet in front of 40 grains of Fg blackpowder. It established a reputation for fine accuracy and Winchester and Marlin added it to their line of lever-action repeating and single shot rifles late in 1886 *et seq.* The late Harry Pope's favorite cartridge was the 32-40 and his variant, 33-40. Ammunition has been discontinued by major companies. However, in the early 1980s Winchester loaded this caliber to boost sales of their John Wayne Commemorative rifle.

General Comments In a good solid-frame rifle, the 32-40 will shoot as well as any modern high-powered match cartridge out to 200 or 300 yards. It was a fairly popular hunting cartridge for medium game and deer, and while it has certainly killed its share of deer, the factory loading barely qualifies in that class. However, in a strong action it can be handloaded to equal the 30-30. For small to medium game or varmints, it will do very well at moderate ranges. Do not use high-velocity loadings in the old Ballard or Stevens 44 rifles. A number of modern copies of old Sharps single shot rifles and a special commemorative M1894 Winchester have chambered the 32-40 in recent years. Usable cases can easily be formed from 30-30, 32 Special or 38-55 brass.

32-40 Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
155 Lead	2400	13.0	1460	786	
165 Lead	H-4895	16.0	1410	729	OK for old rifles—Hodgdon
165 Lead	H-4198	14.0	1340	658	OK for old rifles—Hodgdon
165 Lead	H-4895	22.0	1865	1275	Not for old rifles—Hodgdon
165 Lead	H-335	23.0	1890	1309	Not for old rifles—Hodgdon
170 Lead	XMP5744	20.0	1802	1226	Accurate Arms
165 SP	FL		1440	760	Winchester factory load
165 SP	FL		1752	1125	High velocity Winchester factory load

32 Remington



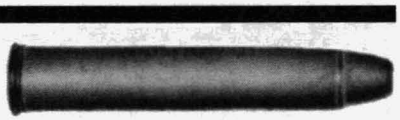
Historical Notes Another of the Remington rimless line of medium high-power rifle cartridges, this one is a rimless version of the 32 Winchester Special. Introduced in 1906, it was originally chambered in the Model 8 autoloader and later available in Remington slide-action and bolt-action rifles. The ammunition companies discontinued it many years ago.

General Comments Remington felt some need to counter the popular series of rimmed cartridges chambered in Winchester's Model 94 lever action. The incentive was great enough to persuade Remington to invent substitutions for Winchester's rimmed 25, 30 and 32 calibers, and it could be argued that the 35 Remington was an answer to Winchester's 38-55. A bit of reflection suggests that the folks at Remington were confused. It wasn't the cartridges that made Mr. Browning's invention successful, it was Mr. Browning's invention that made the cartridges successful. The 32 Remington is, nonetheless, perfectly adequate for any task to which the 30-30 or 32 Special are suited.

32 Remington Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
170 SP	IMR 4895	33.0	2070	1578	Lyman
170 SP	IMR 3031	30.0	2020	1546	
170 SP	IMR 4198	26.0	1992	1718	
170 SP	FL		2220	1860	Remington factory load

32 Ideal



Historical Notes One of the calibers available for the single shot Stevens 44 and 44½ rifles, as well as for other single shot rifles, this cartridge was introduced in 1903 and was quite popular for 20 years or so.

General Comments The 32 Ideal is an improvement over the older 32 Extra Long Ballard in having inside lubrication and better performance. It is cleaner to handle and easier to reload. It was also quite accurate and an adequate 150-yard small or medium game number. Use of bullets lighter than standard provides room for more powder and gives higher velocity. Sometimes called the 32-25-150, the 32 Ideal uses a bullet diameter of .323-inch and, as pointed out in early Ideal Hand Books, it offered new life, via reboring and rerifling, to "thousands of 32 calibers, Short, Long and Extra Long, Rim and Center Fire rifles that have been shot out or rusted..."

32 Ideal Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
115 Lead	FFg	38	1425	524	Lyman #32359
150 Lead	Fg	25	1250	526	Lyman #32360
150 Lead	IMR 4198	12	1330	596	
150 Lead	FL	(FFg 25)	1250	526	Factory load

33 Winchester

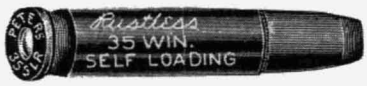
Historical Notes Introduced in 1902 for the Winchester Model 86 lever-action rifle and discontinued along with the rifle in 1936, it was replaced by the 348 Winchester developed for the improved Model 71 rifle. It was also chambered in the Marlin Model 95 lever action and in the Winchester Model of 1885 single shot. This round was dropped in 1940.

General Comments The 33 Winchester earned a good reputation as a deer, black bear and elk cartridge when used in the woods at moderate ranges. Its paper ballistics are no better than the 35 Remington rimless, but it uses a smaller diameter bullet with better sectional density than the 200-grain 35-caliber. It gave good penetration and satisfactory killing power when properly used. It is still a good cartridge for anything up to and including elk, and it can be improved safely with modern powders. In any case, it is not quite as powerful as the 348 Winchester and the Model 86 action is not quite as strong as the Model 71. Cases can be formed from 45-70 brass.

33 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
200 SP	H-4895	45	2200	2150	Hornady
200 SP	IMR 3031	40	2100	1959	Hornady
200 SP	FL		2200	2150	Winchester factory load

35 Winchester Self-Loading (35 WSL)



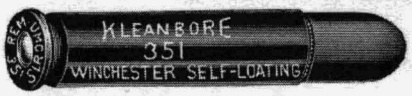
Historical Notes The 35 SL was the original cartridge for the Winchester Model '05 semi-auto rifle introduced in 1905. The Model '05 was the only rifle that ever chambered it, and the cartridge was such a poor one that it was discontinued in 1920.

General Comments The 35 SL cartridge was unsuitable for anything but small to medium game at very close ranges. However, it was too expensive for such shooting. It is too underpowered for deer and ranks right along with the 32 SL as a rather useless cartridge. It is semi-rimless, and can be fired in the 38 Special or 357 Magnum revolver if reloaded with .357-inch diameter lead bullets. Just what value this might have is difficult to imagine, but it is an interesting fact, just in case the reader didn't already know it.

35 Winchester Self-Loading Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
180 SP	IMR 4227	13.5	1440	834	
180 SP	2400	13.0	1430	823	
165 Lead	2400	8.0	920	312	
180 SP	FL		1452	842	Winchester factory load

351 Winchester Self-Loading (351 WSL)



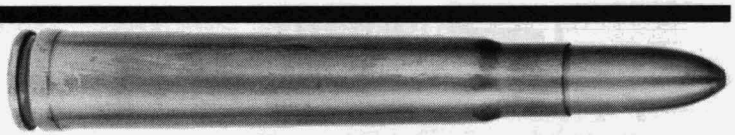
Historical Notes Introduced in 1907 to replace the 35 SL, the 351 Self-Loading is a more powerful round for the improved Model 1907 Winchester autoloading rifle. This cartridge was used to a very limited extent in both WWI and II by the French as a military cartridge. The rifle was discontinued in 1957.

General Comments The 351 SL doesn't have much to offer, even though it is an improvement over the older 35. It won't qualify as a suitable deer cartridge, although it has been used for that purpose. It is a good medium-game cartridge for coyote, mountain lion or animals in that class, but is too powerful for small game. It is expensive, not accurate enough and too limited in range for varmint shooting. Nevertheless, it far surpasses even the best 357 Magnum rifle loads and comes very close to duplicating the 357 Remington Maximum. It has been popular for Latin American jungle hunting because at the short ranges involved it has sufficient power for the game encountered there. Here in the U.S. the 351 WSL and the handy Model 1907 semi-automatic rifle it was introduced in was used extensively as a prison guard gun and is notorious as one of the guns used in the killing of Bonnie and Clyde. It has been used from low-flying, light aircraft in the western United States for pest control. Like the 35, the 351 SL is semi-rimmed and the principal differences are a .24-inch longer case used in the 351 and higher loading pressures. Winchester was the last company to offer ammunition in this caliber.

351 Winchester Self-Loading Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
177 Cast	IMR 4227	16.0	1550	947	Lyman #351319
180	2400	19.0	1793	1280	Medium game only; Lyman
180	4227	19.5	1751	1225	
180	FL		1850	1370	Factory load

350 Griffin & Howe Magnum



Historical Notes The 350 G&H Magnum was developed by Griffin & Howe in the early 1930s. It is also known as the 350 Holland & Holland Magnum since that company chambered it in their rifles for a number of years. In the U.S., ammunition was loaded by Western Cartridge Company. It is based on the 375 H&H case necked-down and is similar to a number of 35-caliber wildcats that came along years later. It did not achieve popularity and died out by the end of the 1930s. Today it is largely a collectors item.

General Comments The 350 G&H Magnum used standard .357-inch diameter bullets and so could be handloaded with a variety of weights and types. It is a good big game cartridge for either North American or African hunting. However, it is obsolete and the 358 Norma Magnum or one of the 35-caliber short magnums would be a better choice. Cases are easy to make and plenty of good bullets are available.

350 Griffin & Howe Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
220 SP	IMR 4350	88	3120	4762	
250 SP	IMR 4831	93	2950	4848	
250 SP	FL		2700	4055	Western factory load

35 Winchester

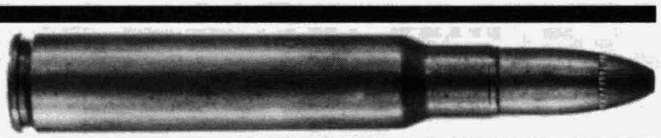
Historical Notes Developed by Winchester for their Model 1895 lever-action rifle, the 35 Winchester was introduced in 1903. The Remington-Lee bolt-action rifle also chambered this round. It was discontinued in 1936 along with the Model 95 rifle. It was listed in the 1962 British Kynoch ammunition catalogs.

General Comments The 35 Winchester is a more powerful cartridge than the 33 Winchester, but is not as potent as the 348 or the 358 Winchester. It had a good reputation as a short-range number for elk, moose or brown bear. It is certainly powerful enough for any North American big game, but doesn't have much to offer as compared to more modern calibers. It can be improved by using modern powders, but pressures in the old 1895 lever action should be kept down to 45,000 psi or less. This cartridge, like the 405 Winchester, is based on the same case as the 30-40 Krag. Safe cases can be trimmed from same with the somewhat shorter neck offset by seating bullets out as crimping is not required in the box magazine of the M95 Winchester.

35 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
200 SP	IMR 4895	52	2480	2738	
200 SP	IMR 4064	45	2220	2182	
204	IMR 4227	18	1550	1091	Lyman #358315
250 SP	IMR 4895	50	2290	2920	
250 SP	IMR 4320	48	2190	2670	
250 SP	FL		2195	2670	Winchester factory load

35 Newton



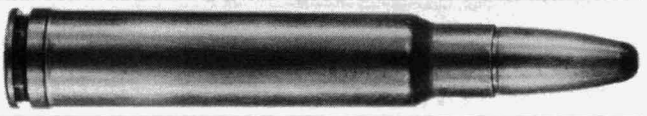
Historical Notes The 35 Newton was listed in the Newton Rifle Company catalog in 1915, which presumably is the year it was introduced. It is the 30 Newton case necked-up to 35-caliber. The Western Cartridge Company listed it until 1936, but no commercial rifles other than the Newton chambered this round.

General Comments The 35 Newton is more powerful, in some loadings, than the 375 H&H Magnum. The factory load listed below was the last one offered by the Western Cartridge Company, but at one time other loads were available. This cartridge is somewhat overpowered for most North American big game. It has been used in Africa with considerable success, although the Newton rifle was much too light and poorly stocked for such a powerful cartridge. The only way in which cases can be made is by necking-up the 30 Newton, itself a scarce item. Performance is similar to the later 358 Norma Magnum which would be a far better choice because loaded ammunition.

35 Newton Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
200 SP	IMR 3031	78	3030	4100	
250 SP	IMR 4064	70	2650	3918	
250 SP	IMR 4320	75	2815	4410	
250 SP	FL		2660	3930	Western factory load
250 SP	FL		2975	4925	Western factory load

358 Norma Magnum



Historical Notes This cartridge was developed by Norma and introduced in the U.S. in 1959. At the start no rifles were chambered for the 358 Norma Magnum. However, empty brass cases and loaded ammunition were available. The Schultz & Larsen Model 65 and the Husqvarna bolt action were made available in this caliber early in 1960. No American gun manufacturer chambers the cartridge. Like the 308 Norma Magnum, it is a proprietary cartridge and perhaps should be listed under European cartridges. However, it was designed for the American market and is listed here.

General Comments The 358 Norma Magnum is a short, magnum-type cartridge intended to work through standard-length actions. It is so nearly identical to the wildcat 35 Ackley belted, short magnum. It is also nearly identical to the wildcat 35-338, which is the 338 Winchester necked-up to 35-caliber.

The 358 Norma Magnum delivers the same performance as the slightly larger 375 H&H Magnum and would be suitable for the same range of game. It is overpowered for most North American big game, but would be an excellent choice for the big Kodiak bears. It is another good all-round number for the man who wants to be prepared for hunting anything, anywhere, at any time, whether or not rifles are in production.

358 Norma Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
180 SP	IMR 4895	69	3100	3842	Speer
200 SP	IMR 3031	66.5	2900	3736	Hornady
225 SP	IMR 4350	75	2900	4203	Nosler
250 SP	IMR 4320	68	2800	4353	Hornady
250 SP	IMR 4350	76	2700	4048	Speer
250 SP	MRP	78	2500	3470	Speer
300 SP	IMR 4350	71	2600	4504	Barnes
250 SP	FL		2790	4322	Norma factory load.

35-30 Maynard (1882)

Historical Notes The 35-30 was one of the series of cartridges designed for and introduced with the Model 1882 Maynard single shot rifle. The Improved Hunters Rifle Nos. 7 and 9, along with the Target & Hunting No. 10 and Improved Target No. 16 were available in this caliber.

General Comments Maynard rifles were used during the Civil War. After the war, the company manufactured sporting rifles. The Maynard rifle used a tip-up breech linked to an underlever. They were smooth operating, safe and possessed excellent accuracy. The 35-30 ammunition can be made from 38-55 cases. Bullets .358-inch diameter can be sized down or used as is. The Lyman 165-grain No. 358429 bullet can be used.

35-30 Maynard 1882 Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
165 Lead	IMR 4198	16	1320	645	Lyman #350293
165 Lead	2400	13	1450	787	Lyman #350293
250 Lead	FL		1280	918	Factory load

35-40 Maynard (1882)

Historical Notes This an elongated version of the 35-30 and used in the Model 1882 Maynard rifles.

General Comments The 35-40 provides greater powder capacity than the shorter 35-30. The case dimensions are not identical, but brass can be made from 38-55 brass just as with the 35-30. The long case is probably superior for hunting, but since both are strictly small to medium game numbers, any advantage would be more opinion than anything else. Any .358-inch rifle or revolver bullet can be sized to work. The Lyman No. 358429 (165 grains) would be a good choice.

35-40 Maynard Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
165 Lead	IMR 4198	18	1400	725	Lyman #358429
250 Lead	FL		1355	1018	Factory load

38-45 Stevens

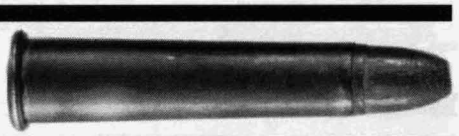
Historical Notes One of the special Stevens "Everlasting" cartridges, this one was introduced with the 1875 tip-up models. It was not very popular and was discontinued within a few years. Today it is one of the rarer Stevens cartridges.

General Comments Another of the 38-40 class cartridges, the 38-45 used a heavier bullet, but ballistics are similar. The 38-40 and 38-55 made most of these in-between cartridges obsolete. Original loading called for 45 to 50 grains of Fg blackpowder and a bullet of from 210 to 255 grains in weight. It should be possible to convert 303 British cases to work in these rifles.

38-45 Stevens Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
210 Lead	IMR 4198	16	1340	845	Lyman #36275
210 Lead	FL		1420	947	Factory load

38-40 Remington-Hepburn



Historical Notes Although listed as the 38-40 Remington-Hepburn, this cartridge was available in the No. 1 Sporting Model rolling block rifle that preceded the Hepburn action by 10 years. The No. 1 rifle was also chambered for the 38-40 WCF shortly after Winchester introduced it during 1873-1874. It is likely that this cartridge was intended as a straight-case version of the bottlenecked Winchester round. The 38-40 Remington-Hepburn appeared about 1875.

General Comments The rifle and ammunition manufacturers went all out to please every segment of the trade during the 1800s. Some riflemen didn't cotton to the bottlenecked cases, so all kinds of straight, tapered and bottleneck designs appeared in the same caliber and with the same powder charge. This may have provided a great "lift" to the men using them, but it is very confusing. The 38-40 Remington and 38-40 Winchester are a case in point. Neither could do anything the other wouldn't, but the Winchester round won out in company with the repeating rifle. The Remington cartridge is a good target or small to medium game number. Original bullet is slightly heavier than the 38 WCF, but loading data for one will give similar results in the other. It is possible to convert 30-40 Krag cases to load this cartridge.

38-40 Remington-Hepburn Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
190 Lead	IMR 4198	16	1427	865	Lyman #373164
250 Lead	2400	15	1300	937	
245 Lead	FL		1200	790	Remington factory load

38-45 Bullard

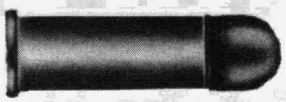
Historical Notes This is another of the special cartridges for the Bullard lever-action, single shot and repeating rifles. It was introduced about 1887, but this is only an approximate date. Remington once loaded this round, however it was never a very popular number.

General Comments Very few rifles of this caliber are still around. Ballistically it is similar to the 38-40 WCF. It was an accurate cartridge, suitable primarily for small or medium game at close ranges. Cartridges in this caliber are now collector's items. It should be possible to convert 44 Remington Magnum cases to work in these rifles.

38-45 Bullard Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
175 Lead	2400	16	1480	883	Lyman #37582
250 Lead	Unique	10	1200	797	
190 Lead	FL		1388	822	Remington factory load

38 Long, Centerfire (38 Long, CF)



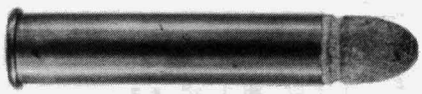
Historical Notes The 38 Long is another old-timer designed to replace a similar rimfire cartridge. It was introduced in 1875-76 and used in a number of single shot rifles including the Ballard, Stevens, Remington and others. It was obsolete by 1900, and oddly, the original rimfire version outlived the centerfire.

General Comments The 38 Long, like the 32 and 44, was not really very effective and had a short life. It was an alternate choice to the rimfire and many of the old rifles could, by a simple adjustment, fire either. The 38 Long Colt or 38 S&W Special can be used to make ammunition for this caliber. Standard load was 20 to 25 grains of blackpowder and a 140- to 150-grain bullet.

38 Long, Centerfire Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
145 Lead	FL	950	291	Factory load

38 Ballard Extra Long



Historical Notes This centerfire version of the 38 Extra Long rimfire was introduced in 1885-86 as one of the calibers for the Ballard No. 2 Sporting Model. It was also used by many other companies. It had the old No. 1 primer that has not been made for many years. Some of these rifles were furnished with a changeable firing pin or hammer arrangement so they could fire the rim- or centerfire version with only a minor adjustment.

General Comments The 38 Extra Long was designed to furnish a reloadable case to those who favored the 38 Extra Long rimfire ballistics. It was a nice little plinking, small game or target cartridge for those who wanted economy. Any .358-inch bullet of suitable weight can be used. Using Lyman No. 358161 (145 grains) and 31 grains of FFg blackpowder will work fine. The 357 Remington Maximum case can be converted to work in the 38 Ballard Extra Long chamber.

38 Ballard Extra Long Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
150 Lead	Unique	6	1160	450	Lyman #358160
146 Lead	FL		1275	533	Factory load

38-35 Stevens

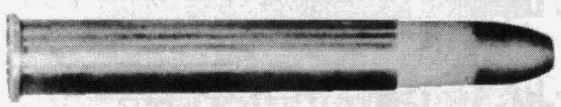
Historical Notes Introduced in 1875 for the Stevens tip-up single shot rifles, this was one of the special Stevens "Everlasting" calibers. It was not very popular because it was dropped after a few years. In its original form it is occasionally referred to as the 38-33.

General Comments Stevens "Everlasting" shells were sold as separate components and the older, less popular numbers are seldom encountered as loaded rounds. The shells were intended for very long reloading life and were thick and heavy. There were about six of these special calibers that survived. Loadings were not standard, and they may be found with a variety of bullet weights in both grooved and paper patched form. A load of 35 grains or so of Fg blackpowder and any bullet of from 180 to 255 grains can be used in this cartridge. It should be possible to chamber and safely shoot either 41 Short Colt or the 41 Long Colt lead bullet loads in these rifles. The softer oversize bullet will easily swage down to bore diameter.

38-35 Stevens Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
180 Lead	Fg	35	*1350	729	
215 Lead	FL	(Fg 35)	1255	758	Factory load
*Estimated					

38-50 Maynard (1882)



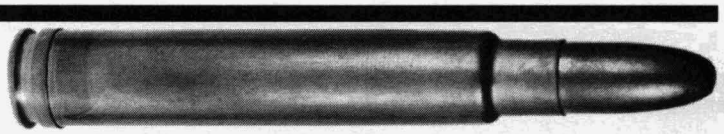
Historical Notes The 38-50 Maynard is practically identical to the 38-55 Ballard and Winchester and uses a bullet of similar diameter. It was not popular because it was so similar to the Winchester number.

General Comments To reload the 38-50, one can make cases by resizing and trimming 38-55 brass and loading 38-caliber rifle bullets sized to correct diameter. Most shooters don't know it, but the 38-55 would only hold 48 to 50 grains of blackpowder after the ammunition companies began using heavier, solid head cases. For all practical purposes there is no performance difference between the 38-50 Maynard and the 38-55.

38-50 Maynard Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
149 Lead	IMR 4198	10	1100	420	Lyman #37583
250 Lead	IMR 4198	16	1320	974	Lyman #375248
255 Lead	FL		1325	990	Factory load

375 Weatherby Magnum



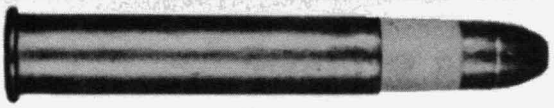
Historical Notes The 375 Weatherby Magnum was developed by the late Roy Weatherby between 1944 and 1945, and was chambered only in Weatherby rifles. There are several similar wildcat versions, but the 375 WM had the advantage of commercial ammunition loaded by Weatherby using Norma brass. Although brass cases are available, Weatherby no longer loads ammunition or chambers rifles for this cartridge.

General Comments The 375 WM is a full-length, blown-out and improved cartridge based on the 375 H&H case. It holds more powder and delivers higher velocity with the same bullets than the parent cartridge. It is similar to several wildcats, such as the 375 Improved Ackley Magnum, but had the advantage of being available on a commercial basis. It is really overpowered for North American big game. On African game it will qualify for just about anything and is considered a fine all-round cartridge, particularly for dangerous game. The 270-grain bullet approximates 30-06 trajectories and is a fine long-range load for large North American game and for thin-skinned African animals. Commercial chambers are freebored in the Weatherby tradition. This increases the charge required to achieve any given pressure and velocity.

375 Weatherby Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
235 SP	IMR 4064	84.0	3015	4745	Ackley
270 SP	IMR 4064	80.0	2795	4685	Ackley
300 SP	IMR 4350	86.0	2675	4770	Ackley
270 SP	FL		2940	5181	Weatherby factory load.
300 SP	FL		2800	5223	Weatherby factory load.

38-50 Ballard



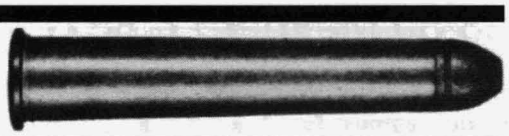
Historical Notes This cartridge was the forerunner of the 38-55. It was introduced in 1876 for the Ballard Perfection No. 4 and Pacific No. 5 rifles, but was also available in other models. It is an "Everlasting" type case, heavier than the standard 38-55 and 3/16-inch shorter. It was replaced by the 38-55 when that cartridge was introduced in 1884.

General Comments The standard bullet diameter for most 38-caliber rifles was .375-inch, but many had a groove diameter of .379-inch, requiring a larger bullet. It is wise to measure the bore diameter before ordering a bullet mould for these old rifles. Lyman moulds are available in a variety of 38 rifle bullets from 150 grains to over 300. Modern 38-55 brass can be used in 38-50 rifles by cutting .188-inch off the case length. Performance and usefulness is on a par with the 38-55 (see Chapter 2).

38-50 Ballard Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
145 Lead	IMR 4198	14	1300	550	Lyman #37583
250 Lead	IMR 4198	17	1350	1020	Lyman #375248
255 Lead	FL		1321	989	Factory load

38-50 Remington-Hepburn



Historical Notes Introduced in 1883 as one of the calibers for the Remington-Hepburn match rifles, it was too similar to the popular 38-55 to gain much of a following and was discontinued after a few years.

General Comments Loading data for the 38-55 Winchester and Marlin can be applied to this cartridge. There is no difference in the use or performance of the two. It should be possible to convert 303 British or 40-40 Krag cases to work in these rifles.

38-50 Remington-Hepburn Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
255 Lead	IMR 4198	23	1580	1421	
250 Lead	Unique	10	1200	797	
255 Lead	FL		1320	989	Factory load

38-56 Winchester

Historical Notes Introduced in 1887 for the Model 1886 Winchester repeater, it was used in the single shot and the 1895 Marlin. The 38-56 made the transition into the smokeless era and was loaded until about 1936. The Colt New Lightning, slide-action, magazine rifles also used this cartridge.

General Comments The design of this cartridge was intended to develop increased velocity without lengthening the case. It is a sort of super 38-55 in conception, but not in fact. With smokeless powder, and within allowable pressures, there isn't any real performance difference. It is a bottlenecked case and will not interchange with others of similar designation. Although advertised as a powerful big game number, it is little more than a deer or black bear cartridge. With maximum handloads it might do OK for elk at short range. Cases can be made from 45-70 brass.

38-56 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
255 Lead	IMR 3031	36	1830	1908	
265 Lead	IMR 4198	25	1600	1512	Lyman #375296 GC
255 SP	FL		1395	1105	Factory load

38-90 Winchester Express (38 Express)

Historical Notes Introduced in 1886 as one of many calibers for the successful Winchester Model 1885 single shot, this was not a popular cartridge, and by 1904 it had been discontinued.
General Comments This is a long, bottlenecked case with a light bullet for cartridges of this class. Since it is designated an "Express" caliber, it was probably intended to develop superior velocity for a 38-caliber rifle. Old Ideal catalogs list bullet No. 375248 as standard with the No. 3 loading tool in this caliber, but any of the lighter 38-55 bullets can be used. A charge of 90 grains of Fg blackpowder was the original factory loading.

38-90 Winchester Express Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
218 Lead	IMR 4198	21	1350	886	Lyman #37584
218 Lead	IMR 4198	23	1470	1045	Lyman #37584
217 Lead	FL		1595	1227	Winchester factory load.

38-70 Winchester

Historical Notes Introduced in 1894 for the Model 1886 Winchester lever-action repeater, the 38-70 did not catch on and was discontinued within a few years.

General Comments This cartridge offers little if any improvement over the 38-55. It is of bottlenecked design but is not the same as the 38-56 or the 38-72 Winchester. The older Lyman catalogs indicated it used the standard 38-55 diameter bullet of .379-inch. Although the 38-70 case is longer than that of the 45-70, usable, short-necked cases could be made from the 45-70. However, the "basic" 45 cases now available will make perfect replacement cases.

38-70 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
250 Lead	IMR 4198	26	1710	1625	
265 Lead	IMR 3031	41	1700	1698	
255 Lead	FL		1490	1257	Factory load.

38-72 Winchester

Historical Notes Designed for, and introduced with, the Model 1895 Winchester lever-action, box magazine repeater. Both gun and cartridge were obsolete by 1936. It was only moderately popular.
General Comments This is a nearly straight case with a very slight neck. Some cases have a pronounced groove around the neck to prevent the bullet from receding under recoil. This tends to obscure the slight neck. This is another 38-caliber cartridge touted as being very powerful when, in fact, it is nearly the same as 38-55 (see Chapter 2). The 38-72 case has the same basic body as the 30-40 Krag but because headspacing is on the rim, it may not be possible to safely use that case to make the 38-72 except for very low pressure loads.

38-72 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
255 Lead	IMR 3031	33	1735	1715	
275 Lead	IMR 4198	27	1350	1120	Lyman #375167
275 Cast	Fg	72.0			Lyman #357167
275 SP	FL		1475	1330	Winchester factory load.

40-50 Sharps (Straight)

Historical Notes Introduced in 1879, this is the smallest of the Sharps cartridges. There is a similar, necked version. In addition to Sharps rifles, the Winchester single shot was available in this caliber as was the Remington rolling block. This is also known as the 40-1 7/8" Sharps.

General Comments Although listed as the 40-50, this cartridge was actually loaded with 40 or 45 grains of powder and was identical in performance to the 40-40 Maynard and other similar rounds. The standard diameter of most 40-caliber rifle bullets is .403-inch and almost any bullet of that diameter can be used. It should be possible to convert the 30-40 Krag case to work in these rifles.

40-50 Sharps (Straight) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
260 Lead	IMR 4198	21	1450	1220	Lyman #403169
265 Lead	FL		1410	1168	Factory load.

40-50 Sharps (Necked)

Historical Notes Also known as the 40-1 11/16", this cartridge was introduced in 1869 for that model Sharps Sporting rifle. It was available with several bullet weights, including 265, 285, and 296 grains. The Remington rolling block and other single shot rifles also chambered this cartridge.

General Comments The 40-50 bottlenecked cartridge is shorter than the straight version, but there is little difference in ballistics. The 40-50 Sharps (Straight) and 40-50 Sharps (Necked) are not interchangeable. Proper bullet diameter is .403-inch, and several Lyman bullet moulds are available in this size. This is largely a medium game, deer or intermediate-range target cartridge. It should be possible to convert 45-70 brass to work in these rifles.

40-50 Sharps (Necked) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
260 Lead	IMR 4198	21	1500	1308	Lyman #403169
265 Lead	FL		1460	1262	Factory load.

40-60 Marlin

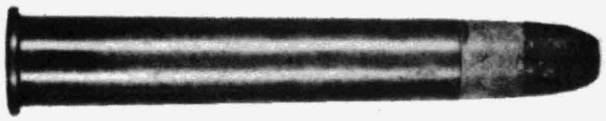
Historical Notes The 40-60 is one of the calibers for Marlin 1881 and 1895 lever-action repeaters. The 1895 uses the same basic system as the 1893 and 1894 models, but is larger and longer. This appears to be the same case as the 40-65 Winchester, but with a slightly different loading. The slide-action Colt New Lightning rifles used the Marlin loading of this cartridge, too.

General Comments During the late 1800s, the same cartridge often went under various names, depending on who loaded it or whose rifle it was used in. It was also common practice to change the name if you furnished more than one load or bullet in the same case; that is what happened here. The 40-60 Marlin and the 40-65 Winchester are interchangeable and either can be used in the same gun. However, the old Ideal catalog states the 40-60 Marlin "must not be confused with the 40-60 Winchester as they are not the same." This, of course, is true. If the reader isn't thoroughly confused by now, he should be. Go ahead, read it through a few more times and it will clear up. The 45-70 case can be easily converted for 40-60 Marlin brass.

40-60 Marlin Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
260 Lead	IMR 4198	23	1500	1308	Lyman #403170
260 Lead	IMR 3031	35	1480	1263	
260 Lead	FL		1385	1115	Factory load.

40-63 and 40-70 Ballard



Historical Notes These two cartridges have identical length and outside dimensions, so are listed together. The 40-63 is actually just a heavier case version of the 40-70 factory cartridge. Both are, in turn, an outgrowth of the original 40-65 Everlasting case which had to be handloaded. The 40-63 and 40-70 were first listed for the Ballard Perfection No. 4 and Pacific No. 5 after the Marlin Fire Arms Company took over manufacture of these rifles in 1881.

General Comments This was a fairly popular caliber among Ballard rifle fans and was as good as similar cartridges offered by Winchester and others. However, cartridges designed for repeating rifles tended to survive longer than those intended for single shots. These were more match cartridges than anything else, but they also made good deer, black bear or elk numbers. Their performance is identical to the 40-70 Sharps Straight or the 40-72 Winchester. The 444 Marlin case should work in these rifles.

40-63/40-70 Ballard Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
330 Lead	IMR 4198	22	1310	1260	Lyman #403149—1/20 or 1/30 tin-lead.
330 Lead	FL		1335	1318	Factory load

40-65 Ballard Everlasting

Historical Notes The 40-65 Ballard Everlasting was introduced in 1876 as one of the original calibers for the Perfection No. 4 and Pacific No. 5 rifles, and in 1879 it was added to the Hunter No. 1½. These were all the same basic, under-lever, single shot action. This cartridge was used in the J.M. Marlin Ballards, and after the Marlin Fire Arms Co. took over, it was altered to the 40-70 and 40-63.

General Comments The 40-70 or 40-63 Ballard can be fired in the older 40-65 rifles, but the 40-65 case will not fit the other chamber. It is a much heavier case of slightly larger diameter, although all have the same length. The ballistics of all of these are the same for practical purposes, and the loading data shown for the 40-63 will give the same results in any of the cases. The 40-65 Everlasting is one of the rarer Ballard cartridges and is seldom encountered. It should be possible to convert the 45-70 case to work in these rifles.

40-70 Sharps (Straight)

Historical Notes This is the 40-2½" straight case introduced in 1876. It is sometimes referred to as the 40-65 because with heavy reloadable cases that is all the powder it would hold unless a lighter bullet was used. Remington and Winchester single shots also chambered this round.

General Comments This is another cartridge with ballistics similar to a half-dozen others of different make or origin. There are actually more than a dozen 40-caliber cartridges with powder charges of from around 40 to 70 grains, and none offer any stupendous advantage over the others. Like other 40 Sharps numbers, this one used a .403-inch diameter bullet, weighing 330 or 370 grains. There are a number of Lyman moulds available in this size. Although longer, this case has the same basic body as the 30-40 Krag. But because headspacing is on the rim, it may not be possible to safely use that case to make the 40-70 except for very low pressure loads.

40-70 Sharps (Straight) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
330 Lead	IMR 4198	23	1250	1150	Lyman #403149
330 Lead	FL		1258	1160	Factory load

40-70 Sharps (Necked)

Historical Notes This is the 40-2¼" bottlenecked Sharps that was brought out in 1871 for the Model 1871 Sporting rifle. It was used in other single shot rifles also.

General Comments The 40-70 necked cartridge had a reputation for fine accuracy and was popular as a match cartridge as much as for hunting. While many people regard the Sharps rifles as strictly buffalo guns, Sharps also made match rifles that gained worldwide respect on the range. Whence the name, Sharps-shooter. The best shots were given Sharps rifles in a special squad and their notoriety grew until the single word "sharpshooter" was synonymous with accurate rifle fire. It should be possible to convert the 45-70 case to work in these rifles but the neck would be very short. The 45 Basic will make perfect cases.

40-70 Sharps (Necked) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
330 Lead	IMR 4759	26	1510	1671	
330 Lead	IMR 4198	27	1450	1542	Lyman #403139
330 Lead	FL		1420	1482	Factory load

40-85 Ballard
40-90 Ballard

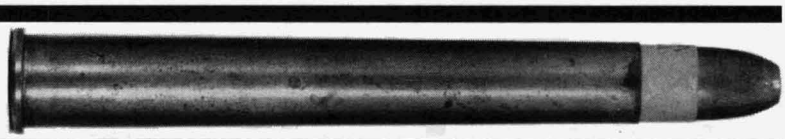
Historical Notes The 40-85 and the 40-90 Ballard are the same case with different loadings. L.D. Satterlee lists the 40-90 Everlasting with the J.M. Marlin Ballard Pacific No. 5 and Sporting No. 4½ (introduced in 1878). He shows the 40-85 chambering for the Pacific No. 5 after the Marlin Fire Arms Co. took over manufacture in 1881.

General Comments The 40-90 Everlasting is heavier and about ⅛-inch longer than the regular 40-90 or 40-85 brass. Many of the 40-90 Everlasting cases were nickeled. This is a hunting cartridge very similar to the 40-90 Sharps straight. The same loading data can be used for both, however they are not interchangeable. Although the case of the 40-85 Ballard is longer, it has the same basic body as the 444 Marlin case. It should be possible to make usable, albeit shorter, cases from those.

40-85/40-90 Ballard Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
370 Lead	IMR 4198	28	1400	1615	Lyman #40395
370 Lead	FL		1427	1672	Factory load

40-90 Sharps (Straight)



Historical Notes Sharps catalogs do not list this cartridge although Sharps rifles (and others) chambered for it are known. It was introduced about 1885. The Remington-Hepburn No. 3 single shot was advertised in this caliber and UMC and Winchester manufactured cases and ammunition.

General Comments The so-called "Everlasting," or reloadable case, was popular with hunters and target shooters during the 1880-90 period. These heavy cases could be used over and over many times. In fact, they were made so heavy that the powder capacity was often reduced by 5 or 10 grains. To get around this, the "Everlasting" case was often made longer than the standard. UMC cases of 40-3¼-inch-caliber are almost always of very heavy, reloadable construction.

The reason for mentioning this is that it might have a bearing on the origin of this cartridge. Physical measurements of the so-called 40-90 Sharps Straight are practically identical to the 40-90 Ballard, except for the length. It is possible that the design of the 40-90 Sharps straight is based on lengthening the Ballard cartridge to create an "Everlasting" version with the same capacity and ballistics. Anyway, the idea is worth mentioning and would probably occur to anyone who compared the two. Although longer, this case has the same basic body as the 444 Marlin. It should be possible to make usable, albeit shorter, cases from those.

40-90 Sharps (Straight) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
370 Lead	IMR 4198	30	1400	1612	Lyman #403171
370 Lead	FL		1387	1582	Factory load

40-90 Sharps (Necked)

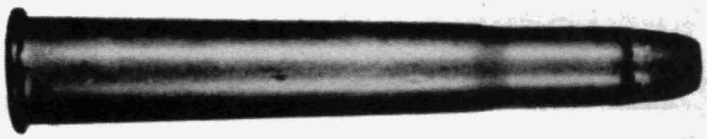
Historical Notes The 40-90 Sharps was introduced in 1873 for the Sharps side-hammer model rifles. There was also another loading, referred to as the 40-100 Sharps, that had a 190-grain hollowpoint bullet. There is no difference in the $2^{5}/_{8}$-inch case, however.

General Comments This became one of the more popular Sharps cartridges. The hollowpoint Express bullets made by Sharps were designed to accept a 22 rimfire blank, which was supposed to provide explosive expansion and better knockdown. The author has experimented with bullets of this type, and they don't work as they are intended to. An ordinary hollowpoint or a properly constructed softpoint will do as much damage. Perfect cases can be made from the 45 Basic brass.

40-90 Sharps (Necked) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
370 Lead	IMR 4198	28	1450	1735	Lyman #403171
370 Lead	FL		1475	1800	Factory load

40-110 Winchester Express (40 Express)



Historical Notes Designed for the Winchester single shot rifle and introduced in 1886, the 40-110 was intended to compete with the big Sharps cartridges.

General Comments In its original form, the 40-110 used a copper-tubed bullet. The Ideal catalog lists bullet No. 403169 (260 grains) as proper for reloading. The 50 Basic will make perfect cases.

40-110 Winchester Express Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
260 Lead	FG	110	1617	1509	
260 Lead	IMR 4198	32	1650	1580	Lyman #403169
260 SP	FL		1617	1509	Winchester factory load

40-60 Winchester

Historical Notes The 40-60 Winchester is a sharply-tapered, slightly-necked cartridge for the Model 1876 Winchester rifle, which is a heavier version of the lever-action Model 1873 designed to handle more powerful cartridges. Rifle and cartridge were marketed from 1876 until 1897. This was a fairly popular caliber and Winchester continued to load it up to 1934.

General Comments The big powerful cartridges available for the Sharps and other single shot rifles forced Winchester to bring out a more efficacious line for their repeaters. The cartridges for the Centennial Model were the beginning of such a trend. This is not the same as the 40-60 Marlin. It is a better hunting caliber than the old 44-40 WCF. The 45-70 case can be easily converted to 40-60 Winchester brass.

40-60 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
210 Lead	IMR 4198	21	1520	1083	Lyman #403168
210 Lead	FL		1562	1138	Winchester factory load

40-70 Winchester

Historical Notes This cartridge was developed for the Model 1886 Winchester repeater and also used in the Winchester single shot. It was introduced in 1894, but never became popular or widely used. The Marlin Model 1895 repeating rifle was also available in this caliber.

General Comments This is a bottlenecked case generally similar to the 38-70 Winchester. It provides a larger, heavier bullet in a cartridge suitable to the same action as the 38-caliber. This case is not the same as that of the 40-72 Winchester. However, the ballistics are nearly identical. It should be possible to convert the 45-70 case to work in these rifles but the neck would be short. The 45 Basic will make perfect cases.

40-70 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
330 Lead	IMR 4759	26	1540	1738	
330 Lead	IMR 4198	25	1380	1050	Lyman #406150
330 Lead	FL		1383	1333	Factory load

40-70 Remington

Historical Notes Although listed as the 40-70 Remington, this cartridge is really Remington's version of the 40-70 Sharps necked. The Remington rolling block No. 1 Sporting Model chambered it and so did the Hepburn No. 3. It was added to the Remington line in 1880.

General Comments Two versions of this cartridge were available; the regular brass case and a special reloading case with a brass body and steel head. The steel head fastened to the brass body with an inside screw, which served as a primer anvil and also had the flash hole drilled through it. Steel head cases in 1880! There really is nothing new under the sun. The 40-70 was more of a match than a hunting cartridge. It should be possible to convert the 45-70 case to work in these rifles but the neck would be very short. The 45 Basic will make perfect cases.

40-70 Remington Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
330 Lead	IMR 4198	27	1450	1542	Lyman #403139
330 Lead	FL		1420	1482	Remington factory load

40-65 Winchester

Historical Notes The 40-65 Winchester & Marlin was introduced in 1887 for the Model 1886 Winchester rifle. The Winchester single shot also chambered it and so did the Marlin Model 1895. The 40-65 Winchester was loaded in both black and smokeless versions and Winchester catalogs listed it to 1935.

General Comments The 40-65 was a further effort to put more steam in the repeating rifles' cartridges so they would be competitive with similar single shot cartridges. This one, reasonably popular, continued for almost 50 years. Rifles of this caliber are fairly common and ammunition can be made by reforming 45-70 brass.

40-65 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
260 Lead	IMR 4198	23	1500	1308	Lyman #403169
260 Lead	IMR 3031	44	1720	1708	
260 Lead	FL		1420	1165	Factory load
260 Lead	XMP 5744	26.0	1651	1573	Accurate Arms
300 Lead	XMP 5744	24.0	1515	1528	Accurate Arms

40-72 Winchester

Historical Notes Introduced for and with the Winchester Model 1895 lever-action, box magazine repeater, the 40-72 wasn't very popular, but was loaded until 1936.

General Comments This cartridge uses a smaller diameter bullet 30 grains heavier than the much more powerful 405 Winchester. The latter was preferred by most purchasers of the Model 1895. Blackpowder cartridges of the 1890s suffered from competition with the new smokeless powder cartridges. Most blackpowder cartridges of that era didn't have a chance to establish any degree of popularity. Although longer, this case has the same basic body as the 30-40 Krag. But because headspacing is on the rim, it may not be possible to safely use that case to make the 40-72 except for very low pressure loads.

40-72 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
330 Lead	IMR 3031	40	1435	1510	Lyman #406150
300 Lead	FL		1425	1350	Winchester factory load
330 Lead	FL		1407	1451	Winchester factory load

40-82 Winchester

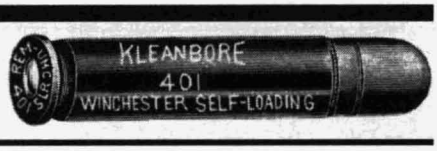
Historical Notes Introduced in 1885 for the Winchester single shot and also available for the Model 1886 lever-action repeater, this cartridge was popular enough to make the transition into the smokeless powder era. It was loaded up to 1935.

General Comments The 40-82 WCF gained a favorable reputation on elk and heavy game. It developed a higher muzzle velocity than many other blackpowder cartridges which made it easier to hit over unknown distances. Despite the relative popularity, rifles in this caliber are seldom encountered. Most of the original single shots and Model 1886s have been rebarreled to some more modern caliber. It should be possible to convert the 45-70 case to work in these rifles but the neck would be very short. The 45 Basic will make perfect cases.

40-82 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
260 Lead	IMR 4198	28	1425	1180	Lyman #403169
260 Lead	FL		1490	1285	Winchester factory load

401 Winchester Self-Loading (401 WSL)



Historical Notes The 401 was introduced by Winchester in 1910 for their new Model 10 autoloading rifle, which was a minor modification of the Model 1907. Both the cartridge and the rifle were discontinued in 1936, but the ammunition was loaded by most ammunition companies until after WWII. It is another obsolete "Self-Loading" cartridge.

General Comments The 401 is the most powerful of the Winchester autoloading line, and the only one suitable for deer. The 401 found favor with many hunters as a quick, short-range number for hunting deer and black bear. Velocity is too low and the trajectory too high for this to be a useful cartridge for anything but woods and brush use. It can be reloaded, but like all cartridges used in semi-auto guns, it is necessary to stick to the factory ballistics or the rifle action may not function properly. Proper bullet diameter is .406-inch.

401 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
200 SP	2400	24.7	1915	1625	Lyman
212 Lead	IMR 4227	29.0	2074	2025	Lyman
240 Lead	IMR 4227	27.5	1968	2150	Lyman
200 SP	FL		2135	2020	Winchester factory load
250 SP	FL		1870	1940	Winchester factory load

40-70 Peabody "What Cheer"

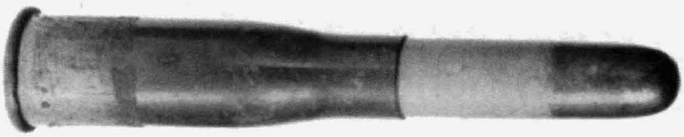
Historical Notes Made for the Peabody-Martini rifles (made by the Providence Tool Co.), this is one of a series of cartridges named for the "What Cheer" rifle range outside Providence, Rhode Island opened in 1875. The first of the Peabody sporting and target rifles was said to have been exhibited at the opening celebration. The 40-70 cartridge actually wasn't introduced until 1877 or 1878. The Union Metallic Cartridge Co. loaded the round and so did Winchester.

General Comments This is an odd-shaped cartridge with a long, tapered shoulder and short body. Most samples have Berdan priming. Bullet diameter is .408-inch, but most .406-inch bullets are cast sufficiently oversize to meet this diameter. This is not a common cartridge in collections, and rifles of this caliber are rare.

40-70 Peabody "What Cheer" Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
330 Lead	IMR 4198	22	1350	1340	Lyman #406150
380 Lead	FL		1420	1710	Factory load

40-90 Peabody "What Cheer"



Historical Notes This unusually shaped cartridge was for the Peabody-Martini Rifle No. 3, introduced in 1877-78. This rifle was a fancy model similar to the No. 2 "Creedmoor," but designated the "What Cheer," in line with the Peabody policy of naming their rifles after famous target ranges of the day.

General Comments The 40-90 Peabody is a bottlenecked case similar to the other "What Cheer" cartridges. This was a popular match cartridge until the early 1900s. Proper bullet diameter is .408-inch. Bullets intended for the 405 Winchester can be sized down and used in this round. No one lists a mould for a 500-grain bullet of this caliber.

40-90 Peabody "What Cheer" Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
330 Lead	IMR 4198	27	1450	1550	Lyman #406150
500 Lead	FL		1250	1735	Factory load

405 Winchester

Historical Notes The 405 is another of the rimmed cartridges developed for the Winchester Model 1895 lever-action rifle. Introduced in 1904, the rifle became obsolete in 1936. The Winchester single shot also chambered the 405, and a number of double rifles were turned out in this caliber in England and Europe. The Remington-Lee bolt-action rifle was available in 405-caliber between 1904 and 1906. The old Eley-Kynoch catalog lists the 405 Winchester with a 300-grain softpoint bullet and standard factory ballistics.

General Comments The 405 Winchester is the most powerful rimmed cartridge ever developed for the lever-action rifle. It is adequate for any North American big game at short- to medium-range and has been used successfully in Africa on all species. In the old Model 1895 Winchester, with its curved buttplate and poorly-designed stock, it had a reputation for punishing recoil. Theodore Roosevelt used the 405 in Africa and thought very highly of it as a lion cartridge. However, John Taylor in his excellent book, *African Rifles and Cartridges,* rates it as a poor choice compared to other available calibers for African use. The short, fat 300-grain round-nosed bullet loses velocity rapidly and lacks the sectional density necessary for deep penetration of heavy game. Nevertheless, it is quite adequate for any North American animals at ranges of 100 to 150 yards. Although longer, this case has the same basic body as the 30-40 Krag. But because headspacing is on the rim it is not possible to safely use that case to make 405s except for very low pressure loads, which I have done. With modern jacketed pistol bullets one can thus make perfectly adequate short-range deer loads.

405 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
290 Cast	IMR 3031	40.0	1500	1449	Lyman #412263
300 SP	IMR 4895	56	2230	3321	
300 SP	IMR 3031	57	2250	3380	
300 SP	FL		2200	3220	Winchester factory load

40-75 Bullard

Historical Notes Introduced in 1887 for the Bullard lever-action repeating rifle and also available for the single shot, the 40-75 was the same case with a different bullet weight and powder charge as the 40-60 Bullard.

General Comments This is a big game cartridge similar in performance to the 40-60 Marlin or the 40-65 Winchester. The Winchester cartridge achieved the greatest popularity of the three. Proper cast bullet diameter is .413-inch, which is slightly larger than many of the other 40-caliber cartridges which used a bullet of .403-inch. The old Bullard catalog states that the 40-60 Marlin can be fired in guns of the above caliber. If so, then the 40-65 WCF could also be used, as it is the same case as the Marlin round. It should be possible to convert the 45-70 case to work in these rifles.

40-75 Bullard Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
260 Lead	Fg	75	1513	1315	Lyman #412174
260 Lead	IMR 4198	20	1500	1302	Lyman #412174
258 Lead	FL		1513	1315	Factory load

40-90 Bullard

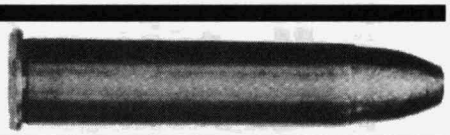
Historical Notes This rather odd bottlenecked cartridge was developed for the Bullard single shot and repeating rifles, introduced in 1886-87. Both Winchester and Remington manufactured this round for a number of years.

General Comments This is a rather large, fat cartridge with ballistics similar to other 40-caliber cartridges of the period such as the 40-82 Winchester. There was not a lot to choose from regarding performance with any of them. The cartridges designed by the big manufacturers for their rifles were more widely advertised and distributed, and consequently won the popularity race. Cartridges like the Bullard line gradually faded into the background. The 40-90 Bullard was undoubtedly an effective big game caliber, particularly if the now-rare 400-grain loading was used. It should be possible to convert the 348 case to work in these rifles.

40-90 Bullard Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
300 Lead	Fg	90	1569	1648	Lyman #415175
300 Lead	IMR 4198	29	1450	1405	Lyman #415175
300 Lead	FL		1569	1648	Factory load

40-40 Maynard (1882)



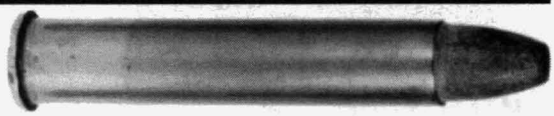
Historical Notes A cartridge for the Maynard 1882 rifle, Improved Hunting or Target No. 9 and the Mid Range Target or Hunting No. 10, it was advertised as a combination hunting and target caliber.

General Comments In performance, the 40-40 is similar to the 44-40 WCF. Maynard made only two bullet weights in 40-caliber; the 330-grain was intended for the longer 40-60, but was sometimes used in the 40-40. Bullet diameter of these cartridges is not the same as the .403-inch of most Sharps and Winchester calibers. The Maynard Company sold moulds or factory-made bullets for their rifles. The 40-caliber diameter is usually .415- to .417-inch in these Maynards. It should be possible to convert the 303 British case to work in these rifles.

40-40 Maynard 1882 Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
260 Lead	IMR 4198	24	1400	1140	Lyman #413174
270 Lead	FL		1425	1222	
330 Lead	FL		1260	1168	Factory load.

40-60 Maynard (1882)



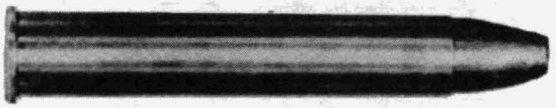
Historical Notes This is an intermediate-range match cartridge for the 1882 Maynard Models 10, 12 and 13 Hunting and the Models 15-16 Target rifles. It does not use the same case as the longer 40-70 Maynard.

General Comments The 40-60 Maynard is an elongated version of the 40-40 and differs mainly in the longer case length. Unfortunately, it duplicated the performance of similar Marlin, Sharps and Winchester cartridges, and for that reason, it did not become popular or widely used. It should be possible to convert the 303 British case to work in these rifles.

40-60 Maynard 1882 Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
300 Lead	IMR 4198 26	1370	1248	Lyman #413175
330 Lead	FL	1370	1380	Factory load

40-70 Maynard (1882)



Historical Notes One of three 40-caliber cartridges for the 1882-type Maynard single shot rifle, which was available in both target and hunting models.

General Comments Some publications show the 40-70 Maynard to be the same as the 40-60, but with a different load. Others indicate that it is identical except for length. As a matter of fact, it has a little longer case (.21-inch) with a slightly larger rim and base diameter. The 40-60 can be fired in a 40-70 chamber, but the reverse is not true. In overall length, this is the shorter of the two cartridges because of the lighter bullet seated farther down in the case. This is more of a hunting cartridge, even though it was also available in the target rifle models. It should be possible to convert the 303 British case to work in these rifles.

40-70 Maynard (1882) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
260 Lead	IMR 4198 27	1450	1211	Lyman#413174
270 Lead	FL	1645	1620	Factory load

44 Evans Short

Historical Notes This is the cartridge for the various Old Model Evans rifles introduced in 1875. Winchester loaded the ammunition until the early 1920s.

General Comments The Evans rifle was designed for military use, but when it was turned down by the U.S. Ordnance Department, it was manufactured as a sporting number. The Evans had a magazine capacity of 34 cartridges held in the four-column tubular magazine located in the butt. It was an odd-looking lever-action rifle. Evans rifles were once fairly common items and box lots of ammunition could be purchased until 1940-41. It is not a particularly strong action, so use blackpowder loads. A load of 28 grains of Fg or FFg was used in the original round. Cases can be made by cutting off 303 Savage cases and perhaps thinning the rim as required. (As in similar rim thinning situations pistol primers may have to be used, but those are preferable in almost every blackpowder or blackpowder pressure load anyway.)

44 Evans Short Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
215 Lead	FL	850	350	Winchester factory load

44 Evans Long

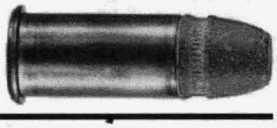
Historical Notes The 44 Evans Long was developed for the 1877 New Model Evans sporting rifle. It is sometimes referred to as the 44-40 Straight or the 44-40-300 because of its different loadings.

General Comments The New Model Evans rifle was similar to the Old Model except for the change to a longer, more powerful cartridge. The magazine capacity was only (!) 26 rounds compared to 34 for the Old Model. Again, this is not a strong action, so it is advisable to use only blackpowder loads. The cartridge was loaded with 275- to 300-grain bullets and 40 to 43 grains of blackpowder. Although this case is somewhat larger in diameter, usable cases might be made by cutting off 303 Savage cases as with the the Henry Flat Center Fire Flat. As with all similar numbers, it is best to load only with blackpowder or Pyrodex.

44 Evans Long Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
280 Lead	FL	1200	903	Factory load

44 Henry Center Fire Flat



Historical Notes This is a centerfire version of the rimfire 44 Henry Flat. It is believed to have been a special cartridge manufactured for the final lot of 1866 Henry rifles made by Winchester. Since the rifle was discontinued in 1873, it would be reasonable to assume the above cartridge was developed about that time.

General Comments Rifles for this cartridge are extremely rare. The 1866 Henry rifle was not very strong, and if anyone has one of them and wants to shoot it, stick to blackpowder. The proper charge is 26 or 28 grains of FFg or FFFg. Bullets for the 44-40 WCF can be used. Cases can be made by cutting off 303 Savage cases and, perhaps thinning the rim, as required. (As in similar rim thinning situations, pistol primers may have to be used, but these are preferable in almost every blackpowder or blackpowder pressure load anyway.)

44 Henry Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
200 Lead	FL	1150	594	Factory load
227 Lead	FL	1200		Factory load

44 Game Getter
44-40 Marlin
44 Colt Lightning

Historical Notes In 1908, Marble Arms Corp. introduced their Game Getter, a double-barrel, over/under pistol with a removable skeleton buttstock. The upper barrel was rifled and chambered for the 22 rimfire cartridge; the lower barrel was smoothbore and chambered for the 44 Shot cartridge. The introduction of this pistol bolstered the popularity of the several varieties of 44 Shot cartridges.

The Stevens Model 101 "Featherweight" rifle (1914-16) chambered this caliber as well as the 44XL and 44 WCF shot cartridges. The 44 WCF Shot cartridge was a crimped case with cardboard wadding; others were loaded with a wood or paper "bullet" that enclosed the shot. The Marble catalog of 1914 stated, "Shot cartridges with paper or wooden ends are especially adapted to rifled barrels. However, they can be used in the Game Getter, but give uncertain results." UMC loaded a 44 Round Ball cartridge before the introduction of the Game Getter, using 34 grains of blackpowder and a 115-grain round lead ball bullet. This combination of gun and cartridge became very popular and Winchester and U.S. Ammunition Co. began to offer it, calling it the 44 Game Getter.

General Comments The 44-40 is, of course, still loaded today, but during its life span as a blackpowder cartridge (and the early smokeless days) it was available in a variety of loads that are now obsolete.

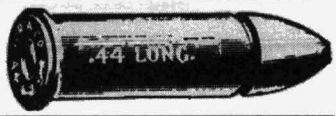
The standard load of 40 grains of blackpowder and a 200-grain bullet of the 44 WCF was altered slightly (a 217-grain bullet was used) and the resulting cartridge was called the 44-40 Marlin or the 44 Colt Lightning Magazine Rifle. All are nothing more than load variations on the standard 44-40 Winchester; some rifles may require shorter overall cartridge lengths.

Also obsolete today are the high-velocity smokeless powder loads that were offered for rifles with stronger actions.

44-40 Extra Long

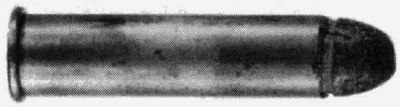
General Comments The 44-40 Extra Long is listed in various publications and sample rounds are fairly common. It has a longer body and neck than the standard 44-40 WCF. The author was unable to find any record of what gun it is for. It is listed so the reader will not confuse it with the straight Ballard or Wesson Extra Long 44 cartridges. They are not the same. Some believe this is the 44-40 shot case with a conical bullet. According to William R. Small of Ojo Caliente, New Mexico, the Stevens Model 101 "Featherweight" rifle (1914 to 1916) chambered this round as well as the 44XL and 44 WCF shot cartridges. Cases can be made by shortening and necking 444 Marlin cases.

44 Long Centerfire (Ballard)



Historical Notes The 44 Long CF, was introduced in 1875-76 as one of the calibers for the J.M. Marlin Ballard Sporting Rifle No. 2. It was also used in a number of other single shot rifles, including those of Frank Wesson. It was replaced by the 44 Extra Long CF, before both were phased out by the more popular 44-40 WCF. It is the centerfire equivalent of the 44 Long rimfire.
General Comments This is a more or less transitional cartridge from the rimfire to the better centerfires. Most early breechloading rifles were developed for rimfire cartridges and it was a simple matter to bring out a similar centerfire for the same rifle. This allowed the shooter to reload, however most of these cartridges were no more effective than the rimfire they replaced so they didn't last long. Ammunition for old rifles of this caliber can be made from 44 S&W Special brass, but stick to blackpowder in loading. Original load used 35 grains of blackpowder and a 227-grain bullet. Muzzle velocity was low, only about 1100 to 1200 fps. As with the 44 Evans Long, Short or Henry Flat Center Fire, cases can be made by cutting off 303 Savage cases.

44 Extra Long Ballard

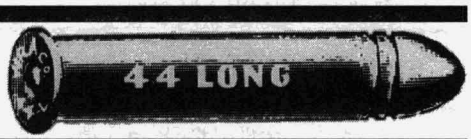


Historical Notes This cartridge is sometimes listed simply as the 44 Extra Long. It is a straight case and is the centerfire version of the 44 Rimfire Extra Long. As near as can be determined, it was introduced in 1876 for the J.M. Marlin Ballard Sporting Rifle No. 2. It was only available for a few years, before being replaced in the Ballard rifles by the 44-40 WCF. Rifles of this caliber are rare today.
General Comments The 44 Extra Long was not a popular Ballard number because there were too many better 44-caliber cartridges available. The 44-40 WCF was already popular by the time the Ballard round hit the market and the 44 Extra Long was available only in the single shot. It did, however, provide a reloadable case for those used to the 44 E.L. rimfire and quite a few of the old rimfire rifles were probably converted to use the centerfire type. Remington loaded this with 50 grains of blackpowder and a 265-grain bullet. Cases can be made by cutting off 303 Savage cases as mentioned in the discussion about the 44 Henry Flat Center Fire.

44 Extra Long Ballard Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
265 Lead	FL	1320	1030	Remington factory load

44 Wesson Extra Long



Historical Notes Made for the Frank Wesson tip-up rifles, this cartridge appears to be identical to the 44 Extra Long Ballard except for the shape of the bullet. The Wesson bullet shows two grease grooves when loaded in the case while the Ballard shows only one.
General Comments Many of the Wesson tip-up rifles were furnished with a patented adjustable hammer, permitting the use of both rim- and centerfire cartridges. Lyman No. 419182 (240-grain) or 424100 (170-grain) bullets can be adapted to this cartridge. Original load used 48 to 50 grains of blackpowder. Wesson rifles in this caliber are very rare. As discussed with the 44 Henry Flat Center Fire, cases can be made by cutting off 303 Savage cases.

44 Wesson Extra Long Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
250-257 Lead	FL	1340	1010	Factory load

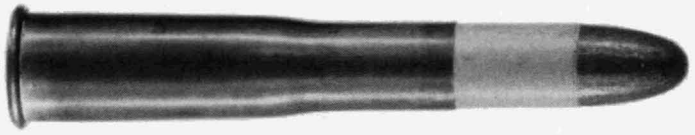
44-90 Remington Special (Necked)

Historical Notes The 44-90 Remington Special looks like the 44-90 Sharps, but on closer inspection it has a shorter case with slightly larger body diameter so they are not interchangeable. The 40-90 was introduced as a match cartridge for the Remington rolling block Creedmoor series in 1873. Remington catalogs listed empty cases and bullets of this caliber as late as 1910.
General Comments The 44-77 Sharps had a $2^{1}/_{4}$-inch case, the 44-90 Sharps a $2^{5}/_{8}$-inch case. The 44-90 Remington Special case was $2^{7}/_{16}$ inches or 2.44 inches long. The Remington cartridge was regularly loaded with a 550-grain patched or lubricated lead bullet which is heavier than the normal bullet used in Sharps cartridges. Remington probably designed their 44-90 so they could use a heavy bullet and 90 grains of powder without increasing the overall length of the cartridge. The loaded length is actually less than the similar Sharps cartridges. This is primarily a match cartridge, but would also be effective on almost any big game. Lighter bullets and more powder could be used to increase black-powder ballistics for hunting. It might be possible to form 45-70 cases to work in these rifles but the neck would be very short. Usable cases can be formed from the Basic 45.

40-90 Remington Special Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
470 Lead	IMR 4198	30	1270	1688	Lyman #446187
470 Lead PP	Fg	90			Early factory load, paper patch
550 Lead	Fg	90	1250	1812	Remington factory load

44-95 Peabody "What Cheer"

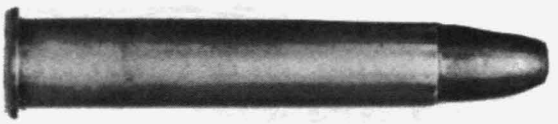


Historical Notes The 44-95 Peabody also had a 100-grain loading and was referred to as the 44-100 Peabody on occasion. It is the largest of the Peabody "What Cheer" cartridges. It was the original caliber for the Peabody-Martini Long-Range Creedmoor Rifle. The straight stock version was the No. 3 "What Cheer" and eventually the cartridge was given this name. Some authorities say it was introduced in 1877, but it may have made its debut as early as 1875. It was popular primarily as a target round.
General Comments Peabody and Peabody-Martini rifles were manufactured by the Providence Tool Company of Providence, Rhode Island. The action was patented by H.L. Peabody of Boston, Massachusetts in 1862. Peabody-Martini military rifles were manufactured for the Turkish government during 1873 and something like 600,000 were delivered. The original Peabody pivoting block action had a sidehammer, but the Swiss Martini modification did away with this, employing an internal lock. The British Martini-Henry rifle is based on this modified American design. This is one of the strongest of the old single shot actions.

44-95 Peabody "What Cheer" Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
470 Lead	Fg	100	1380	1990	Lyman #446187
470 Lead	IMR 4759	21	1380	1990	Lyman #446187
550 Lead	FL		1310	2100	Factory load

44-70 Maynard (1882)



Historical Notes Introduced for the 1882-type Maynard single shot rifle, the 44-70 was also available for the Hunters Model No. 11 and the Creedmoor No. 14 match rifle.
General Comments The 44-70 Maynard is a 44-caliber version of the popular 45-70 Government military round. Many riflemen of the late 1880s preferred the 44-caliber over the larger 45 bore, though there is little difference in bore dimensions. The Maynard company furnished a 430-grain bullet for hunting and general shooting and a 520-grain for target work. Although somewhat too short, 45-70 cases will work in these rifles.

44-70 Maynard (1882) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
470 Lead	IMR 4198	26	1300	1768	Lyman #446187
430 Lead	FL		1310	1640	Factory load

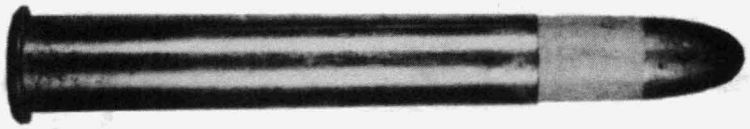
44-75 Ballard Everlasting

Historical Notes The 44-75 is one of the rare Ballard cases. Seldom found in collections and not mentioned in most cartridge books, L.D. Satterlee* lists it as available for the J.M. Marlin Ballard Perfection No. 4, Pacific No. 5 and Schuetzen No. 6, all introduced in 1876. He gives the case length as 2¼-inches.† The caliber is not listed in the Marlin Fire Arms Co. after they began making Ballard rifles in 1881. James J. Grant** says this was one of the special Marlin Everlasting cases using the shallow Berdan-type #2 primer similar to the 40-65. He also has specimens using Large Rifle primers.

General Comments The 44-75-2½-inch can be made by trimming and sizing Sharps 45-2 6/16-inch brass. It must have been intended as both a target and hunting cartridge since it was available in rifles of both types. Marlin and Ballard catalogs listed a patched 405-grain, 44-caliber bullet which was probably one of the weights used in the 44-75. Bullets for 44-caliber Sharps cartridges of .446-inch diameter can be adapted to the 44-75 Ballard. No factory ballistics are available, so it is probable that only empty cases and bullets were furnished.

*op. cit.
***More Single Shot Rifles* (New York, 1959).
†John T. Amber owned a fine No. 7 Ballard in 44-75 caliber, complete in case with hunting and target sights, etc., and including a score or more of cases. All of these were 2½ inches long, not 2¼ inches, and were Berdan-primed Everlasting type.

44-100 Ballard



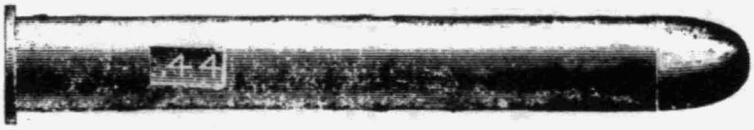
Historical Notes The 44-100 Ballard Everlasting was one of the calibers introduced with the various J.M. Marlin Ballard rifles. It is first listed for the 1876 Model Pacific No. 5 and Long Range No. 7A. It was discontinued about 1880 and does not appear as a standard caliber in the later Marlin Fire Arms Co. catalogs. However, the 1888 Marlin & Ballard catalog again lists the brass shells under obsolete sizes at 12 cents each. The 45-100 Ballard that came out at a later date is based on this same case with the neck reamed out to accept the larger diameter bullet.

General Comments This is another rare Ballard cartridge. It was an accurate target number and had considerable knockdown power for big game. Ballard rifles were manufactured by several companies. The best known of these were made by the Marlin Fire Arms Co. after it was incorporated in 1881. Most of their models and cartridges are not particularly scarce. John M. Marlin organized the Marlin Fire Arms Co., but prior to that he turned out Ballard rifles under the name of J.M. Marlin (1875 to 1881). The first Ballard arms were for rimfire cartridges, and these were introduced by Ball & Williams in 1861, and continued until 1866 under their brand. From 1866 to 1869, they were made by Merrimack Arms & Manufacturing Co. and from 1869 to 1873 by Brown Manufacturing Co. Some of these early models and cartridges are rare and valuable. Although the 44-100 Ballard is larger and somewhat longer in diameter, it might be possible to form 45-70 cases to work in these rifles. Basic 45s could be cut to the proper length. In either case one might have to turn down the rim to fit the chamber.

44-100 Ballard Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
365 Lead	Fg	110	1500	1830	Lyman #446109
365 Lead	IMR 4198	26	1350	1480	Lyman #446109
535 Lead	FL		1400	2328	Factory load

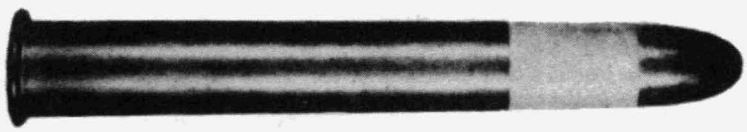
44-100 Wesson



Historical Notes As with the 44-85 Wesson, this one was found on a U.S. Cartridge Company advertising sheet printed in 1881-82. This is also a straight case with the length listed as 3⅜ inches. The bullet is seated deeply so the total length of the loaded cartridge is 3 9/10 inches. The load is given as 100 or 120 grains of blackpowder with a 550-grain paper patched bullet.

General Comments What date and what rifle? There is no information given on this. As previously stated, all 44-caliber Sharps cartridges are necked, and perhaps this is intended as the straight case counter to the necked 44-100 or 105 (2⅝ inches) Sharps. This is speculation, but many shooters of this period did prefer the straight case. The 44-100 Wesson is not listed in any previous cartridge book, and now that its existence has been brought to the attention of collectors, additional information may be forthcoming. The muzzle velocity of this combination would be approximately 1350 to 1400 fps, depending on charge, barrel length, etc.

44-100 Remington "Creedmoor" 44-90 Remington Straight



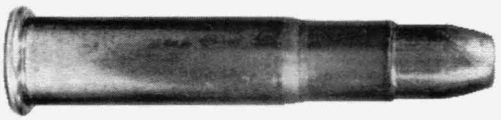
Historical Notes The 44-100 cartridge was for the Remington-Hepburn or No. 3 Long-Range Creedmoor rifle. It was introduced in 1880. This is the special $2^{6}/_{10}$-inch shell that had various loadings and bullets plus the usual variety of designations for the same round. It may have been designed to furnish a straight case as an alternative to some of the necked Sharps 44 cartridges.

General Comments Also known as the 44-$2^{6}/_{10}$-inch and 44-90 Remington Straight, this was designed as a match cartridge for long-range shooting out to 1000 and even 1400 yards. It was moderately popular, but rifles of this caliber are scarce. The cartridge is a collector's item. Remington manufactured a number of match rifles designated "Creedmoor," and this is the correct spelling of the Creedmoor, Long Island rifle range. However, they also made ammunition in various calibers under the "Creedmore" label with a different spelling. Ammunition so designated had a target-type bullet and very often was for rifles that had never been called "Creedmoor" by the manufacturer. This has caused no end of confusion, although they changed the spelling to try to prevent it. Both Remington and Winchester furnished empty cases and bullets for handloading.

44-100 Remington "Creedmoor" Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
470 Lead	IMR 4198	27	1410	2080	Lyman #446187
520 Lead	FL		1435	2380	Remington factory load
550 Lead	FL		1380	2338	Remington factory load

44-77 Sharps & Remington



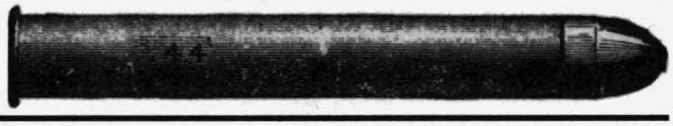
Historical Notes This is the $2^{1}/_{4}$-inch Sharps bottlenecked case introduced in 1869 for the Model 1869 Sharps breech-loading sporting rifle. It was also one of the calibers available for the Remington-Hepburn or No. 3. It was a popular target round, used more for this purpose than hunting. The design of the 44-77 is said to have been based on a combination of the 42 Russian and the 43 Spanish military cartridges.

General Comments A variety of factory loadings were turned out for the 44-77, with bullet weights from 300 grains to 470 grains. It is sometimes listed as the 44-70 or 44-75 depending on the powder charge used. Remington made an unusual two-piece reloadable case with a steel head and brass body.

44-77 Sharps & Remington Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
365 Lead	IMR 4198	28.0	1480	1782	Lyman #446109
470 Lead PP	Fg	77.0			Early factory load, paper patch
365 Lead	FL		1460	1730	Factory load

44-85 Wesson



Historical Notes The 44-85 Wesson is another of the mysterious and little-known Wesson cartridges. What little information is available was picked up from a U.S. Cartridge Company advertising sheet printed in 1881-82. The 44-85 is a straight case with a length of $2^{7}/_{8}$ inches. All 44-caliber Sharps cartridges were necked, so it isn't similar to any of those. There is nothing to indicate which of the Wesson rifles it was for, but with that length, it was probably meant for the Creedmoor models.

General Comments It is well to point out that during the late 1800s many riflemen didn't like bottlenecked cases. It may be that Frank Wesson introduced this cartridge because all the Sharps 44 cases were necked and some individuals wanted the same thing in a straight case. The U.S.C.C. load had a 390-grain patched bullet backed up by 85 grains of Fg blackpowder. This would have developed a muzzle velocity of approximately 1450 fps in the average rifle.

44-85 Wesson Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
390 Lead	Fg	85	1450	1821	Factory load

44-90 Sharps Necked (44-100 Sharps 2⅝"/ 44-105 Sharps Necked)

Historical Notes This is the 44-90 Sharps 2⅝-inch case of larger capacity than the 44-77 Sharps. It was the caliber for the Sharps 1873 Creedmoor rifle made by the old Sharps Rifle Manufacturing Company before its reorganization in 1875-76 and was also chambered in later side-hammer models. Advertisments list it as early as June of 1873. Sharps rifles of 44-caliber were discontinued during 1878 in favor of the more popular 45-caliber.

General Comments These are just different loadings and bullet weights. Ammunition was available with bullets weighing 277, 450, 470, 500 and 520 grains. It was not as popular for hunting as some of the other Sharps calibers, but was used for 1000-yard match shooting. There is a version of this that has a 0.19-inch shorter case. Both are listed in the 1910 Winchester catalog. It might be possible to form 45-70 cases to work in these rifles but the neck would be very short. Perfect cases can be formed from 45 Basic brass.

44-90 Sharps (Necked) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
470 Lead	IMR 4198	28	1300	1630	Lyman #446187
520 Lead	FL		1270	1860	Factory load

44-60 Sharps & Remington (Necked)

Historical Notes This is the 1⅞-inch 44 case that was loaded by Remington and Winchester. It was introduced in 1869 for the 1869 Sporting Rifle and used in Sharps, Winchester and Remington single shot rifles.

General Comments This was a general purpose cartridge for hunting or target shooting. It was listed by Remington and labeled as one of their "Creedmore" types (note the difference in spelling) which has caused some confusion identifying the round. Sharps match rifles for long-range shooting were named after the famous range at Creedmoor, Long Island. Other rifle makers also used this name. Remington applied the name to cartridges not originally chambered in the Sharps Creedmoor line. It is interesting to compare this cartridge with the 42 Russian Berdan Carbine round. Except for bullet diameter, the two are practically identical. This suggests the possibility the 44-60 was developed by expanding the neck of the Russian Carbine cartridge, much as some modern wildcats are made. The 44-60 necked Peabody, Winchester, Remington, etc. appear to be the same as the 44-60 (1⅞-inch) Sharps cartridge.

44-60 Sharps (Necked) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
315 Lead	IMR 4198	24	1300	1188	Lyman #446110
396 Lead	FL		1250	1375	Factory load

44-60 Winchester 44-60 Peabody "Creedmoor"

Historical Notes This cartridge is for the Peabody-Martini "Creedmoor" rifle introduced in 1877-78. It is not a well-known cartridge and apparently was of limited popularity. Winchester loaded this round under their own name which they introduced in 1874-75. It is the same as the Sharps 44-60-1⅞-inch necked round.

General Comments Examination of these cartridges in comparison with the 42 Russian Carbine indicate they are identical except for neck and bullet diameter. The 44-60 was likely developed by expanding the neck of the Russian cartridge, very much as some of our modern wildcats are made. The Russian Carbine cartridge is a shortened version of the 42 Berdan.

44-60 Peabody "Creedmoor" Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
365 Lead	Fg	65	1280	1410	Lyman #446109
395 Lead	FL		1250	1375	Winchester factory load

45-120 (3¼") Sharps
45-125 (3¼") Sharps (Both Straight)

Historical Notes The 45-caliber 3¼-inch case is the largest Sharps cartridge of this caliber. Because of differences in case thickness it usually came in two versions: the 45-120 and the 45-125. It was introduced in 1878-79 for the Sharps-Borchardt rifles, though there is no documentary evidence that the Sharps factory made rifles in this caliber or any of the 3¼-inch cases, either 40, 45 or 50. Rifles and ammunition of this caliber are collectors' items at the present time. The Sharps Rifle Co. failed in 1881 so the big 3¼-inch case didn't have a particularly long life, although other single shot rifles could be (and were) chambered for it. In 1991-92 Eldorado Cartridge made a run of brass and loaded ammunition in this caliber.

General Comments The 45-120 Sharps is a very powerful blackpowder cartridge adequate for any North American big game. It is usually considered one of the big buffalo cartridges, but it couldn't have participated in the slaughter of these animals to any great extent because it arrived on the scene very late. Western buffalo hunting reached its peak in 1875-76 and by 1880 was on the wane. The last of the great herds was destroyed in 1884 and the need for the big powerful buffalo rifles and cartridges passed with the last of these animals. The repeating rifle and the small-bore, high-velocity cartridge would, within a decade, give them the final shove into obsolescence. Most of the Sharps-Borchardt single shot rifles in this and other calibers have been rebarreled and made into modern small-bore varmint rifles.

45-120 (3¼") Sharps (Straight), 45-125 (3¼") Sharps (Straight) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
485 Lead	IMR 4198	26	1360	2000	Lyman #451112
500 Cast	FFg	85.0	1299	1873	Lyman #457125
500 Lead	FL		1520	2561	Factory load

45-100 Remington (Necked)

Historical Notes The 45-100 Remington necked cartridge is listed in the 1880-81 United States Cartridge Co. advertising sheet. It must have been a special-order caliber for Remington single shot rifles because there are no references to it in connection with a specific rifle. It was also available as a special order item for some of the late Sharps rifles, for it is listed in the 1875 Sharps catalog as the 45-2¼-inch case.

General Comments The 45-100 Remington uses a 2⅝-inch necked case which appears to be identical to the 44-90 Remington except for the larger diameter and longer neck. As we have mentioned before, some shooters liked the straight case, while others preferred the necked case. All Sharps 45-caliber cases are straight. Perhaps Remington offered a choice to the man who wanted a necked 45-caliber cartridge. Since the U.S. Cartridge Co. shows loaded ammunition in this caliber, there must have been at least a moderate demand. Although shorter, the 348 Winchester case can be used in these rifles. The Basic 50 will form full-length cases.

45-50 Peabody (Sporting)

Historical Notes A sporting cartridge for the Peabody-Martini single shot rifle, the 45-50 was introduced in 1873-74, shortly after the Martini modification of the Peabody action was adopted.

General Comments The 45-50 bears a close resemblance to the Peabody 45-55 Turkish carbine cartridge. It is probable that it is a modification of the Turkish military round to adapt it to sporting use. Physical measurements of the two are not identical, but very close. This is a rare cartridge and rifles of this caliber are seldom encountered. Almost any 45-caliber rifle bullet can be sized down to .454-inch and used; the Lyman No. 456191 (300-grain) will work fine. Powder charge can be varied from 50 to 55 grains of Fg blackpowder, depending on bullet weight and seating depth. For smokeless loads, use 22 to 23 grains of Du Pont (IMR) 4198. This will more or less duplicate original blackpowder ballistics. It could be possible to cut and form 45-70 cases to work in these rifles. This is one of the few Peabody designs that is close enough to common current chamberings to give one hope of conveniently shooting the rifle chambered for it.

45-50 Peabody (Sporting) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
255 Lead	IMR 4198	25	1350	1080	Lyman #454190
300 Lead	Fg	50	1285	1080	Lyman #456191
290 Lead	FL		1295	1085	Factory load

45-60 Winchester

Historical Notes The 45-60 is one of several cartridges designed for the Winchester 1876 Centennial Model rifle. The 45-60 cartridge was introduced in 1879. Winchester continued production of the cartridge until 1935 even though the rifle was discontinued in 1897. The Kennedy lever-action repeating rifle used this cartridge and so did the Colt Lightning slide-action repeater.

General Comments The 45-60 was brought out, with others of the Model 1876 cartridge line, to provide greater power than the 44-40 and other short cartridges used in the Model 1873 Winchester. The 45-60 design was probably influenced by the 45-70 Government round. The Model 1876 rifle had a medium-length action that would not handle the long cartridges used in the single shots of the period. The 45-60 would be a better deer cartridge than the 44 WCF, but would not be suitable for larger game. Rifles for this cartridge are not strong so one should not attempt to exceed original ballistics. It should be easy to form 45-70 cases to work in these rifles.

45-60 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
300 Lead	IMR 4198	25	1450	1410	Lyman #456191
300 Lead	FL		1315	1152	Winchester factory load

The Kennedy repeating rifle

45-75 Winchester

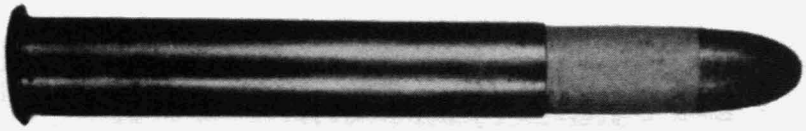
Historical Notes The 45-75 Winchester was the original caliber for the Model 1876 Centennial rifle. Other calibers were added at a later date. The Kennedy repeating rifle also used this round. Winchester continued to produce this cartridge until 1935. The Canadian Northwest Mounted Police adopted the '76 Winchester in 45-75 caliber and used it for 27 years.

General Comments To compete with the big Sharps and other single shot calibers, Winchester needed a longer repeating action. The Model '76 was designed to fill that need. However, as produced it was not long enough to handle cartridges with an overall length exceeding 2¼-inches. The 45-75 gives performance equal to, or slightly better than, the 45-70 Government by use of a shorter, fatter bottlenecked case. The Model '76 action is not noted for great strength and heavy smokeless charges should be avoided. The 45-75 would be a good short-range deer or black bear cartridge by modern standards. It was favored by Theodore Roosevelt for grizzly bear. Usable cases can be made from 348 Winchester brass.

45-75 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
350 Lead	IMR 4198	24	1380	1480	Lyman #456192
350 Lead	FL		1383	1485	Factory load.

45-100 Ballard



Historical Notes Satterlee* indicates that this cartridge was introduced in 1878 with the Ballard Sporting No. 4½ rifle. However, Grant† first shows it with the 1882 (Marlin Fire Arms Co.) Pacific No. 5. The manufacture of Ballard single shot rifles was discontinued between 1888 and 1890. The 45-100 cartridge was still listed as a standard caliber in the 1888 Marlin & Ballard catalog. This was the last catalog that advertised the Ballard according to some authorities.

General Comments The 45-100 is not a common cartridge, even though it was available up to the time Ballard rifles were discontinued. It is the same case as the 44-100 Ballard, but the inside of the neck has been reamed out to take the larger 45-caliber bullet. Almost any 45-caliber lead rifle bullet can be sized to fit this case. The company offered 45-caliber bullets in 285, 405, 420, and 550 grains for loading this and other cartridges. Lighter bullets left room for up to 120 grains of blackpowder. This was used as both a target and hunting round and was equal in power to some of the big Sharps and Winchester cartridges of similar capacity. The old Ballard action is not a particularly strong one and caution is advised when using smokeless powder. Although the base is a bit smaller than the 45-70, one suspects usable cases could be made from 45-70 cases. If so, Basic 45 brass could be cut to the proper length to duplicate this cartridge, which is very similar to the 45-90 Winchester, only longer.

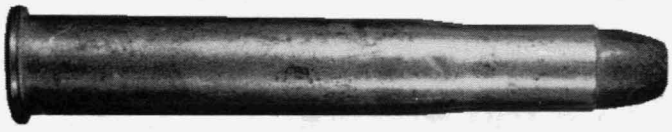
* op. cit.
† op. cit.

45-100 Ballard Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
500 Lead	Fg	100	1400	2180	Lyman #457125
500 Lead	IMR 4198	22	1250	1740	Lyman #457125
550 Lead	FL		1370	2300	Factory load

Ballard No. 5 Pacific Rifle

45-125 Winchester (45 Express)



Historical Notes Introduced in 1886 as a special-order caliber for the Winchester single shot rifle, the 45-125 was not widely used and was discontinued after a few years. Winchester continued to load ammunition of this caliber up to 1916.

General Comments The 45-125 has a long bottlenecked case and was furnished with the 300-grain copper-tubed, Express bullet. Lyman No. 456191 is the proper bullet for reloading. In appearance, this cartridge resembles the British 500/465 Nitro, but they are not the same and can be distinguished by the head markings, bullet diameter, etc. This is a powerful blackpowder number and would do for most big game in North America. One reason it became obsolete is because the 45-90 WCF will do the same thing with a smaller case and less powder.

45-125 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
300 Lead	IMR 4198	35	1475	1456	Lyman #456191
300 SP	FL		1690	1903	Winchester factory load

45-90 Sharps (Straight)
45-100 Sharps (Straight)
45-110 Sharps (Straight)
45 Sharps Special

Historical Notes When the Sharps company adopted the 45-caliber, they developed a variety of loads and case lengths. The first of these was introduced in mid-1876 ($2^{7}/_{8}$ inches), and different case lengths were added late in 1876 ($2^{6}/_{10}$ inches) and mid-1877 ($2^{4}/_{10}$ inches). The principal difference in these cartridges was in the bullet weight, powder charge and case length. Other dimensions are the same. Some are heavy reloadable cases that had to be lengthened slightly to hold the same charge as the originals.

General Comments The 45-100 (2.4 inches), 45-100 (2.6 inches), 45-90 ($2^{3}/_{4}$ inches), 45-100 ($2^{7}/_{8}$ inches) and the 45-110 ($2^{7}/_{8}$ inches) all appear to be identical except for loading and/or case length. The 45-$2^{3}/_{4}$-inch case, listed in the 1876 catalog, is unknown otherwise. There is no point listing all of these separately because of slight differences. However, the reader should know that each exists as they are encountered in literature referring to Sharps rifles or loading data for them. Sharps cartridges use a bullet of .451-inch diameter rather than the larger size of most other rifles. The 45-90 Winchester case can be fired in any of the above caliber rifles by seating the bullet well out of the case. With cast bullets 45-70 cartridges can be fired in these rifles, in spite of the difference in nominal bullet diameter. These cases can be made from Basic 45 brass and many custom bullet moulds are currently available.

45-90 Sharps (Straight), 45-100 Sharps (Straight), 45-110 Sharps (Straight)
Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
485 Lead	IMR 4198	24	1300	1822	Lyman #451112
550 Lead	FL		1360	2240	Factory load

Sharps Model 1877 Rifle

45-70 Van Choate

Historical Notes This cartridge was originally designed for the experimental Van Choate military bolt-action rifle made by the Brown Manufacturing Co. in 1872. It is similar to the 45-70 Government, but has a case length of 2.25 inches instead of 2.10 inches. It was used in other rifles as well because it was listed in Remington and Winchester catalogs as late as 1910-12. The bullet weighed 420 grains and was paper patched.

General Comments There are a number of variations of the 45-70 Government cartridge. Most of these are a matter of bullet weight but a few use a different case length. One of these was the 45-78-475 Wolcott with a 2.31-inch case. There was also a 45-80 Sharpshooter cartridge used in special target rifles. This had a 2.40-inch case that was very similar, if not identical, to the Sharps 2.40-inch case. Even though these cartridges are identical in all dimensions except length, a rifle would have to be chambered to accept the extra length cartridge, and they would not be entirely interchangeable. Just what the originators hoped to gain from these variations is hard to imagine. It was probably done to allow a full or increased powder charge with a heavier or longer than standard bullet. Most of these variations have an odd-shaped bullet. For any of these, one can use the same bullets and loading data given with the 45-70. Standard 45-70 cases chamber in these rifles. To duplicate the original case, trim Basic 45s to the proper length.

45-75 Sharps (Straight)
45-70 Sharps

Historical This cartridge is identical to the 45-70 Government. It represents another instance of a manufacturer adding his name to a cartridge when chambered for his rifles. Also known as the 45-70 Sharps, it was added to the company product line early to mid-1875. It was one of the loadings of what was designated as the Sharps 45-2$^{1}/_{10}$-inch case.

General Comments Use the same loading data as that given for the 45-70 Government. Most original Sharps rifles have blackpowder steel barrels so it is advisable to stick to lead bullets to reduce wear on the bore. Any load safe for the 1873 "Trapdoor" Springfield will be OK in Sharps rifles of any vintage.

45-75 Sharps (Straight) Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
400 Lead	FL	1330	1580	Factory load

45-82 Winchester
45-85 Winchester
45-90 Winchester

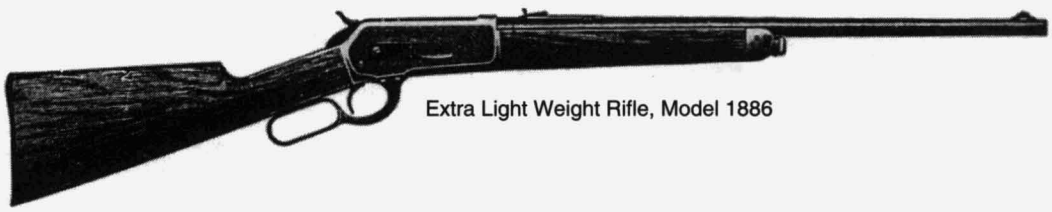
Historical Notes These three calibers are often listed separately with different case dimensions. However, they are nothing more than different loads and bullet weights in the same basic 45-90 case. All loads were for the Winchester Model 1886 repeater or single shot. The 45-90 was introduced in 1886. The other loads followed. The Marlin Model 1895 was also chambered for the group. The smokeless powder 45-90 came out in 1895 and was discontinued about 1936.

General Comments For many decades after its introduction the 45-90 was a popular sporting cartridge. Once offered in a high-velocity loading with its standard 300-grain bullet at nearly 2000 fps and generating over 2900 foot pounds of energy, it was no doubt a good killer. With a 200 fps advantage over the high-velocity 45-70-300 load, it would shoot a bit flatter and give, perhaps, 50 yards more usable range.

The 45-90 case is practically identical to the 45-70, only longer. It is common practice to fire the 45-70 in these rifles when the proper ammunition is not available. The 45-90 is adequate for any North American big game at moderate ranges. Use standard .457-inch diameter bullets for loading. For handloading use only lead bullets to avoid excessive barrel wear.

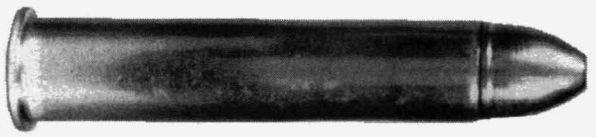
45-82, 45-85, 45-90 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
300 Lead	IMR 4198	38	1530	1565	
405 Lead	IMR 4198	32	1410	1790	Lyman #457483 GC
405 Cast	IMR 3031	40.0	1500	2023	Lyman #457124
300 Lead	FL		1554	1609	Factory load
350 Lead	FL		1510	1775	Factory load
405 Lead	FL		1468	1938	Factory load



Extra Light Weight Rifle, Model 1886

50-90 Sharps
50-100 Sharps
50-110 Sharps

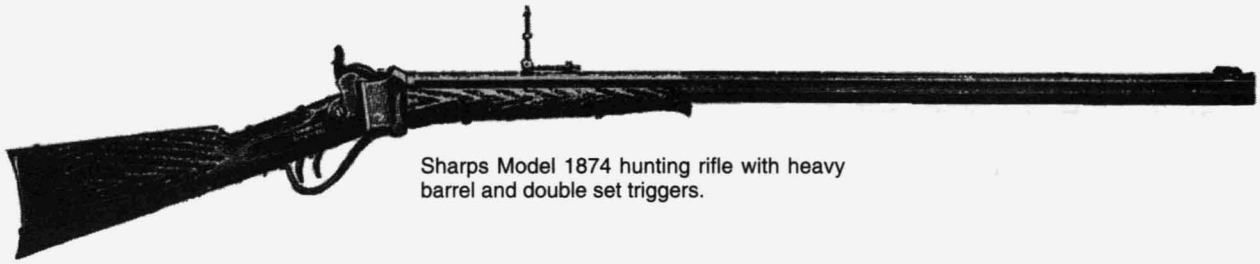


Historical Notes The 2½-inch, 50-caliber Sharps was introduced in the 1872 Sharps catalog which also listed the 50-70, among others. This period was the heyday of buffalo hunting. There was a strong demand for more potent loads in all game calibers. The 50-90 offered rather more power. When western writers refer to the "Big 50" Sharps buffalo rifle and cartridge, this is the cartridge they mean whether they know it or not. The longer Sharps (3¼-inch) 50-caliber cartridge didn't arrive on the scene until after the buffalo were finished as a commercial possibility.

General Comments Soon after its introduction, it was the "Big Fifty" or "Poison Slinger." The 50-90 is also called the 50-100 or 50-110 depending on what bullet weight and powder charge was used. Sharps discontinued their 40- and 50-caliber cartridges except on special order when they adopted the 45-caliber. Correct bullet diameter is .509-inch; several Lyman moulds in this size are available. One should not confuse various loadings of this cartridge with the 50-110 Winchester, though the latter case can be used to make up ammunition for 50 (2½-inch) Sharps rifles, even though a little short. Although much shorter, straightened 348 Winchester cases should work in most rifles. The Basic 50 will make perfect copies of this case.

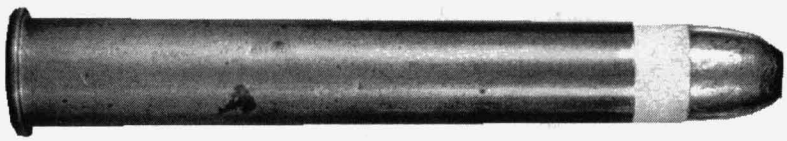
50-90 Sharps, 50-100 Sharps, 50-110 Sharps Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
365 Lead	XMP 5744	37.0	1652	2210	Accurate Arms
422 Cast	IMR 4198	25.5	1129	1194	Lyman #515141
440 Lead	XMP5744	33.0	1418	1965	Accurate Arms
465 Lead	IMR 4198	30	1320	1804	Lyman #509133
550 Lead	XMP5744	30.0	1275	1985	Accurate Arms
335 Lead	FL		1475	1630	Factory load
473 Lead	FL		1350	1920	Factory load



Sharps Model 1874 hunting rifle with heavy barrel and double set triggers.

50-140 Sharps
50-140 Winchester Express



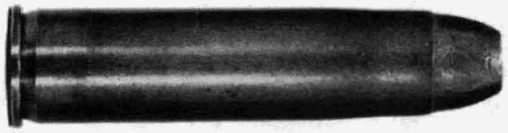
Historical Notes This is another special-order Sharps cartridge. It was introduced in 1880, but specific reference is lacking. Dimensions, except for length, are the same as the 50-90 Sharps. Some authorities believe rifles were made by rechambering 50-90s. None of the Sharps catalogs list this caliber.

General Comments Winchester loaded the 50-140 with a 473-grain bullet, but many handloaders used the 700-grain paper-patched type which could be purchased on a commercial basis. UMC also made empty cases. Rifles chambered for this round are rare, and cartridges are collector's items. This was the most powerful of the Sharps "buffalo" calibers, but it was introduced after most of the great herds were long gone. By 1880, buffalo hunting had almost ended, though it continued sporadically until 1884 when the last remaining herd was destroyed. Buffalo hunting for scattered individuals or small groups was not economically feasible. Sharps rifles used .509-inch diameter bullets while Winchester used .512-inch diameter. Although much shorter, straightened 348 Winchester cases should work in most rifles. The Basic 50 will make perfect copies of this case.

50-140 Sharps, 50-140 Winchester Express Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
422 Cast	IMR 4198	39.0	1386	1780	Lyman #515141
440 Lead	XMP5744	55.0	1978	3820	Accurate Arms
550 Lead	XMP5744	50.0	1736	3680	Accurate Arms
465 Lead	IMR 4198	33.0	1450	2190	Lyman #509133
700 Lead	XMP5744	48.0	1529	3635	Accurate Arms
473 Lead	FL		1580	2520	Winchester factory load
700 Lead	FL		1355	2850	Factory load

50-115 Bullard



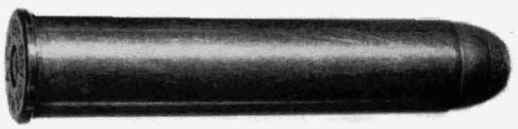
Historical Notes This, the largest of the Bullard cartridges, was introduced in 1886. It is unique in being both the first semi-rimmed and solid head cartridge produced in the U.S. It was chambered in the repeating Bullard rifles and possibly the single shot. No other rifle makers used it.

General Comments The 50-115 Bullard has a slight shoulder. With its larger body diameter, it is shorter than similar 50-caliber cartridges. It delivers the same performance as the longer 50-110 Winchester. It is another rare caliber and would be difficult to duplicate out of some other case because of the semi-rim construction.

50-115 Bullard Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
290 Lead	Fg	115	1539	1580	Lyman #512139
290 Lead	IMR 4198	32	1570	1647	Lyman #512139
300 Lead	FL		1539	1583	Factory load

50-100 Winchester
50-105 Winchester
50-110 Winchester



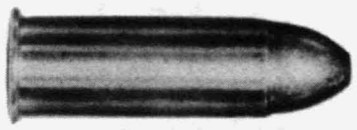
Historical Notes Here we have another example of different loads for the same case causing them to be confused as separate calibers. These are all variations of the original 50-110 Winchester introduced in or before 1892 for the Model 1886 repeating rifle. It was also available for the single shot and Winchester listed it in cartridge catalogs until 1935.

General Comments Originally a blackpowder number, both a standard- and high-velocity smokeless version were also developed. The high-velocity load pushed the 300-grain bullet at 2225 fps and developed 3298 fpe at the muzzle. This was quite a potent number, being comparable to some of the British African cartridges. For loading, use the Lyman No. 512139 (290 grains) hollowpoint or No. 512138 (450 grains) or those listed below with the loading data. In spite of being a bit shorter, straightened 348 Winchester cases should work in most rifles. The Basic 50 will easily form duplicate cases.

50-100, 50-105, 50-110 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
285 Lead	Fg	110	1600	1710	Lyman #518144
285 Lead	IMR 4198	39	1750	2045	Lyman #518144
450 Lead	Fg	100	1475	2190	Lyman #515141
300 Lead	FL		1605	1720	Standard Winchester factory load
300 Lead	FL		2225	3298	High velocity Winchester factory load

50-50 Maynard (1882)



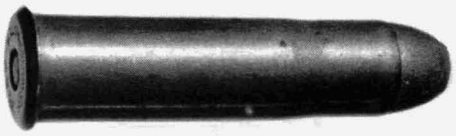
Historical Notes This is the Maynard version of the 50 U.S. Carbine cartridge. It was used in the 1882 Model Maynard single shot rifle.

General Comments Some of the 50-50 Maynard cartridges have a smaller base diameter than that listed, but this is more a matter of manufacturing tolerance than design difference. Ammunition for old rifles of this caliber can be made by trimming 50-70 brass to the correct length. Powder charge is 50 to 60 grains of blackpowder, depending on bullet weight and type. Lyman No. 518144 (285-grain) or 518145 (350-grain) make good cast bullets for these old rifles. By shortening, and possibly thinning the rim, 348 Winchester cases can be used in these rifles.

50-50 Maynard Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
350 Lead	FL	1270	1260	Factory load
400 Lead	FL	1210	1305	Factory load

50-95 Winchester
50-95 Winchester Express



Historical Notes The 50-95 is another of the short-necked cartridges developed for the Winchester 1876 Centennial Model repeater. This is the big bore of the group and was introduced in 1879. It was not as popular as some of the others and had a relatively short production life. The Colt New Lightning slide-action rifle was also available in this caliber.

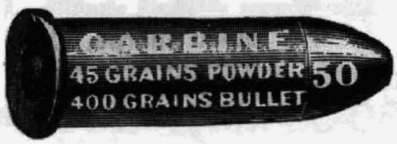
General Comments The 50-70 Government cartridge gained a certain following among buffalo hunters of the period and the 50-95 is an improved, repeating rifle version of this. Lyman hollow-point bullets No. 512137 (350 grains) or 512139 (290 grains) can be used for loading. It is advisable to stick to blackpowder or low pressure smokeless loads for the Model '76 Winchester. It is not a strong action, although entirely adequate for any blackpowder load. Shortened 348 Winchester cases should work in most rifles.

50-95 Winchester Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
285 Lead	IMR 4198	26	1420	1302	Lyman #518144
350 Lead	IMR 4198	23	1350	1420	Lyman #518145
300 Lead	FL		1557	1615	Winchester factory load

Colt Lightning, Large Frame

50 U.S. Carbine
(50 Carbine)



Historical Notes Introduced as a carbine loading for the 1870 "Trapdoor" Springfield single shot rifle or carbine, this is a centerfire modification of similar rimfire types developed during and immediately after the Civil War.

General Comments The 50 Carbine round is a short-case variation of the standard 50-70 military cartridge. It can be fired in the rifle, but the standard 50-70 case is too long to fit in carbines. The carbine load consisted of a 400-grain bullet and 45 to 50 grains of Fg blackpowder. Lyman No. 518144 (285 grains) is a good bullet for loading these old shells. If your gun won't take the regular 50-70, just trim the case to the proper length. The 1870 Springfield has a weak action so don't try any hot smokeless loads. Shortened 348 Winchester cases should work in most rifles.

50 U.S. Carbine Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	
400 Lead	IMR 4198	22	1200	1285	
400 Lead	FL		1200	1285	Factory load

50-70 Musket (50 Govt.)

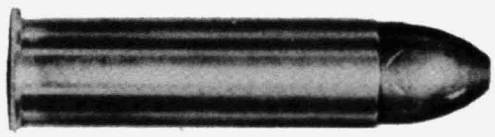
Historical Notes The 50-70 was the United States military rifle cartridge from 1866 to 1873. It was the first centerfire cartridge in general use by the U.S. military. The design was derived from the 50-60-400 Joslyn rimfire. It was used in various models and modifications of the single shot Springfield rifle until replaced by the 45-70 in 1873. It was also chambered in the Remington single shot military rifle and in a wide variety of sporting rifles, both single shot and repeating. The original cartridge had the inside, Benet-type primer. It has been obsolete since the turn of the century.

General Comments The 50-70, or 50 Government, was a popular cartridge through the 1870s and '80s. It was said to be very effective on buffalo and other heavy game. It was the popularity of this cartridge that induced Winchester to bring out the 50-110, which was, in effect, an improved and more powerful version of the 50-70. Very few rifles of this caliber remain in use and ammunition is almost non-existent. However, it would be adequate for any North American big game at short range. Cases with the later Boxer-type priming can be reloaded. Most 50-70 rifles were intended for blackpowder; only very light charges of smokeless powder can be considered safe. In 1934, Francis Bannerman & Sons of New York City advertised both 50-70 Springfield rifles and the ammunition. Rifles were still available as late as 1940. No sporting rifles have chambered this round since the early 1900s. There was also a carbine version with a shorter case (1.35 inches instead of 1.94 inches). Shortened 348 Winchester cases should work in most rifles.

50-70 Musket (50 Govt.) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
350 Lead	IMR 3031	38	1310	1333	Lyman #518145
422 Cast	IMR 4198	25.5	1129	1194	Lyman #515141
425 Lead	XMP5744	30.0	1419	1900	Accurate Arms
550 Lead	XMP5744	25.0	1208	1780	Accurate Arms
450 Lead	IMR 3031	36	1270	1611	Lyman #515141
450 Lead	IMR 4198	26	1410	1987	
425 Lead	FL		1275	1535	Factory load
450 Lead	FL		1260	1488	Factory load

55-100 Maynard



Historical Notes This cartridge is for the Maynard Improved Hunters Rifle No. 11, 1882-type. The 55-100 listed here was introduced the same year as the rifle. This is a little known and seldom encountered round. There was also a shotshell version.

General Comments Some Maynard rifles were available as combination guns with interchangeable shot or rifled barrels. The 55-100 was one of the cartridges for this arrangement. Shells for both shot loading and bullet loading were advertised in their catalog. This is an odd bullet diameter (.551-inch) and no one makes a suitable mould. However, some of the 54-caliber musket balls or Minie bullets could probably be resized to work.

55-100 Maynard Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
530 Lead	FL	1410	2340	Factory load

58 Carbine (Berdan)

Historical Notes This is the carbine version of the 58 Berdan Musket cartridge introduced in 1869. The two differ only in case length and powder charge. The carbine case is 1.125 inches long, whereas the musket case is 1.750 inches long. There is no other difference except the powder charge.

General Comments Rifles for 58 Berdan cartridges are scarce items. Proper load for the carbine version is 40 to 45 grains of Fg blackpowder. Use Lyman No. 585213 (476-grain) bullet. For a good smokeless load, try 22 grains of Du Pont (IMR) 4198.

58 Berdan Carbine Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
530 Lead	FL	925	1012	Factory load

58 U.S. Musket (Berdan)

Historical Notes Introduced in 1869 for use in the Berdan breech-loading conversion of the Springfield rifled musket, there is both a rifle version (listed here) and a carbine version (listed below) of this cartridge. Bullet weight is the same in both cartridges. This caliber was never officially adopted by the United States armed forces, but was used experimentally. The centerfire cartridge evolved from earlier rimfire and inside-primed types. The Springfield muzzle-loading musket used a 500-grain bullet and 60 grains of powder for 950 to 1000 fps before conversion to breechloading.

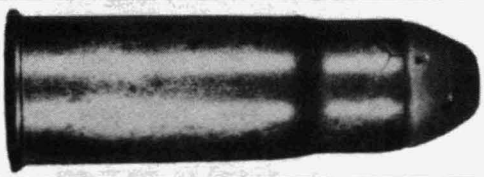
General Comments Col. Hiram Berdan, noted chiefly for his part in organizing and leading Berdan's Sharpshooters during the Civil War, was also a firearms designer of considerable importance in the post-war period. The breech-loading conversion system he designed was not used by the U.S., but was adopted by Spain, Russia and other European powers. His Berdan I (hinged, cam lock) and Berdan II (bolt-action) single shot rifles were both officially adopted and used by Russia for a number of years. In 1895, his widow was awarded a judgment for patent infringement in a suit filed against the U.S. government. The 1866 Springfield rifle used a breech system that copied essential features of the Berdan design.

In 1870, Col. Berdan developed the priming form that bears his name, the Berdan system that is used almost universally outside of the United States. The Boxer primer used here was invented by an Englishman. The 58 Musket cartridge is common, but arms of this caliber are scarce.

58 U.S. Musket (Berdan) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
476 Lead	Fg	80-85	1230	1608	Lyman #585213
476 Lead	IMR 4198	25	1230	1608	Lyman #585213
530 Lead	Fg	80-85	1100	1420	Factory load

70-150 Winchester



Historical Notes The 70-150 cartridge appeared on the 1888 Winchester cartridge boards. Some say it was an advertising novelty for display only. According to Paul Foster (*Gun Digest*, 1952, 6th Edition p. 173), the only gun chambered for it was a specially-made Model 1887 shotgun with rifled barrel. It was never produced on a commercial basis.

General Comments The 70-150 is based on the brass 12-gauge shotshell shortened and necked slightly. It is mentioned only to complete the record because no guns were produced for it. No loading or ballistics data is available. However, the case would hold about 150 grains of powder and bullets of this caliber could weigh anywhere from 600 to 900 grains. The muzzle velocity this combination could develop would be approximately 1300 to 1500 fps, depending on bullet weight.

70-150 Winchester Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
600 Lead	FL	1500	3000	Theoretical factory ballistics
900 Lead	FL	1300	3380	Theoretical factory ballistics

NEWTON

TABLE OF BALLISTICS OF DIFFERENT CARTRIDGES.

The following table shows the ballistics of most of our cartridges at present in use and we feel will be found of considerable interest, as by comparing the figures of the different ranges the true value of the cartridges may be seen.

Range.	Bullet.	22 Sav. H. P. 68 gr. C-.26	.22 Newton 90 gr. C-.464	6mm 112 gr. U. S. Navy C-.259	25-35-117 C-.245	25-35-117 Rem. Auto C-245	.250 Savage 87 grains C-.276	.256 Newton 123 gr. C-.464	.256 Newton 140 gr. C-.548	7mm U. M. C. 139 gr. C-.44	7mm Mauser 151.5 gr. C-.495	Ross .280 145 gr. C-.457	Ross .280 180 gr. C-.567	30-30-170 C-.272
Muzzle	Velocity, ft. sec.	2800	3103	2562	1978	2127	3000	3103	3000	2784	2604	3050	2700	2008
	Energy, ft. lbs. .	1190	1921	1632	1016	1175	1740	2632	2800	2475	2310	3002	2834	1522
100 Yd.	Velocity, ft. sec.	2453	2891	2231	1680	1812	2657	2891	2824	2577	2425	2837	2541	1735
	Energy, ft. lbs. .	911	1660	1239	733	854	1375	2288	2492	2057	1991	2595	2592	1136
	Trajectory, ft. . .	.052	.04	.063	.109	.094	.045	.04	.042	.048	.058	.042	.052	.104
	Time Flt., sec. . .	.114	.100	.125	.165	.153	.106	.100	.103	.11	.120	.102	.114	.161
200 Yd.	Velocity, ft. sec.	2131	2689	1923	1420	1535	2340	2689	2655	2378	2254	2635	2387	1493
	Energy, ft. lbs. .	687	1445	918	516	608	1061	1980	2198	1751	1718	2247	2286	850
	Trajectory, ft. . .	.242	.173	.291	.576	.443	.204	.173	.181	.217	.246	.180	.222	.482
	Time Flt., sec. . .	.246	.208	.27	.359	.333	.226	.208	.213	.233	.248	.212	.236	.347
300 Yd.	Velocity, ft. sec.	1833	2496	1647	1218	1303	2042	2496	2492	2188	2089	2441	2239	1290
	Energy, ft. lbs. .	510	1247	680	386	433	783	1709	1932	1473	1474	1929	2016	629
	Trajectory, ft. . .	.666	.417	.767	1.38	1.19	.530	.417	.435	.530	.593	.436	.535	1.28
	Time Flt., sec. . .	.408	.323	.438	.588	.546	.364	.323	.320	.364	.385	.330	.366	.564
500 Yd.	Velocity, ft. sec.	1341	2133	1217	1001	1036	1526	2133	2183	1832	1781	2076	1956	1047
	Energy, ft. lbs. .	272	907	370	257	281	435	1242	1484	1029	1064	1392	1530	408
	Trajectory, ft. . .	2.46	1.35	2.99	5.20	4.58	1.98	1.35	1.37	1.77	1.94	1.42	1.69	4.75
	Time Flt., sec. . .	.784	.583	.863	1.14	1.07	.704	.583	.586	.665	.697	.597	.653	1.09
1000 Yd.	Velocity, ft. sec.	869	1383	834	721	744	920	1383	1518	1175	1197	1337	1354	775
	Energy, ft. lbs. .	114	341	174	129	134	165	513	714	417	486	580	738	221
	Trajectory, ft. . .	20.1	8.53	23.0	34.1	31.14	17.6	8.53	7.95	11.6	12.1	9.00	10.4	30.7
	Time Flt., sec. . .	2.24	1.46	2.40	2.92	2.79	2.10	1.46	1.41	1.70	1.74	1.50	1.61	2.77
1500 Yd.	Velocity, ft. sec.	641	1016	611	508	526	700	1016	1100	930	959	998	1038	572
	Energy, ft. lbs. .	62	207	93	67	70	95	283	378	264	304	319	432	119
	Trajectory, ft. . .	71.8	30.5	81.0	117.	108.1	60.8	30.47	26.8	39.9	39.9	32.0	34.6	100.
	Time Flt., sec. . .	4.26	2.76	4.50	5.40	5.19	3.90	2.76	2.59	3.16	3.16	2.83	2.94	5.01

Range		30-40 Army 220 gr. C-.352	.30 U. S. G. 220 gr. C-.394	.30 U. S. G. 150 gr. C-.389	.30 cal. 150 gr. Newton C-.389	.30 cal. 172 gr. Newton C-.491	.30 Newton 225 gr. C-.632	.303 Savage 195 gr. C-.312	32-20-115 C-.129	32-20-115 W. H. V. C-.162	32-40-165 C-209	32-40-165 W. H. V. C-.225	32-40 H. P. 165 gr. C-.209	32-W Sp. 170 gr. C-.222	8mm Spitzer 154 gr. C-347	8mm-236 C-.363	33-200 W. C. F. C-.238
Muzzle	Vel. .	2000	2200	2700	3208	3000	2610	1952	1222	1640	1427	1752	2065	2112	2915	2129	2056
	En. . .	1970	2376	2445	3445	3440	3470	1658	381	690	747	1125	1558	1684	3018	2375	1877
100 Yd.	Vel. .	1783	1999	2465	2950	2804	2470	1718	1011	1282	1194	1460	1708	1769	2646	1912	1741
	En. . .	1553	1950	2034	2910	3010	3060	1285	261	420	523	781	1072	1181	2402	1888	1346
	Tra. .	.101	.03	.055	.038	.043	.056	.106	.298	.171	.21	.141	.102	.096	.046	.089	.101
	Tim. .	.159	.14	.116	.098	.104	.118	.163	.273	.207	.231	.188	.16	.155	1.07	1.49	1.59
200 Yd.	Vel. .	1590	1812	2244	2707	2618	2333	1506	887	1068	1055	1231	1403	1471	2392	1713	1467
	En. . .	1235	1602	1686	2445	2631	2723	987	195	287	380	561	726	816	1956	1534	960
	Tra. .	.454	.36	.241	.166	.185	.238	.49	1.38	.869	.996	.679	.49	.465	.206	.397	.476
	Tim. .	.337	.29	.243	.204	.215	.244	.35	.588	.466	.499	.412	.35	.341	.227	.315	.345
300 Yd.	Vel. .	1418	1639	2039	2477	2439	2202	1324	787	955	967	1082	1177	1237	2151	1540	1246
	En. . .	985	1311	1392	2040	2287	2430	762	161	230	330	429	495	578	1586	1251	680
	Tra. .	1.15	.91	.596	.409	.44	562	1.27	3.59	2.31	2.53	1.82	1.39	1.28	.515	.956	1.30
	Tim. .	.537	.47	.384	.320	.333	.375	.563	.948	.760	.796	.675	.588	.564	.359	.489	.569
500 Yd.	Vel. .	1138	1342	1668	2049	2100	1949	1083	612	786	829	916	960	994	1714	1236	1009
	En. . .	632	879	932	1395	1685	1913	509	92	161	247	313	330	374	1001	802	454
	Tra. .	4.10	3.13	2.04	1.37	1.44	1.77	4.58	13.0	8.41	8.64	6.76	5.38	4.93	1.80	3.50	4.93
	Tim. .	1.01	.88	.709	.586	.598	.665	1.07	1.80	1.45	1.47	1.30	1.16	1.11	.672	.935	1.11
1000 Yd.	Vel. .	831	961	1068	1223	1395	1413	824	284	464	561	647	655	694	1047	915	720
	En. . .	337	451	382	495	739	990	294	21	55	115	148	158	170	370	439	220
	Tra. .	26.8	21.3	14.5	9.73	8.76	9.86	28.52	117.	61.5	53.6	41.7	37.5	34.3	13.5	22.7	33.4
	Tim. .	2.59	2.24	1.86	1.56	1.48	1.57	2.67	5.40	3.92	3.66	3.23	3.06	2.93	1.84	2.38	2.89
1500 Yd.	Vel. .	657	790	853	928	1032	1087	637		237	352	432	424	467	823	738	502
	En. . .	211	305	244	285	408	585	176		14	49	66	66	83	231	283	112
	Tra. .	85.9	69.2	52.8	35.6	30.5	31.3	90.25		286	199	147	139.2	124	48.2	70.9	115
	Tim. .	4.63	3.97	3.45	2.98	2.76	2.80	4.75		8.45	7.05	6.07	5.91	5.56	3.47	4.21	5.37

TABLE OF BALLISTICS (Continued).

Range.		Jeffery .333 250 gr. C-.586	.33 Newton C-.395 200 gr.	.35 Newton C-.40 250 gr.	35 W. C. F. 250 gr. C-.287	351-180 Win. Auto C-.202	35-200-Rem. Auto C-.229	9mm Mauser 280 gr. C-.371	38-40-180 C-.129	38-40-180 W. H. V. C-.156	38-55-255 C-.218	38-55-255 W. H. V. C-.244	38-56-255 C-.228	38-55-255 H. P C-.25	38-70-255 C-.236	38-72-275 C-.286	38-90-217 Express C-.207
Muzzle	Vel. .	2600	3000	2975	2200	1861	2000	1850	1324	1775	1321	1593	1397	1700	1489	1476	1595
	En. . .	3750	4000	4925	2687	1385	1776	2128	700	1260	988	1437	1105	1635	1256	1331	1227
100 Yd.	Vel. .	2450	2758	2737	1923	1523	1681	1660	1053	1367	1131	1350	1189	1442	1262	1286	1313
	En. . .	3270	3400	4175	2053	927	1260	1708	443	747	725	1033	801	1173	903	1010	831
	Tra. .	.056	.043	.044	.085	.127	.107	.117	.266	.149	.244	.206	.217	.147	.193	.192	.171
	Tim. .	.118	.104	.105	.146	.178	1.64	.171	.258	.193	.247	.227	.233	.192	.220	.219	.207
200 Yd.	Vel. .	2304	2530	2512	1672	1254	1406	1485	918	1104	1024	1168	1061	1238	1106	1143	1119
	En. . .	2950	2852	3500	1550	630	880	1372	338	486	580	765	638	867	689	798	608
	Tra. .	.238	.188	.192	.391	.627	.518	.527	1.28	.774	1.10	.77	1.00	.692	.895	.869	.831
	Tim. .	.244	.217	.219	.313	.396	.359	.363	.564	.440	.526	.440	.501	.416	.473	.466	.456
300 Yd.	Vel. .	2162	2312	2297	1448	1083	1196	1333	813	975	944	1056	979	1097	1014	1052	1012
	En. . .	2600	2382	2950	1175	468	640	1108	265	378	510	637	526	688	586	687	477
	Tra. .	.575	.465	.473	1.02	1.72	1.39	.132	3.32	2.11	2.76	2.00	2.51	1.82	2.29	2.20	2.17
	Tim. .	.379	.341	.344	.506	.654	.592	.575	.912	.728	.833	.708	.793	.676	.758	.743	738
500 Yd.	Vel. .	1893	1907	1896	1130	906	983	1114	634	795	816	915	848	944	879	929	861
	En. . .	2000	1628	2000	700	324	420	773	162	252	380	484	408	506	434	523	347
	Tra. .	1.82	1.56	1.59	3.82	6.35	5.29	4.58	12.2	7.90	9.24	6.86	8.41	6.55	7.73	7.29	7.61
	Tim. .	.677	.625	.632	.978	1.26	1.15	1.07	1.75	1.41	1.52	1.31	1.45	1.28	1.39	1.35	1.38
1000 Yd.	Vel. .	1340	1166	1165	827	611	698	872	297	458	560	664	596	688	628	706	584
	En. . .	1000	600	750	375	144	216	476	36	84	179	250	204	255	227	303	152
	Tra. .	10.5	10.9	11.0	26.2	42.8	34.8	28.3	108	60.8	55.95	41.5	50.7	39.4	46.5	41.2	48.7
	Tim. .	1.62	1.65	1.66	2.56	3.27	2.95	2.61	5.21	3.90	3.74	3.22	3.56	3.14	3.41	3.21	3.49
1500 Yd.	Vel. .	1037	907	910	625	384	477	707		226	359	463	395	484	426	522	368
	En. . .	600	366	450	218	54	100	308		20	74	122	89	133	102	165	65
	Tra. .	35.3	38.9	38.9	86.5	161	123	81.7		294	213	139	177	132.	159.	143.	181.
	Tim. .	2.97	3.12	3.12	4.65	6.37	5.55	4.52		8.57	7.29	5.90	6.65	5.75	6.31	5.98	6.73

Range.		40-65-260 C-.198	40-70-330 C-.254	40-72-300 Smokeless C-.236	40-82-260 C-.206	.40 Newton H. P. C-.374	401-200 Auto Loading C-.183	401-250 Auto Loading C-.207	Jeffrey .404 400 gr. C-.396	.405-300 W. C. F. C-.258	45-70-350 C-.209	45-70-500 C-.342	45-90-300 W. H. V. C-.194	.450 Cordite 480 gr. C-.384	.476-520 Cordite C-.387	50-110-300 W. H. V. C-.155	.500-570 Cordite C-.378	.577-750 Cordite C-.385	.600-900 Cordite C-.40
Muzzle	Vel. .	1367	1382	1423	1492	3042	2141	1875	2200	2204	1344	1201	1992	2150	2100	2242	2150	2050	1950
	En. . .	1079	1401	1350	1285	6180	2037	1952	4320	3236	1404	1602	2644	4944	5086	3349	5844	6994	7592
100 Yd.	Vel. .	1145	1196	1214	1236	2784	1721	1543	1997	1897	1139	1095	1621	1944	1898	1744	1940	1850	1766
	En. . .	757	1049	983	883	5220	1315	1323	3560	2399	1009	1350	1751	4032	4158	2026	4579	5695	6227
	Tra. .	.230	.219	.208	.197	.042	.101	.124	.082	.086	.238	.334	.112	.086	.090	.092	.086	.095	.102
	Tim. .	.240	.234	.228	.222	.103	.159	.176	.143	.147	.244	.289	.167	.147	.150	.152	.147	.154	.160
200 Yd.	Vel. .	1024	1075	1078	1075	2541	1372	1275	1807	1623	1025	1026	1316	1752	1711	1342	1745	1667	1595
	En. . .	598	845	780	650	4320	840	900	2920	1740	819	1150	1158	3264	3390	1200	3876	4665	5103
	Tra. .	1.07	.992	.968	.940	.186	.56	.605	.362	.404	1.09	1.44	.554	.38	.402	.482	.387	.422	.462
	Tim. .	.517	.498	.492	.485	.216	.375	.389	.301	.318	.522	.599	.372	.31	.317	.347	.311	.325	.340
300 Yd.	Vel. .	937	997	994	981	2310	1132	1097	1631	1384	942	968	1112	1576	1540	1083	1567	1476	1438
	En. . .	509	726	660	546	3570	560	675	2360	1290	693	1000	828	2640	2756	780	3135	3638	4140
	Tra. .	2.70	2.50	2.45	.242	.462	1.44	1.66	.906	1.07	2.73	3.46	1.54	.96	1.00	1.50	.968	1.17	1.16
	Tim. .	.822	.790	.783	.778	.340	.602	.645	.476	.518	.828	.933	.621	.49	.501	.612	.492	.542	.538
500 Yd.	Vel. .	800	874	864	838	1882	915	919	1329	1078	810	871	917	1280	1255	864	1269	1210	1193
	En. . .	364	561	498	390	2370	380	475	1572	780	511	850	561	1728	1820	498	2052	2445	2844
	Tra. .	9.24	8.18	8.18	8.29	1.56	5.76	6.15	3.13	4.16	9.24	10.9	5.95	3.31	3.49	6.25	3.39	3.94	3.96
	Tim. .	1.52	1.43	1.43	1.44	.628	1.20	1.24	.884	1.02	1.52	1.65	1.22	.91	.936	1.25	.921	.994	.997
1000 Yd.	Vel. .	525	640	616	563	1130	585	626	965	779	545	677	607	942	935	506	935	918	919
	En. . .	159	297	252	182	840	152	217	832	390	231	500	246	960	1013	171	1112	1410	1701
	Tra. .	58.4	47.1	48.4	52.7	11.3	43.3	36.2	20.4	28.7	56.8	57.5	41.73	21.53	22.3	49.1	21.9	24.0	24.2
	Tim. .	3.82	3.43	3.48	3.63	1.68	3.29	3.01	2.26	2.68	3.77	3.79	3.23	2.32	2.36	3.51	2.34	2.45	2.46
1500 Yd.	Vel. .	316	449	417	351	881	345	401	790	565	340	511	373	768	764	256	760	749	756
	En. . .	52	149	117	70	510	52	90	556	210	90	290	93	624	676	44	735	937	1143
	Tra. .	225.	155.	169.	208.0	41.0	174.	154.	63.0	97.6	210.2	174	162.5	66.58	69.2	237.2	67.9	72.9	72.9
	Tim. .	7.51	6.23	6.44	7.22	3.20	6.63	6.20	3.97	4.94	7.27	6.61	6.38	4.08	4.13	7.69	4.12	4.27	4.27

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Velocity, Energy, Penetration And Trajectory Of Winchester Bullets And Recoil Of Rifles.

Penetration is not the measure of striking energy. As an illustration, take the figures in our table for the .30-30 Winchester Center Fire cartridge. With the soft point bullet the penetration is but 11 boards, whereas that cartridge with the full metal patched bullet will penetrate 42 boards. The energy of both is the same. All other things being equal, the bullet which resists deformation will give the maximum penetration. The soft pointed bullet, which generally stops inside the skin of the animal, delivers its whole energy; while the full metal patched bullet, which passes through the animal, may make a less severe wound. Penetration, therefore, is not a good test of killing power. If the target is harder or softer than that described in our table, the results obtained will not be the same; nor will the comparative results show corresponding differences.

Name of Rifle Used.	Length of Barrel. Inches.	Name of Cartridge.	Weight of Bullet. Grains.	Velocity of Bullets (At 50 Ft.) Feet Per Second.	Energy of Bullets (At 50 Ft.) Ft. Lbs.	Penetration of Bullets in ⅞ in. Pine Boards At 15 Ft. from Muzzle.			Trajectory of Bullets.			Free Recoil in Foot Pounds.	
						Lead. Boards.	S. P. Boards.	F. P. Boards.	100 Yds. Height at 50 Yds. Inches.	200 Yds. Height at 100 Yds. Inches.	300 Yds. Height at 150 Yds. Inches.	Smoke-less.	Black.
Model 1890,	24	.22 Winchester R. F.	45	1137	121	7			4.25				.32
Model 1903,	20	.22 Automatic,	45	1025	104	7			4.80			.12	
Single Shot,	26	.22 Winchester Single Shot,	45	1481	218	8			2.71	12.63	33.67	.39	.51
Lee St. Pull.	28	6 mm. U. S. Navy,	112	2500	1553		12	60	.76	3.49	9.14	7.10	
Model 1892,	24	.25-20 W. C. F.,	86	1300	323	9	8	11	3.30	13.78	34.69	.80	.88
Model 1892,	24	.25-20 W. H. V.,	86	1650	520		10	20	1.85	9.37	26.22	1.36	
Single Shot,	28	.25-20 Single Shot,	86	1304	325	9	8	11	3.35	13.61	34.68	.52	.67
Model 1894,	26	.25-35 W. C. F.,	117	1925	985		11	36	1.32	6.21	16.61	3.39	
Model 1894,	26	.30 W. C. F.,	170	1960	1449		11	42	1.28	5.79	15.23	7.20	
Savage,	26	.303 Savage,	180	1840	1352		12	37	1.39	6.53	17.00	8.31	
Model 1895,	28	.303 British,	215	1960	1833		13	56	1.23	5.52	14.08	10.98	
Model 1895,	28	.30 U. S. Army,	220	1960	1880		13	58	1.22	5.47	13.55	11.59	
Model 1895,	24	.30 U. S. G. M. '03, Rimless,	220	2250	2488		14	72	.92	4.15	10.49	16.13	
Model 1892,	24	.32 Winchester,	115	1177	352	6½	6½	10	3.46	15.37	37.21	1.11	1.24
Model 1892,	24	.32-20 W. H. V.,	115	1575	633		7	17	2.10	10.70	29.89	2.66	
Model 1894,	26	.32-40	165	1385	702	8½	8½	18	2.56	12.21	31.90	3.08	4.13
Model 1894,	26	.32-40 W. H. V.,	165	1700	1058		10	30	1.70	8.23	22.08	5.45	
Model 1894,	26	.32 W. S. Smokeless,	170	2050	1585		12	45	1.17	5.60	15.26	7.66	
Model 1894,	26	.32 W. S. Black,	170	1385	724	9			2.56	12.21	31.90		4.41
Model 1905,	22	.32 Self-Loading,	165	1400	718		11	21	2.54	11.96	31.35	2.60	
Model 1886,	24	.33 W. C. F.,	200	2000	1775		13	39	1.21	5.78	15.51	11.35	
Model 1895,	24	.35 W. C. F.,	250	2150	2567		15	56	1.03	4.73	12.24	19.81	
Model 1905,	22	.35 Self-Loading,	180	1400	782		10	18	2.53	12.05	32.58	3.10	
Model 1892,	24	.38 Winchester,	180	1268	644	7½	10	12	3.19	14.42	35.68	3.20	4.69
Model 1892,	24	.38-40 W. H. V.,	180	1700	1154		10	20	1.80	9.46	27.33	6.67	
Model 1894,	26	.38-55,	255	1285	934	9½	13½	17	2.97	12.92	31.98	5.96	8.41
Model 1894,	26	.38-55 W. H. V.,	255	1550	1360		10	23	2.01	9.52	25.46	9.42	
Model 1886,	26	.38-56 Winchester,	255	1359	1047	11	12	15	2.82	12.23	30.14	5.76	8.13
Model 1886,	26	.38-70 Winchester,	255	1449	1190	10	12	19	2.58	10.58	27.17	7.16	10.24
Model 1895,	26	.38-72 Winchester,	275	1443	1293	16	15	25	2.24	10.58	27.67	8.70	9.40
Single Shot,	30	.38-90 Winchester Express,	217	1546	1149	9			2.05	10.15	27.49		9.58
Marlin,	28	.40-60 Marlin,	260	1419	1163	8½			2.97	11.81	29.40		7.69
Single Shot,	28	.40-69 Winchester,	210	1475	1014	9½			2.61	11.65	30.11		6.94
Model 1886,	26	.40-65 Winchester,	260	1325	1013	9	11	14½	2.85	12.00	30.67	6.80	8.68
Model 1886,	26	.40-70 Winchester,	330	1349	1335	13	11	19½	2.89	11.79	29.44	9.23	12.95
Single Shot,	26	.40-70 Sharp's Straight,	330	1229	1108	11½			3.30	13.40	32.86		11.33
Model 1895,	26	.40-72 Winchester, Black,	300	1359	1386	13			2.59	12.21	30.50		15.57
Model 1895,	26	.40-72 Winchester, Smokeless,	300	1386	1307		14	22	2.43	11.63	28.54	9.99	
Model 1886,	26	.40-82 Winchester,	260	1445	1205	12	11	17½	2.56	11.92	30.32	8.79	12.19
Single Shot,	30	.40-90 Sharp's Straight,	370	1357	1508	16			2.73	10.76	26.85		15.35
Single Shot,	30	.40-110 Winchester Express,	260	1555	1395	12			2.07	8.95	23.63		16.73
Model 1895,	24	.405 W. C. F.,	300	2150	3077		13	48	1.05	4.86	12.82	28.24	
Model 1892,	24	.44 Winchester,	200	1245	688	9	10	13	3.36	15.27	37.39	3.93	5.42
Model 1892,	24	.44-40 W. H. V.,	200	1500	999		10	14	2.32	12.12	33.64	5.98	
Single Shot,	30	.45-60 Winchester,	300	1271	1075	11½			3.16	13.67	33.10		9.28
Model 1886,	26	.45-70-350 Winchester,	350	1307	1327	13	11	17	2.79	13.13	32.35	10.28	14.57
Model 1886,	26	.45-70-330 Gould H.,	330	1338	1315	10			2.82	12.66	31.76		12.70
Model 1886,	26	.45-70-405 U. S. G.,	405	1286	1652	13	12	18	4.12	12.33	29.00	12.27	15.21
Model 1886,	26	.45-70 W. H. V.,	300	1825	2214		13	25	1.47	7.40	19.65	16.16	
Model 1886,	26	.45-70-500 U. S. G.,	500	1179	1542	18	15	20	3.66	14.36	34.36	15.22	18.43
Single Shot,	30	.45-75 Winchester,	350	1343	1401	14½			3.04	12.41	30.62		13.61
Model 1886,	26	.45-90 Winchester,	300	1480	1457	13	15	19	2.44	10.25	27.25	11.38	16.53
Model 1886,	26	.45-90 W. H. V.,	300	1925	2466		14	26	1.41	6.63	17.73	18.99	
Single Shot,	30	.45-125 Winchester Express,	300	1633	1775	9½			2.19	9.01	25.11		22.93
Single Shot,	30	.50-95 Winchester Express,	300	1493	1484	10			2.58	12.57	33.51		17.48
Model 1886,	26	.50-110 Winchester Express,	300	1536	1571	11	12½	20	2.53	11.91	33.52	11.32	19.76
Model 1886,	26	.50-110 W. H. V.,	300	2150	3020		14	26	1.07	5.82	17.28	25.62	
Model 1886,	26	.50-100-450 Winchester,	450	1383	1719	16	14	20	2.85	11.94	30.69	21.53	25.17

For purposes of comparison, we give herewith the free recoil of a Winchester 12 gauge repeating shotgun, and a 12 gauge double-barreled shotgun: With a load of 3¼ drams of black powder and 1¼ ounces of shot, the free recoil is 31.5 foot pounds. The same guns loaded with 3¼ drams of smokeless powder and 1¼ ounces of shot give a free recoil of 28.0 foot pounds.

Reproduced from the Ideal Hand Book No. 17, printed circa 1906.

OBSOLETE AMERICAN RIFLE CARTRIDGES
Centerfire Sporting—Blackpowder and Smokeless
Dimensional Data

Cartridge	Case type	Bullet dia.	Neck dia.	Shoulder dia.	Base dia.	Rim dia.	Case length	Ctge. length	Twist	Primer
219 Zipper	A	.224	.252	.364	.421	.497	1.94	2.26	16	L
22-15-60 Stevens	B	.226	.243	—	.265	.342	2.01	2.26	12	S
22 Extra Long (Maynard)**	B	.228	.252	—	.252	.310	1.17	1.41	16	S-O***
22 Winchester CF	A	.228	.241	.278	.295	.342	1.39	1.61	16	S
22 Savage High Power	A	.228	.252	.360	.416	.500	2.05	2.51	12	L
244 Remington	C	.243	.276	.429	.470	.472	2.23	2.90	12	L
6mm Lee Navy	C	.244	.278	.402	.445	.448	2.35	3.11	7 1/2	L
25-20 Single Shot	A	.257	.275	.296	.315	.378	1.63	1.90	12-15	S
25-20 Marlin	A	.257	.274	.329	.349	.405	1.33	?	13-14	S
25-21 Stevens	B	.257	.280	—	.300	.376	2.05	2.30	14	S
25-25 Stevens	B	.257	.282	—	.323	.376	2.37	2.63	14	S
25-36 Marlin	A	.257	.281	.358	.416	.499	2.12	2.50	9	S
256 Winchester Magnum	A	.257	.283	.370	.378	.440	1.30	1.53	14	S
25 Remington	C	.257	.280	.355	.420	.421	2.04	2.54	10	L
256 (6.5mm) Newton	C	.264	.290	.430	.469	.473	2.44	3.40	10	L
6.5 Remington Magnum	E	.264	.300	.490	.512	.532	2.17	2.80	9	L
275 H&H Magnum	E	.284	.375	.375	.513	.532	2.50	3.30	9 1/2	L
7x61 Sharpe & Hart	E	.284	.320	.478	.515	.532	2.40	3.27	12	L
28-30-120 Stevens	B	.285	.309	—	.357	.412	2.51	2.82	14	L
30-30 Wesson	A	.308	.329	.330	.380	.440	1.66	2.50	12	L
30-03 Government	C	.308	.340	.441	.470	.473	2.54	3.34	10	L
30 Newton	C	.308	.340	.491	.523	.525	2.52	3.35	10-12	L
308 Norma Magnum		.308	.340	.489	.514	.529	2.56	3.30	10-12	L
32-40 Remington	A	.309	.330	.358	.453	.535	2.13	3.25	16	S
32-20 Marlin	A	.312	.326	.338	.353	.405	1.32	?	20	S
32-30 Remington	A	.312	.332	.357	.378	.437	1.64	2.01	16	S
32-35 Stevens & Maynard	B	.312	.339	—	.402	.503	1.88	2.29	16	S
32-40 Bullard	A	.315	.332	.413	.453	.510	1.85	2.26	16	S
32 Long, CF*	B	.317	.318	—	.321	.369	0.82	1.35	20	S
32 Extra Long, Ballard*	B	.317	.318	—	.321	.369	1.24	1.80	22	S
32 Winchester SL	H	.320	.343	—	.346	.388	1.28	1.88	16	S
32-40 Ballard & Win.	B	.320	.338	—	.424	.506	2.13	2.59	16	L
32 Remington	C	.320	.344	.396	.420	.421	2.04	2.57	14	L
32 Ideal	B	.323	.344	—	.348	.411	1.77	2.25	18	S
33 Winchester	A	.333	.365	.443	.508	.610	2.11	2.80	12	L
35 Winchester SL	H	.351	.374	—	.378	.405	1.14	1.64	16	S
351 Winchester SL	H	.351	.374	—. .378	.407	1.38	1.91	16	S	
350 Griffin & Howe Magnum	E	.357	.382	.446	.511	.528	2.848	3.64	12	L
35 Winchester	A	.358	.378	.412	.457	.539	2.41	3.16	12	L
35 Newton	C	.358	.383	.498	.523	.525	2.52	3.35	12	L
358 Norma Magnum	E	.358	.384	.489	.508	.526	2.52	3.22	12	L
35-30 Maynard (1882)	B	.359	.395	—	.400	.494	1.63	2.03	16-18	S
35-40 Maynard (1873)	B	.360	.390	—	.400	.492	2.06	2.53	16-18	S
35-40 Maynard (1882)	B	.360	.390	—	.400	.492	2.06	2.53	16-18	S
38-45 Stevens	B	.363	.395	—	.455	.522	1.76	2.24	16-18	S
35-30 Maynard 1873	B	.364	.397	—	.403	.765	1.63	2.10	16-18	B-1
35-30 Maynard 1865	B	.370	.397	—	.408	.771	1.53	1.98	16-18	none
38-40 Remington-Hepburn	B	.372	.395	—	.454	.537	1. 77	2.32	16	S
38-45 Bullard	A	.373	.397	.448	.454	.526	1.80	2.26	16-18	S
38 Long, CF*	B	.375	.378	—	.379	.441	1.03	1.45	36	S
38 Extra Long, Ballard*	B	.375	.378	—	.379	.441	1.63	2.06	36	S
38-35 Stevens	B	.375	.402	—	.403	.492	1.62	2.43	—	S
38-50 Maynard (1882)	B	.375	.415	—	.421	.500	1.97	2.38	—	S
375 Weatherby Magnum	E	.375	.403	.495	.513	.530	2.86	3.69	12	L
38-50 Ballard	B	.376	.395	—	.425	.502	2.00	2.72	20	S
38-50 Remington-Hepburn	B	.376	.392	—	.454	.535	2.23	3.07	16	S
38-56 Winchester	A	.376	.403	.447	.506	.606	2.10	2.50	20	L
38-90 Winchester Express	A	.376	.395	.470	.477	.558	3.25	3.70	26	L
38-70 Winchester	A	.378	.403	.421	.506	.600	2.31	2.73	24	L
38-72 Winchester	A	.378	.397	.427	.461	.519	2.58	3.16	22	L
38 Colt Lightning	A	.401	.416	.438	.465	.520	1.30	?	36	S-L
38-40 Marlin	A	.401	.416	.438	.465	.520	1.30	?	36	S-L
40-50 Sharps (Straight)	B	.403	.421	—	.454	.554	1 88	2.63	18	B-1
40-50 Sharps (Necked)	A	.403	.424	.489	.501	.580	1.72	2.37	18-20	B-1
40-60 Marlin	B	.403	.425	—	.504	.604	2.11	2.55	20	S
40-63 (40-70) Ballard	B	.403	.430	—	.471	.555	2.38	2.55	20	S
40-65 Ballard Everlasting	B	.403	.435	—	.508	.600	2.38	2.55	18-20	B-1
40-70 Sharps (Straight)	B	.403	.420	—	.453	.533	2.50	3.18	18-20	L
40-70 Sharps (Necked)	A	.403	.426	.500	.503	.595	2.25	3.02	18-20	L
40-85 (40-90) Ballard	B	.403	.425	—	.477	.545	2.94	3.81	18-20	S
40-90 Sharps (Straight)	B	.403	.425	—	.477	.546	3.25	4.06	18	B-1
40-90 Sharps (Necked)	A	.403	.435	.500	.506	.602	2.63	3.44	18-20	B-1
40-110 Winchester Express	A	.403	.428	.485	.543	.651	3.25	3.63	28	L
40-60 Winchester	A	.404	.425	.445	.506	.630	1.87	2.10	40	S
40-70 Winchester	A	.405	.430	.496	.504	.604	2.40	2.85	20	L
40-70 Remington	A	.405	.434	.500	.503	.595	2.25	3.00	18-20	L
40-65 Winchester	B	.406	.423	—	.504	.604	2.10	2.48	20-26	L
40-72 Winchester	B	.406	.431	—	.460	.518	2.60	3.15	22	L
40-82 (40-75) Winchester	A	.406	.428	.448	.502	.604	2.40	2.77	28	L
401 Winchester SL	H	.406	.428	—	.429	.457	1.50	2.00	14	L

OBSOLETE AMERICAN RIFLE CARTRIDGES (Continued)

Cartridge	Case type	Bullet dia.	Neck dia.	Shoulder dia.	Base dia.	Rim dia.	Case length	Ctge. length	Twist	Primer
40-70 Peabody	A	.408	.428	.551	.581	.662	1.76	2.85	18	L
40-90 Peabody	A	.408	.433	.546	.586	.659	2.00	3.37	—	B-1
405 Winchester	B	.412	.436	—	.461	.543	2.58	3.18	14	L
40-75 Bullard	B	.413	.432	—	.505	.606	2.09	2.54	20	S
40-90 Bullard	A	.413	.430	.551	.569	.622	2.04	2.55	18	L
40-40 Maynard (1882)	B	.415	.450	—	.456	.532	1.78	2.32	18-20	S
40-60 Maynard (1882)	B	.417	.448	—	.454	.533	2.20	2.75	18-20	S
40-70 Maynard (1882)	B	.417	.450	—	.451	.535	2.42	2.88	18-20	B-1
44 Evans Short	B	.419	.439	—	.440	.513	0.99	1.44	36	S
44 Evans Long	B	.419	.434	—	.449	.509	1.54	2.00	36	L
40-40 Maynard (1873)	B	.422	.450	—	.460	.743	1.84	2.34	18-20	B-1
40-70 Maynard (1873)	B	.422	.450	—	.451	.759	2.45	3.00	18-20	B-1
44 Henry Centerfire Flat	B	.423	.443	—	.445	.523	0.88	1.36	36	S
40-40 Maynard 1865	B	.423	.450	—	.458	.766	1.75	2.24	18-20	none
44 Game Getter/44-40 Marlin/ 44 Colt Lightning	A	.427	.443	.458	.471	.520	1.31	?	36	L
44-40 Extra Long	A	.428	.442	.463	.468	.515	1.58	1.96	36	S
44 Long Ballard (CF)*	B	.439	.440	—	.441	.506	1.09	1.65	36	S
44 Extra Long, Ballard (CF)*	B	.439	.441	—	.441	.506	1.63	2.10	36	S
44 Extra Long, Wesson*	B	.440	.441	—	.441	.510	1.63	2.19	36	S
44-90 Rem. Special (Necked)	A	.442	.466	.504	.515	.628	2.44	3.08	?	L
44-100/44-90/44-110 Creedmoor	B	.442	.465	—	.503	.568	2.60	3.97	22-30	L
44-95 Peabody	A	.443	.465	.550	.580	.670	2.31	3.32	?	B-1
44-70 Maynard 1882	B	.445	.466	—	.499	.601	2.21	2.87	?	B-1
44-75 Ballard Everlasting	B	.445	.487	—	.497	.603	2.50	3.00	?	B-2
44-100 Ballard	B	.445	.485	—	.498	.597	2.81	3.25	20	L
44-100 Wesson	B	.445	?	—	.515-.520	.605-.610	3.38	3.85	?	L
44-77 Sharps & Remington	A	.446	.467	.502	.516	.625	2.25	3.05	?	L-B1
44-85 Wesson	B	.446	?	—	.515-.520	.605-.610	2.88	3.31	?	L
44-90 (44-100) Sharps 2⅝"	A	.446	.468	.504	.517	.625	2.63	3.30	?	B-1
44-60 Sharps & Remington	A	.447	.464	.502	.515	.630	1.88	2.55	?	L-B1
44-60 Peabody & Winchester	A	.447	.464	.502	.518	.628	1.89	2.56	?	B-1
44-60 Sharps & Remington Necked	A	.447	.464	.502	.515	.630	1.88	2.55	?	L-B1
44-100 Maynard 1873	B	.450	.490	—	.497	.759	2.88	3.46	?	B-1
45-90/44-100/44-110 Sharps (2.4-2.6") 2¾-2⅞")	B	.451	.489	—	.500	.597	2.40,2.60 2.75,2.87	2.85 3.00	18-20	B-1
45-120/450125 (3¼") Sharps	B	.451	.490	—	.506	.597	3.25	4.16	18	L
45-100 Remington (Necked)	A	.452	.490	.550	.558	.645	2.63	3.26	18-20	L
45-50 Peabody	A	.454	.478	.508	.516	.634	1.54	2.08	?	?
45-60 Winchester	B	.454	.479	—	.508	.629	1.89	2.15	20	L
45-75 Winchester	A	.454	.478	.547	.559	.616	1.89	2.25	20	L
45-100 Ballard	B	.454	.487	—	.498	.597	2.81	3.25	20	L
45-125 Winchester	A	.456	.470	.521	.533	.601	3.25	3.63	36	L
45-70 Van Choate	B	.457	Same as 45-70				2.25	2.91	22	L
45-75/45-70 Sharps 2.1"	B	.457	Same as 45-70				2.10	2.90	22	L
45-78 Wolcott	B	.457	Same as 45-70				2.31	3.19	22	L
45-80 Sharpshooter	B	.457	Same as 45-70				2.40	3.25	20-22	L
45-90/45-82/45-85 Winchester	B	.457	.477	—	.501	.597	2.40	2.88	32	L
50-90 Sharps	B	.509	.528	—	.565	.663	2.50	3.20	?	L
50-140 (3¼") Sharps & Winchester	B	.509/.512	.528	—	.565	.665	3.25	3.94	?	L
50-115 Bullard	G	.512	.547	.577	.585	.619	2.19	2.56	72	L
50-110/50-100/50-105 Winchester	B	.512	.534	—	.551	.607	2.40	2.75	54	L
50-50 Maynard 1882	B	.513	.535	—	.563	.661	1.37	1.91	42	L
50-95 Winchester	A	.513	.533	.553	.562	.627	1.94	2.26	60	L
50-70 Maynard 1873	B	.514	.547	—	.552	.760	1.88	2.34	42	B-1
50 U.S. Carbine	B	.515	.535	—	.560	.660	?	?	?	B-1
50-70 Govt. Musket	B	.515	.535	—	.565	.660	1.75	2.25	24-42	L
50 Sporting										
50 Maynard 1865	B	.520	.543	—	.545	.770	1.24	1.75	42	none
55-100 Maynard 1882	B	.551	.582	—	.590	.718	1.94	2.56	?	L
58 Carbine, Berdan	B	.589	.625	—	.640	.740	?	?	?	B-2
58 Berdan Musket U.S.	B	.589	.625	—	.646	.740	1.75	2.15	68	B-1
70-150 Winchester	A	.705	.725	.790	.805	.870	2.18	2.63	?	L

A—Rim, bottleneck B—Rim, Straight C—Rimless, bottleneck D—Rimless, straight E—Belted, Bottlenck F—Belted, straight G—Semi-rimmed, straight H—Semi-rimmed, straight I—Rebated, bottleneck

Primer: S—Small rifle (.175") L—Large rifle (.210") B-1—Berdan #1 B-2—Berdan #2

*Cartridges so marked used an outside lubricated bullet when originally introduced, and this was of a diameter about the same as the neck or shell mouth. Later, inside lubricated loadings used a much smaller diameter bullet than listed, usually with a long, hollow base. Before the recent advent of effective wax-type lubricants, outside lubricated bullets were never very popular or effective. The inside lubricated hollow-base bullets were cleaner to handle and use and the hollow base was intended to expand the bullet to fit the larger barrel. This never worked very well and accuracy suffered.

**Original 22-10-45 Maynard case length was 1.25".

***This is a blackpowder primer smaller than the small rifle or pistol size. It has not been made for many years.

Note on blackpowder primers: Not all companies used the same primer type or size in the same caliber or length case. For example, the 45-70 or its equivalent was usually loaded with the large rifle size primer. However, the Marlin version had the small rifle size and Sharps Co. ammunition had Berdan primers. Primer type and size listed is what appears to have been the most general size and type used.

Unless otherwise noted, all dimensions are in inches.

Chapter 4

WILDCAT CARTRIDGES

(Rifle and Handgun)

WE HAVE taken the occasion of this 8th Edition to accomplish something that probably should have been done from the beginning—creating separate chapters for wildcat and proprietary cartridge listings. This chapter, therefore, will concern itself only with wildcat cartridges.

Wildcat cartridges have been around for a long time, at least 100 years. Originally, wildcats were developed by some gunsmith or individual experimenter attempting to improve on the ballistics of a commercial cartridge in order to fulfill a personal or special requirement, possibly to increase the effective range for varmint shooting or the knockdown power on big game. I don't know who coined the term "wildcat" to describe these efforts, but for our purposes we will define wildcat cartridges as: cartridge designs and loads not available from major manufacturers as over-the-counter ammunition or cartridges not generally available even in custom loadings. To shoot wildcat cartridges you have to load them yourself or contract that loading with a custom handloader.

There has been a great proliferation of wildcat cartridges during the past decade or so, some quite good and some not so good. In some instances the wildcat filled, or was perceived to fill, some niche not accommodated by commercially available ammunition. Good examples include the 35 Whelen and the 458 Alaskan. The former lingered in wildcat limbo for a generation before being commercially adopted. The latter, though certainly useful, will likely never achieve commercialization chiefly because the only rifle appropriate for it was long ago discontinued. In other instances the only basis for a wildcat was to offer ballistics previously unavailable in a certain type of firearm such as the entire genre of current Thompson/Center custom chamberings. Benchresters have long experimented with wildcats, creating designs where the only criteria is potential inherent accuracy. These wildcats are built to precisely fit a single firearm, and though they are nominally of the same specifications, cannot be interchanged in other so-chambered firearms with impunity.

Because there is considerable renewed interest in wildcat developments, the editor has enlarged this section of the book. Some of the additional material is new, but the older wildcats of historical or developmental interest are also included because many of the younger or new shooters don't know that they exist. This is probably one reason for the development of wildcats that are really just a variation on a theme and don't offer anything new.

It is quite impossible to include every known wildcat cartridge because there are simply too many of them. Former editions claimed there were over 300 known. I suspect the number now is in the thousands. Also, it hasn't been possible to gather all of the necessary information on many of them. Furthermore, wildcat cartridges tend to be very regional in nature; what is popular in one area may be completely unknown in the rest of the country. Even wildcats that have been written up and published in gun magazines may have only a limited following. Probably the best indicator of the popularity of a cartridge is the number of loading die sets sold in that particular caliber. RCBS in Oroville, California is the world's largest manufacturer of wildcat loading and case-forming dies. They will make up special-order die sets to your specifications at relatively moderate prices. Quite a few wildcat cartridges have retained sufficient popularity over the years to warrant RCBS carrying them as standard stock items. Less popular ones are available on special order, subject to minor delays in delivery.

For many years, the trend in wildcat cartridge development has been toward increased case capacity and higher velocity. At the present time, wildcat cartridge design and chambering for the sake of improved performance has declined from enthusiastic to almost nonexistence. The reason, I think I can venture forth without incurring too much wrath, is a maturity among shooters. We have matured into the realization that there really are no magic cartridges. Within safe pressure parameters, no wildcat chambering in any standard brass case chambered in any standard gun is going to deliver ballistics significantly different from what is already out there in commercial form. Of course, some will disagree, and I will have to admit that there are always exceptions. However, it is safe to say that the vast majority of recent wildcatting has been directed toward filling gun-type chambering niches, e.g., the aforementioned Thompson/Center chamberings.

Wildcat cartridges are made in a number of ways, from the simple to the more complex. They can be grouped into basic categories: those with increased case capacity created by modifying an existing cartridge; those with unusual case capacity for bore diameter, made by necking a case that is larger or smaller than any common commercial example, up or down; those with unusual bullet sizes, created by necking an existing case to accept a different size bullet; those with unusually close cartridge to

chamber tolerances, building the rifle and loading dies to match the custom handloaded ammunition. Let's look at some examples. One of the very early wildcats was the 22 Hornet, wildcatted before it became a commercial number. In this instance no change in the brass case was required since it was based on the 22 WCF blackpowder cartridge, which was simply loaded with smokeless powder and jacketed 45-grain bullets from the 5.5mm Velo Dog revolver cartridge. Early wildcats were rather simple and are good examples of taking a standard commercial cartridge case and necking it either up or down. The 35 Whelen is an example of the former, the 25-06 the latter, both being based on the standard 30-06 case. The Improved line of cartridges are examples of increasing performance in the original case in an uncomplicated manner. Here, the standard cartridge is fired in the improved chamber from where it emerges with less body taper and a sharper shoulder angle. This increases powder capacity, and in some instances, the improved case when reloaded does indeed provide better performance. The Ackley improved 250 Savage and 257 Roberts chambering, along with the various improved versions of the 300 H&H Magnum, are good examples of improved wildcats that do indeed result in substantial ballistic enhancement over the original cartridge. The same cannot be said of some of the others.

One of the advantages of improved chambers is that they will also chamber and fire the original factory cartridge. This is very handy if you happen to run out of improved reloads in some place far from home. There is, of course, a slight reduction in velocity when standard ammunition is fired in the improved chamber, but this is a minor factor.

There are a few wildcat cartridges that are rather complicated to make, requiring extensive reforming and trimming, turning the rim or neck down on a lathe or even swaging a belt on the base of the case. Such cartridges are, in my opinion, impractical for the average shooter. If a wildcat is to achieve any degree of popularity, it must be relatively simple and easy to form the brass case, otherwise its use will be confined to a handful of professionals. This is something to keep in mind if you happen to be working on a wildcat project you hope will one day become a commercial success.

Some readers probably think that if someone develops a popular wildcat and it is eventually adopted by one of the big commercial ammunition companies he will make a lot of money. Not true; he will be lucky if he even gets credit as the originator. No major company is going to adopt a wildcat cartridge until it has a long-term proven track record. By that time, it will have been around so long it will fall into the category of general public knowledge, and no one will have any claim to it. It is also futile to patent a cartridge design because any slight variation becomes a new cartridge. I mention this because every now and again we hear from someone who thinks developing a "new" cartridge is the road to fame and fortune.

There are a good number of commercial cartridges that originated as wildcats. Some prime examples are: 17 Remington, 22 Hornet, 22-250 Remington, 243 Winchester, 244 Remington, 257 Roberts, 25-06 Remington, 280 Remington, 7mm-08 Remington, 7-30 Waters and the 35 Whelen. There are also a number of commercial cartridges that are variations of what were originally wildcats. These include practically all of the American 7mm and 30-caliber factory magnum cartridges. Remington has been the leader in adopting wildcat designs, and this has been very beneficial to the shooting sports.

Working with wildcat cartridges is very instructive, and those of us who have done so have learned a great deal about the relationship between case size and configuration, bore diameter and powder combustion. One of the areas that has provided some real surprises is in working with the short cartridges with case lengths of around 1½ inches or so. This is a trend that was actually begun by the Germans during WWII with their 7.92x33mm assault rifle cartridge, which has a case only 1.30 inches long. The Russians, who were on the receiving end of this innovation, recognized a good idea when they saw one and so developed their 7.62x39mm (M43) cartridge with a case 1.52 inches long.

As a group, wildcatters tend to be advanced handloaders and true devotees of the shooting sports. Wildcat rifles and cartridges are also a good topic of conversation around the hunting campfire, and if you happen to have one, it sort of sets you apart as someone who is at least a little above average in gun knowledge. However, one should never enter lightly into the wildcat arena because this usually entails a custom-built rifle, plus the investment in forming and loading dies. Rifles chambered for wildcat cartridges are much more difficult to trade or sell in the event you decide that what you have is not exactly what you want. Wildcat cartridges and the individuals who work with and develop them have contributed some major advances to our knowledge as well as a number of very fine cartridges to the commercial line-up. Large companies such as Federal, Remington and Winchester are by nature rather conservative and not inclined to market something that won't sell. It is in the area of innovation and breaking new ground that the wildcatters make their major contribution, and we haven't seen the end yet. No telling what great ideas will come to fruition over the next decade or so.

Pocket Manual for Shooters and Reloaders by Parker O. Ackley. Salt Lake City, 1964.

Practical Dope on the .22 by F.C. Neww. New York and Harrisburg, PA, 1947.

Small Game and Varmint Rifles by Henry F. Stebbins. New York City, 1950.

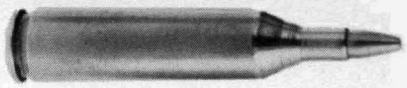
Twenty-Two Caliber Varmint Rifles by Charles S. Landis. Plantersville, SC, 1947.

Why Not Load Your Own? by Colonel Townsend Whelen. Washington, DC, 1949 and later eds.

Wildcat Cartridges by Richard F. Simmons. New York City, 1947.

Woodchucks and Woodchuck Rifles by C.S. Landis. New York City, 1951.

14-222

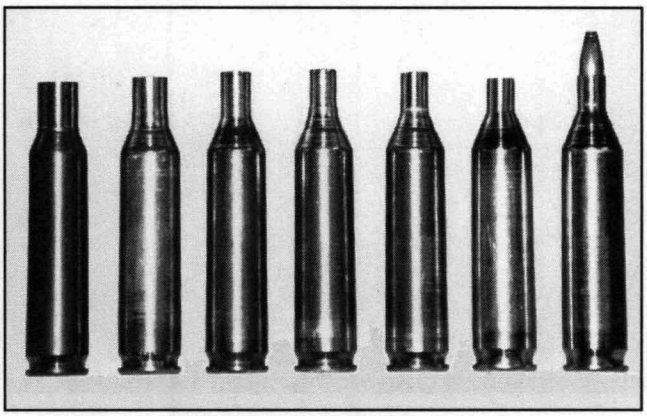


Historical Notes In the decade following WWII, there was considerable interest and experimentation with sub-caliber cartridges of 14- and even 12-caliber. Although interest subsided, it never completely died out, and a small but persistent group continued to work with the 14-caliber. The 14-222 is the latest of these cartridges and was originated by Helmut W. Sakschek about 1985. It is based on the 222 Remington case necked-down to 14-caliber. Information covering the cartridge was published in the 1988 issue (20th Edition) of *Guns Illustrated*, DBI Books, Inc., edited by Harold A. Murtz. Mild report and practically zero recoil are characteristics of these small-caliber rifles. With initial velocities of over 4000 fps, they are quite deadly on small and even large animals.

General Comments An 11-grain bullet starting out at 4465 fps develops 505 fpe, which doesn't sound very impressive. However, anything moving at such hypervelocity imparts a sizable portion of that velocity to the molecular structure of whatever it impacts, with devastating results. On the other hand, once the remaining velocity drops below about 3500 fps, the effectiveness of these small, lightweight bullets diminshes rapidly, so they are not really all that good for long-range shooting. There are also many problems with working with such small projectiles. For example, metal fouling can be a serious problem and such cartridges generally exhibit extreme sensitivity to charge variations. Wind drift with such light projectiles is also a frequent complaint. Some older 14-caliber cartridges used bullets of 20 to 25 grains which are easier to handle and load, but can not be pushed at quite the velocity of the lighter projectiles. In any event, the sub-calibers are extremely interesting and represent an area that may see additional development. Barrels in 14-caliber are currently available from Matco Inc., P.O. Box 349, North Manchester, Indiana 46962. Bullet-making equipment is available through Corbin, Inc., P.O. Box 2659, White City, Oregon 97503.

14-222 Reloading Data

Bullet (grs.)	Powder/grs.		MV	ME
11.4 HP	IMR 4198	20	4200	445
11.4 HP	IMR 3031	21	4465	505



Left to right—factory 222 Rem. case, three stages of progressively swaged necks, resized case with the neck turned to correct thickness, fir-formed case trimmed to length, and finished 14-222 with bullet seated.

17 Hornet (Ackley)

Historical Notes The 17 Ackley Hornet is simply the 22 Hornet Improved necked-down to 17-caliber. It was originated by P.O. Ackley in the early 1950s, and he describes this cartridge as one of the most balanced of the 17-caliber cartridges. Although small, it delivers ballistics equal to some of the larger 17-caliber cartridges. It is an effective 200-yard varmint cartridge and is quite accurate. It is normally used in single shot rifles, although the small Sako bolt action was favored by many because it was made to handle rimmed cartridges such as the 22 Hornet or 218 Bee.

General Comments The 17 Hornet is a good cartridge for use in settled areas where a mild report and minimum ricochet are desirable characteristics. It is one of the most accurate of the 17 calibers. Its use should be confined to varmint shooting. The standard twist is 1 in 10 inches, the same as most other 17-caliber rifles. Reportedly, IMR 4198 gives the most uniform results, although Ball BL-C2 as well as several of the newer powders should work well.

17 Ackley Hornet Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
25 HP	BL-C2	15.0	3040	510	
25 HP	IMR 4198	11.0	3300	600	Ackley
25 HP	IMR 4198	12.0	3585	710	Ackley
25 HP	H-4227	11.5	3570	705	Ackley

17 Ackley Bee

Historical Notes The 17 Ackley Bee is a step up from the 17 Hornet as it is based on the 218 Improved Bee case, which has larger powder capacity than the Improved Hornet case. It was developed by P.O. Ackley back in the 1950s, and he considered it the ideal small case for a 17-caliber cartridge. There is relatively little gain in ballistic performance by using cartridge cases larger than the 17 Bee. In fact, cases of very much larger capacity often produce erratic results and poor accuracy.

General Comments The 17 Bee, like the 17 Hornet, is chambered mostly in single shot rifles, usually of the under-lever type. Bolt actions are sometimes used but will not always handle the rimmed case well when feeding from the magazine. The small Sako bolt action was favored when available. Like most of the smaller 17-caliber cartridges, the 17 Bee is noted for its mild report and low recoil. It is a good 200- to 225-yard varmint cartridge for use in settled areas. P.O. Ackley recommended IMR 4198, or H4198, as the propellant that produces the most uniform results, and there are several new choices recently available that whould work as well. Bullets are available from Hornady.

17 Ackley Bee Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
20	H-4227	11.0	3845	655	Ackley
25 HP	BL-C2	16.5	3190	565	
25 HP	H-335	17.0	3285	595	
25 HP	IMR 4198	13.0	3180	555	

17 Mach IV

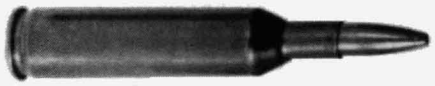
Historical Notes Introduced by the O'Brian rifle company of Las Vegas, Nevada, this cartridge was intended to offer simple case conversion and good ballistics. It succeeded on both counts but could not compete against a factory chambering, i.e., the 17 Remington.

General Comments This short cartridge can be used in short rifle actions. Efficiency is much better than the various full-power 17s available. This diminutive chambering can produce over 3850 fps with 25-grain bullets and is fully capable of delivering good varmint accuracy to about 250 yards, perhaps a bit further on a calm day. Muzzle blast is in a different league from larger 17s and the various high-performance 22s. While by no means "quiet," the 17 Mach IV generates so much less report that this difference is significant. Use of the faster powders listed, while necessitating a slight velocity sacrifice, results in much quieter loads. Since it uses significantly less powder than the 17 Remington, the 17 Mack IV generally produces much less barrel fouling, an important consideration in this diminutive bore size.

17 Mach IV Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
25	2400	13.1	3600	720	Hornady
25	H4227	14.6	3700	760	Hornady
25	H4198	15.6	3700	760	Hornady
25	2015BR	18.5	3850	820	Accurate
25	2230	20.3	3861	825	Accurate
25	2460	20.5	3883	835	Accurate (Compressed)
25	2520	20.5	3768	785	Accurate (Compressed)

17/222



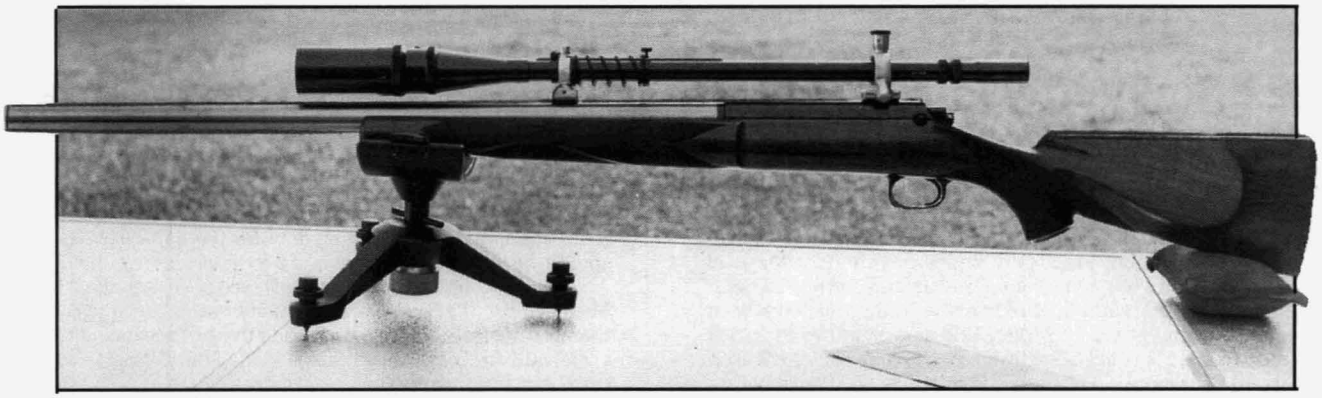
Historical Notes The 17/222 is simply the 222 Remington case necked-down to 17-caliber. There are several versions of this cartridge, but the one listed here is the most popular. The 17/222 dates back to about 1957, possibly earlier. Many shooters considered the 17/222 more accurate and less sensitive to load variations than the wildcat 17/223, which was the forerunner of the later 17 Remington. P.O. Ackley considered the 222 Remington case about maximum capacity for the 17-caliber and states in his book, *Handbook for Shooters and Reloaders*, that larger cases tend to be inflexible. Those who have experimented with larger cases have usually found he is right.

General Comments The 17/222 did not achieve great popularity, but was well liked by those who worked with it. Performance is practically the same as the 17 Remington which has a larger case. Best accuracy is usually with IMR 4198 powder and the 25-grain bullet. Recommended twist is 1 in 10 inches. Cases are simple and easy to form by necking-down 222 Remington brass with no other modification. There has been some renewed interest in this cartridge during the past couple of years.

17/222 Loading Data*

Bullet (grs.)	Powder/grs.		MV	ME	Source
20	IMR 4198	18.0	4348	840	Ackley
25 HP	IMR 4198	15.0	3226	575	Ackley
25 HP	IMR 4198	17.0	3704	760	Ackley
25 HP	IMR 3031	18.0	3704	760	Ackley

***Warning:** 17-caliber cartridges are very sensitive to slight changes in loading density. Reduce all above loads by 10 percent and work up in 0.2-grain increments.



Shilen

17-223

Historical Notes This cartridge is very similar to the 17 Remington but is based on the 223 Remington, rather than the 222 Remington Magnum. It is anybody's guess who might have been the first gunsmith to neck down the commercialized 5.56mm. Likely this conversion occurred almost immediately after Remington offered the 223 as a standard chambering. Just as likely many gunsmiths thought of this at the same time. The 17-223 can be considered one of the logical forebears of the 17 Remington, although the latter is unique.

General Comments The 17-223 has a very short neck, but considering the diminutive projectiles normally available, this does not seem to be much of a concern to those who load it. Capacity, pressure and performance are practically identical to the 17 Remington and the advent of general good availability of 223 cases has spurred a resurgence of this cartridge's popularity. For the handloader it can be considerably less expensive to shoot than the 17 Remington.

17-223 Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
25	H4198	21.1	4000	885	Hornady
25	IMR 3031	22.5	4000	885	Hornady
25	IMR 4320	24.4	4000	885	Hornady
25	IMR 4064	24.9	4000	885	Hornady

MMJ 5.7mm

Historical Notes This cartridge, also known as the 5.7mm Johnson or 22 Spitfire, was introduced in 1963 for the Johnson Guns, Inc. alteration of the U.S. M1 Carbine. This was a clip-fed semi-auto with a folding stock advertised as a survival gun. Production was later undertaken in limited numbers by Plainfield in New Jersey. The package was designed by Melvin M. Johnson, author, Marine colonel, and the man responsible for the Johnson semi-auto rifle and light machinegun of WWII fame.

General Comments The MMJ 5.7mm is based on the 30 Carbine cartridge necked-down to 22-caliber. It is a very efficient cartridge and, like others of this class, gives performance out of all proportion to its size. As a sporting round, its use would be limited to small or medium game and varmint shooting. In a survival situation, it would certainly kill deer, but 22-caliber rifles are not classed for big game in most states. Down in Mexico or Central or South America where animals are not nearly as tough or tenacious as in Africa, the 5.7mm Spitfire would make a dandy explorer's weapon. One could handle anything found in the jungle with it, two- or four-legged. A similar wildcat is known as the 22 Carbine.

MMJ 5.7mm Loading Data

Bullet (grs.)	Powder/grs.		MV	ME
40 HP	IMR 4227	14.o	2850	720
40 HP	2400	12.0	3000	795
50 HP	IMR 4198	14.0	2700	810

222 Rimmed

Historical Notes The 222 Rimmed originated in Australia in the 1960s as a cartridge for single shot rifles, particularly the small Martini action. The 224 R-C Maxi, based on the necked-down 357 Maximum, practically duplicates the 222 Rimmed because both have the same volumetric capacity as the 222 Remington. Cases are manufactured in Australia and have been available through Jack C. Miller, Shooters Supplies Pty., 302 Russell Street, Melbourne, Australia. Headstamp is SUPER, 222.

General Comments This is a good cartridge and can duplicate anything the 222 Remington can do and is useful for the same range of game. The cases tend to be a little heavier than the 222 Remington, and while loading data for the 222 can be used, it should be reduced by 1-grain when approaching maximum. American shooters might be better served to go with the 224 R-C Maxi because the basic 357 Maximum brass is easier to come by than the Australian rimmed case and the performance of the two is virtually identical. Brass can be made from RWS 5.6x50Rmm cases, but they are relatively expensive.

222 Rimmed Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	
45 HP	H-335	24	3450	1185	Near Max.
50 SP	H-335	23	3162	1110	Near Max.
55 SP	IMR 3031	21	3070	1148	Near Max.
70 SP	H-414	24	2880	1288	Near Max.

Warning: All loads near maximum—data should be reduced by 10 percent and worked up slowly.

Martini Single Shot rifle

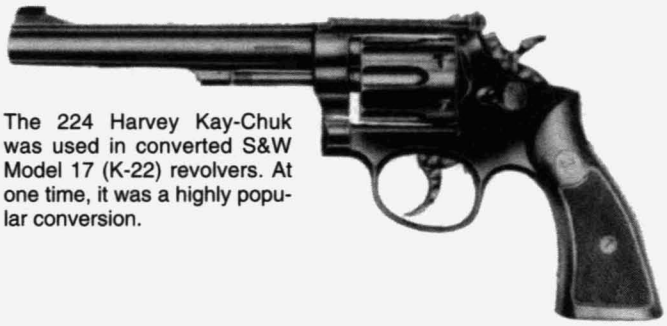
224 Harvey Kay-Chuk

Historical Notes The late Jim Harvey of Lakeville Arms Co., Lakeville, Connecticut, developed this cartridge about 1956-57. It was intended for converted S&W K-22 revolvers. It is based on the K-Hornet wildcat cartridge, but there is also a 224 Kay-Chuk Jr., which is the standard 22 Hornet case trimmed back slightly. This cartridge is noted as being the inspiration for the Remington 22 Jet cartridge.

General Comments The idea of a high-velocity 22 handgun cartridge appealed to no small number of handgun hunters. What they wanted was light recoil combined with flat trajectory. The 224 Kay-Chuk accomplished this better than any previous handgun cartridge and, in fact, is superior in performance to that developed by the S&W 22 Jet revolver. A light 37-grain bullet designed by the late Kent Bellah, a noted writer and firearms authority, is usually used. He did much to introduce the Harvey-designed zinc base and half-jacketed revolver bullets. The 224 Kay-Chuk is one of the most effective small game and varmint cartridges available for the handgun. Unfortunately, it's a wildcat, hence not available on an over-the-counter, commercial basis. It has a straight body and sharp shoulder, unlike the long taper of the 22 Jet. Users of the 224 Kay-Chuk have told me they do not have the extraction trouble and sticking cases that bother some 22 Jet users.

224 Harvey Kay-Chuk Loading Data

Bullet (grs.)	Powder/grs.		MV	ME
40 SP	2400	9.5	1652	254
40 SP	Unique	5.0	1650	242



The 224 Harvey Kay-Chuk was used in converted S&W Model 17 (K-22) revolvers. At one time, it was a highly popular conversion.

22 K-Hornet

Historical Notes Originated by Lysle Kilbourn in 1940, this was one of the first of the so-called "improved" cartridges. It is based on the fire-formed and blown-out 22 Hornet case with straight body, sharp shoulder and short neck. There are other versions, but this is the most popular and is representative of the lot. It has been used for a good many years and is still popular in varmint shooting circles. Extensive experience with this cartridge in the Thompson Contender show fairly substantial improvements over the 22 Hornet.

General Comments The popularity of the 22 K-Hornet was based on increased performance, plus the fact that any regular factory-loaded ammunition could also be fired in the same chamber. In addition, the conversion is quite cheap, and any Hornet rifle can be rechambered. Ammunition is no problem because the round is based on easily-obtainable factory ammunition. It brings the 22 Hornet into the same class as the 218 Bee with the added advantage that the 22 Hornet was chambered in several good bolt-action rifles. It is suitable for the same range of varmints and small game as the 218 Bee. Those lucky enough to find an original Kimber rifle chambered for the 22 K-Hornet can pride themselves in owning a suberb rifle.

22 K-Hornet Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
45 SP	IMR 4227	12.5	2875	825	Ackley
45 SP	2400	11.5	2900	840	Ackley
45	IMR 4198	14.5	2800	780	Ackley
50 SP	2400	11.0	2700	810	Ackley

R-2 Lovell

Historical Notes The development of the R-2 Lovell is unusual because it is an example of a wildcat cartridge developed from what was originally a wildcat. It is believed to have been developed in 1937 by Harvey Donaldson from New York. It derived its name from the fact that the second chambering reamer (made by M.S. Risley, Earlville, NY) appeared to be correct in providing what the designer was striving to produce. It is actually an Improved or blown-out version of the original 22 Lovell or 22-3000 developed by Harvey Lovell about 1934. Both are based on the obsolete 25-20 Single Shot case necked down, itself a wildcat when it first appeared in 1882.

General Comments The R-2 Lovell is probably the most popular wildcat 22-caliber cartridge ever designed. It was so popular that the late J. Bushnell Smith of Middlebury, Vermont, and Griffin & Howe of New York City custom-loaded ammunition in large quantities; when the supply of 25-20 Single Shot cases was exhausted, Griffin & Howe arranged for the manufacture of R-2 cases. This is a fine varmint cartridge and was often chambered in bolt-action and single shot rifles, where it delivered excellent accuracy. Performance is pretty close to the 222 Remington, but the R-2 Lovell has long since been displaced by this more recent factory chambering, and it is not a good choice since suitable cases are no longer available.

R-2 Lovell Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
45 SP	IMR 4227	8.0	1880	350	Ackley
45 SP	IMR 4227	16.0	3280	1070	Ackley
50 SP	IMR 4198	17.0	3050	1030	Ackley
55 SP	IMR 4198	17.0	3050	1135	Ackley

22 Super Jet

Historical Notes The 22 Super Jet was developed by gun writer Dan Cotterman and the data first published in the July, 1962 issue of *Gun World* magazine. It is based on the 22 Remington Jet, which is fire-formed in the 22 Super Jet chamber. It can also be formed from 357 Magnum brass cases because it is essentially the 357 necked-down to 22. There are several versions of this cartridge, but they are all very similar. The Ackley version, or Improved Jet, and the 22 Sabre Cat by Christian Helbig are practically identical, and loading data can be used interchangeably with the same results. These cartridges are also very similar in performance to the 218 Mashburn Bee. Their primary purpose is to provide a rimmed case for use in single shot rifles.

General Comments These relatively small 22 centerfire cartridges are ballistically superior to the factory 218 Bee and will push the 45-grain bullet an extra 200 to 300 fps in muzzle velocity. They are effective cartridges for their intended purpose, but the Mashburn Bee will do as well or better, and is less trouble to make. The one advantage they have over the Mashburn Bee is that 357 Magnum brass is plentiful and cheap. The Super Jets are good 200-yard plus varmint cartridges.

22 Super Jet Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
45 SP	IMR 4198	17.0	3300	1085	Ackley
45 SP	IMR 4227	16.5	3385	1140	Ackley
50	Ball C	21.0	2975	980	Ackley
50 SP	IMR 4227	16	3195	1130	Ackley

Many older single shot rifles were chambered for wildcats to give varmint shooters extra reach.

218 Mashburn Bee

Historical Notes The 218 Mashburn Bee is an improved version of the factory 218 Bee. Cases are made by firing factory ammunition in the Mashburn chamber, so no special case-forming dies are required. The cartridge was the work of A.E. Mashburn of the Mashburn Arms Company in Oklahoma City, Oklahoma. As near as can be determined, the cartridge originated in about 1940 or thereabouts. The improved case produced better ballistics than the original Bee and also offered longer case life when reloaded. There are other Improved versions of the 218 Bee, but they are all pretty much alike. The Mashburn Bee will deliver about the same velocity with the 55-grain bullet as the factory Bee does with the 45-grain bullet.

General Comments The Mashburn Bee was fairly popular until the advent of the 222 Remington. It was, and still is, a very accurate varmint cartridge. The best powders for loading these small cartridges are IMR 4198 and IMR 4227.

218 Mashburn Bee Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
40 HP	IMR 4227	16.5	3300	960	
45 SP	IMR 4227	16.3	3319	1100	Ackley
50 SP	IMR 4198	17.3	3300	1210	Ackley

224 R-C Maxi

Historical Notes The 224 R-C Maxi was developed by Don Rissi and Jack Chechowitz, both of Reno, Nevada in 1987. Most of the work was done while the two were students attending the NRA summer gunsmithing classes at Lassen College in Susanville, California. The cartridge is based on the 357 Remington Maximum necked-down to 22-caliber. This provides a rimmed case with practically the same capacity as the 222 Remington, and loading data for the 222 Remington can be used with similar results, but should be reduced by 10 percent when starting to work up loads. The cartridge is similar to the 5.6x47Rmm, but shorter. The purpose of the cartridge was to provide a rimmed version of the 222 Remington for use in single shot rifles and pistols such as the small Martini or the Thompson/Center. The originators used 222 Remington dies to form the case along with a RCBS 357 shellholder with .002-inch ground off to achieve proper shoulder placement.

General Comments The 224 R-C Maxi, like the 222 Remington, is an accurate cartridge suitable for target or varmint shooting. It can cover the same use range as the 222 Remington where a rimmed cartridge is desirable. Brass 357 Remington Maximum cases are available in larger sporting goods stores, and this case is simple to form without a lot of expensive dies or other equipment. There are other versions of this cartridge and, of course, the standard 357 Magnum has been necked-down to 22-caliber (see the 22 Jet-Ackley). The 22 Remington Jet is also based on the 357 Magnum case. These cartridges are in the same class, but those made from 357 Maximum cases hold more powder and can generate more power at any given maximum pressure.

224 R-C Maxi Loading Data

Bullet (grs.)	Powder/grs.		MV	ME
45	BL-C2	23	3265	1063
45	H-335	24	3410	1155
50	H-335	23	3120	1078
55	IMR 3031	22	3200	1249

T/C Contender Carbine

22 Waldog

Historical Notes The 22 Waldog was originated by Dan Dowling of Accuracy Gunsmithing in Arvada, Colorado in 1980. He named it after a friend, Waldo G. Woodside, thus the Waldog or Waldo-G. The cartridge is made by running 220 Russian cases through a shortened 22/250 die and trimming the case to a length of 1.375 inches. It is, in effect, a shortened 22 PPC. The idea was to create a more efficient case than the 22 PPC by reducing the volumetric capacity to approximately that of the 222 Remington. The cartridge has been used, thus far, exclusively in heavy benchrest rifles. Several 100-yard benchrest world records have been broken by 22 Waldog caliber rifles.

General Comments The 22 Waldog is another effort to develop a super accurate benchrest cartridge. The current trend is toward smaller, more efficient cases, and the Waldog has proven to be a very accurate cartridge. The best accuracy has been obtained with 52-grain match bullets and 24 grains of H-322 powder, but any powder that works well in the 222 Remington should give comparable results in the Waldog. Although not as widely used as the 22 PPC, the Waldog has found a significant following among benchrest shooters. It is similar to the 308x1.5-inch necked down to 22-caliber, also known as the 22 Remington BR, as the two have similar case capacities. However, the 22 Remington BR case length is about 0.12-inch longer than the Waldog. Commercial availability of 22 Remington BR brass will probably give the edge to the Remington cartridge in the future.

219 Donaldson Wasp

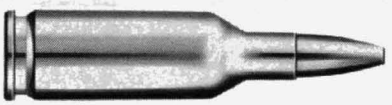
Historical Notes This cartridge originated in 1937, shortly after the 219 Zipper was introduced by Winchester. It is made by shortening, re-necking and blowing-out 219 Zipper cases. The Donaldson Wasp became the most popular version of such adaptations, and more or less the standard. Many benchrest matches have been won with the 219 Wasp, and it has a well-deserved reputation for excellent accuracy. It has been used mostly in custom-made single shot rifles because of the rimmed case.

General Comments The 219 Wasp is another 22 wildcat that achieved notable, continued popularity. It is one of the better wildcat numbers, but like most of the other offbeat 22s, has been overshadowed by the 222 Remington. The 219 Improved Zipper developed by P.O. Ackley in 1938 is a more practical cartridge because it is made by simply fire-forming standard 219 Zipper cases in the Improved chamber. The improved version offers velocities similar to the standard Wasp with significantly lower pressures. Cases for these wildcats can also be made from 25-35 and 30-30 brass. It is claimed by some authorities that breech pressures developed by popular loads in the Wasp can run as high as 55,000 to 60,000 psi.

219 Donaldson Wasp Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
45 SP	3031	30.0	3780	1425	Ackley
45 SP	H380	33.0	3510	1215	
50 SP	IMR 4064	32.0	3605	1440	Ackley
50 SP	H-380	32	3370	1255	

22 BR Remington



Historical Notes The 22 BR Remington is based on the 308x1½-inch Barnes case necked-down to 22-caliber and lengthened by 0.020-inch with the shoulder angle increased to 30 degrees. It is difficult to determine who originated the 22 version of the necked-down 308x1½-inch because there are a number of them dating back to about 1963. J. Stekl is credited with having developed the Remington rendition. In any event, Remington standardized the dimensions in 1978 as their 22 BR. It is one of a series of BR cartridges including the 6mm and 7mm, all based on the same case. The 22 BR is a factory wildcat because loaded ammunition is not available. Brass must be made from special Remington or necked BR cases which have a small rifle primer pocket, or from full-size Remington 6mm or 7mm BR cases. The 22 BR has won many honors in benchrest competition and has great accuracy potential.

General Comments The 22 BR is similar to the 22 PPC but has a case of larger base diameter and slightly greater powder capacity with the same case length. There isn't anything one can do that the other can't duplicate. Both can push a 55-grain bullet at over 3000 fps and duplicate the performance of the 223 Remington. Both are extremely accurate and make excellent varmint cartridges as well as benchrest competitors.

22 BR Remington Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
53 HP Hornady	2460	32.8	3653	1570	Accurate, 26" bbl.
55 BT Nosler	2460	32.5	3605	1585	Accurate, 26" bbl.
60 HP Hornady	2460	31.7	3455	1590	Accurate, 26" bbl.

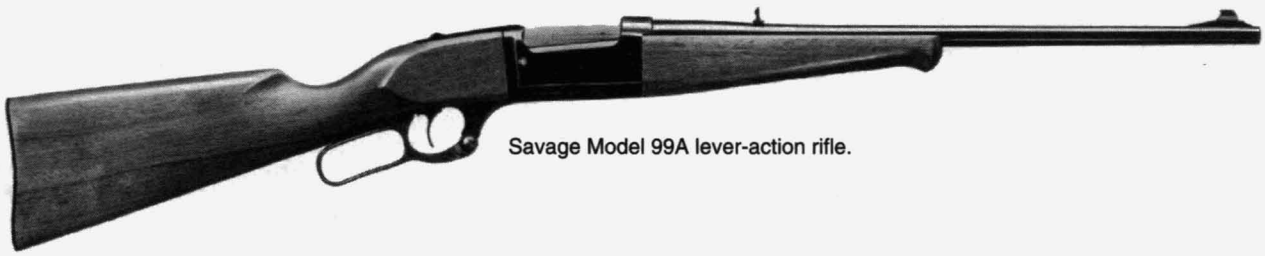
22/30-30 Improved

Historical Notes This is another P.O. Ackley innovation, and is the full-length 30-30 Winchester case necked down and fire-formed to produce minimum body taper and a 40-degree shoulder characteristic of the Ackley improved line of cartridges. It originated in the late 1940s and is similar to the 219 Zipper Improved, but has greater case capacity and develops higher velocities. The 22/30-30 Improved has been used in single shot, bolt-action and lever-action rifles. It works quite well in the older Model 99 Savage lever action rifles with the rotary magazine. It was fairly popular in the late 1940s and through the 1950s. There are several versions of the 22/30-30; some of the more recent ones use a shortened case, the length depending on who originated it.

General Comments The 22/30-30 Improved is in the same class as the 22-250 and is an excellent long-range varmint cartridge. It also has a reputation for match-level accuracy. It is a good choice for single shot rifles or bolt actions made to handle rimmed cartridges. One reason for the development of the 22/30-30 was that post-WWI 219 Zipper brass, used in forming the similar 219 Zipper Improved would split in the shoulder area when fire-formed. The 30-30 case didn't do this, but required a set of forming dies when used for the 219 Improved. The 22/30-30 cases could be made by fire-forming, thus eliminating this problem. Many shooters, therefore, feel it is also a better cartridge.

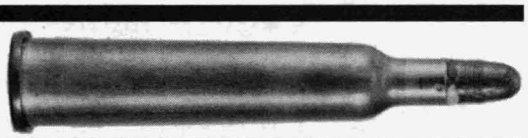
22/30-30 Improved Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
45 SP	IMR 4064	36	3925	1535	P.O. Ackley
50 SP	IMR 4064	36	3905	1690	P.O. Ackley
50 SP	IMR 4064	37	3980	1760	P.O. Ackley
55 SP	IMR 4064	35	3755	1710	P.O. Ackley



Savage Model 99A lever-action rifle.

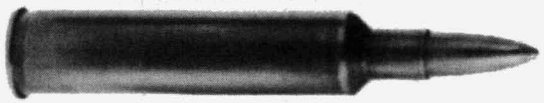
22-303



Historical Notes The 303 British was the standard military cartridge in Canada, Australia and New Zealand, as well as England. It was only natural for someone to neck this particular round to a smaller caliber for use on varmints and small game. The origin of the 22-303 dates back to pre-WWII times circa 1937-1939. Original 303 British military brass had very thick case walls. Later commercial brass has somewhat thinner case walls, thus providing slightly more case capacity. This round has a case capacity just slightly less than the 22-250. The Winchester High Wall and Farquaharson single shot actions were preferred by Canadian shooters in the 1930s and 1940s for chambering to the 22-303. Today's Ruger No. 1 would be an excellent choice for this cartridge. There are some minor dimensional differences between Australian and Canadian versions, but performance of these two numbers is virtually identical. This cartridge would be too noisy and powerful for use in populated areas, but in the western provinces of Canada or the Australian outback it would be an ideal choice.

General Comments This cartridge has found few advocates in the United States. However, for anyone who has a large supply of 303 brass, this would make an ideal varmint cartridge. Velocities can exceed 3800 fps with 50-grain bullets, or 3500 fps with 55-grain bullets. With a rifling twist of 1 in 10 or greater, heavier bullets of 63 to 70 grains would be ideal fare. This is a wildcat of true purpose in parts of the globe where the old 303 still maintains popularity. Load data for this cartridge is not available at this time.

220 Wotkyns-Wilson Arrow



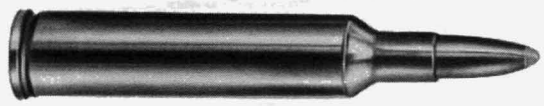
Historical Notes The 220 Wotkyns-Wilson Arrow was the work of Grosvenor Wotkyns and L.E. Wilson and is the 220 Swift with the shoulder angle increased from 21 degrees to 30 degrees. It dates back to the 1940s. Cases are made by reforming unfired 220 Swift brass in full-length sizing dies. Because of the steeper shoulder angle, standard Swift ammunition will not fully enter into the Arrow chamber and cases cannot be made by fire-forming.

General Comments The 220 Wotkyns-Wilson Arrow represents an effort to remedy a problem by making a minor change in cartridge configuration. Factory Swift cases had the reputation of lengthening after only a few firings, requiring frequent trimming. Changing to a steeper shoulder angle reduced the brass flow into the neck and made for longer case life. The Arrow was a popular benchrest cartridge and also a true long-range varmint number. It delivers ballistics comparable to the 220 Swift.

220 Wotkyns-Wilson Arrow Loading Data

Bullet (grs.)	Powder/grs.		MV	ME
45 SP	H-450	47	3985	1580
50 SP	H-450	46	3850	1640
50 SP	IMR 4064	40	3915	1695
55 SP	H-380	39	3510	1500

220 Weatherby Rocket



Historical Notes The 220 Rocket is the only Weatherby development for which loaded ammunition or empty cases are not available. For this reason, it must be placed in the wildcat category. Developed in 1943 by the late Roy Weatherby, it was the first in the long line of his excellent and successful cartridges. However, it has never been very popular, and Weatherby rifles in this caliber are now available only on special order. It is important primarily as the beginning of the Weatherby ammunition line and as the initial stimulant to a career of rifle and cartridge manufacture that has had a considerable impact on American thinking.

General Comments The 220 Rocket is actually one of a number of improved wildcat cartridges based on the 220 Swift case. The Ackley and Kilbourn versions are similar to the Weatherby, and none have any particular advantage over the other. Also, none of them are sufficiently superior to the original 220 Swift to offer anything of outstanding value insofar as performance is concerned. As is typical of improved cartridges where the original design features significant body taper, the improved Swift extracts somewhat easier and, with proper headspacing, gives longer case life.

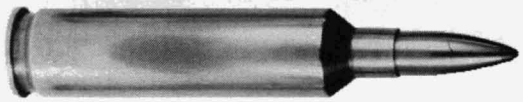
220 Weatherby Rocket Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
50 SP	IMR 3031	40.0	4005	1775	Ackley
55 SP	IMR 3031	39.0	3767	1730	Ackley
55 SP	IMR 4064	42.0	3860	1820	Ackley

Warning: Start all loads 10 percent below these figures and work up gradually.

Weatherby Deluxe Magnum

22 CHeetah



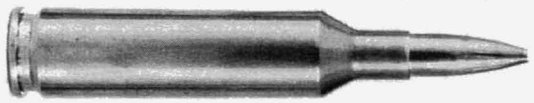
Historical Notes The 22 CHeetah was developed by Jim Carmichel, shooting editor of *Outdoor Life* magazine and Fred Huntington of RCBS fame. It appears to have originated in the late 1970s. The cartridge is essentially a full-length Remington 308 BR case—with the small primer pocket—necked-down to 22-caliber, but with the shoulder moved forward. What you end up with is a variation of the 308 Winchester necked-down to 22, but using a special match case. This is not exactly new because there are in existence several slightly different versions made by necking the 243 Winchester case down, and these date back to the early 1960s. However, the 22 CHeetah is an original with regard to the 308 BR case and its small rifle primer pocket.

General Comments The major difference between the 22 CHeetah and its predecessors are in the use of the lighter, more uniform BR case, blown-out 40-degree shoulder angle and short neck. In other words, the case has been designed to benchrest specifications. It also has greater powder capacity than any of the older versions. There are actually two case types, the MKI with the 40-degree shoulder angle and the MKII with the original 28-degree shoulder. The 22 CHeetah is somewhat more powerful than the 220 Swift, but ballistics were measured from a 27-inch barrel. The cartridge has proven to be superbly accurate and a very effective 300-yard varmint cartridge.

22 Cheetah Loading Data (MKI)

Bullet (grs.)	Powder/grs.		MV	ME
50 SP	IMR 4064	46	4285	2040
52 HP	IMR 4064	44	4135	1970
55 SP	IMR 4350	49	4090	1990

22-243 Middlestead



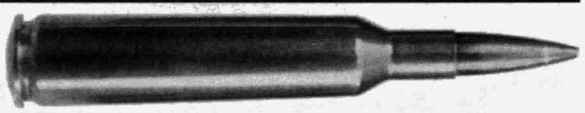
Historical Notes This cartridge was developed by Paul Middlestead of San Diego, California, and is based on the standard 243 Winchester case necked-down to handle a .224-inch bullet. The body dimensions remain unchanged, but the shoulder angle is increased to 30 degrees, thus resulting in a longer neck (.300-inch vs. .241-inch). Forming cases for the 22-243 is a relatively simple operation: 243 Winchester cases are simply run though a 22-243 sizing die and trimmed to length, if needed. This is a major consideration in choosing wildcat cartridges. Case capacity of the 22-243 is about 5 percent more than the 220 Swift, resulting in velocities easily exceeding 4000 fps. While staying on the upper end of the velocity spectrum, this cartridge gives up nothing in the accuracy department. Five-shot 100-yard groups of $^1/_2$-MOA are commonly reported. When planning a rifle for this round, it is a simple matter to rechamber a 22-250. However, rifling twist rates should be taken into account. If one is going to stick to lighter bullets, then the standard 22-250 barrel will not pose a problem. This cartridge excels with heavier bullets in the 68- to 75-grain range, and with them a rifling twist of 1 in 9 or 1 in 8 inches should be considered. The case uses large rifle primers.

General Comments If any wildcat cartridge deserves to become a commercial round, the 22-243 would certainly fall in that class. It can provide high velocity along with excellent accuracy, providing a slightly longer "reach" over the 22-250 and 220 Swift. Both form dies and reloading dies can be obtained from RCBS. The 22-243 is a spectacular performer on varmints and small game.

22-243 Middlestead Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
50 SP	N204	51.0	4250	2006	Jim Gosnell
52 HP	N204	48.0	4020	1860	Jim Gosnell
65 SP	IMR 4350	45.0	3710	1830	Jim Gosnell
70 SP	IMR 4831	45.0	3420	1815	Jim Gosnell

224 Clark



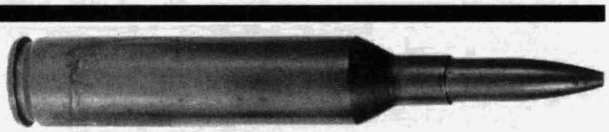
Historical Notes Timothy Clark of Madera, California, wanted a long-range varmint cartridge that would buck wind better than any existing cartridge, have a flatter trajectory, and be harder hitting with greater retained bullet energy. He experimented for 15 years following WWII, and in 1962 finally settled on the design he named the 224 Clark. Clark used the 257 Roberts case necked-down to 22-caliber with a steeper shoulder angle and expanded body. He designed and made special .224-inch bullets which were both longer and heavier than any available bullets of this caliber at that time. While it may seem easier to start with 6mm Remington brass, rather than going to the trouble of re-forming 257 Roberts cases, Clark found the 257s to be much stronger. Clark hand-swaged his own .224-inch hollowpoint bullets weighing 80 grains. This had to be a labor of love. Bullets of lighter weight tend to be less accurate in the 224 Clark due to the fact that a long throat is necessary for the heavier numbers, causing the lighter projectiles to "jump" before contacting the rifling lands. Clark also designed bullets of 85 grains knowing that some hunters may have chosen to use his cartridge on deer and antelope size game.

General Comments There is no doubt that the 224 Clark is a very specialized cartridge. In areas where wind is a concern and ranges are long, this cartridge would be ideal for varmints. However, the small bore and relatively large case capacity are a combination which can lead to very short barrel life. Though an excellent round, the 224 Clark has a very narrow and specialized use. This cartridge requires faster than normal rifling twist, 8 to 9 inches, to stabilize the unusually long standard bullets.

224 Clark Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
53 HP	IMR 4064	47.0	4210	2085	Layne Simpson
60 HP	MRP	55.0	4050	2185	Layne Simpson
63 SP	H-4831	54.5	4000	2240	Layne Simpson
70 SP	H-4831	54.0	3860	2320	Layne Simpson
80 SP	H-4831	51.5	3540	2230	Layne Simpson
85 SP	H-4831	51.0	3510	2325	Layne Simpson

22 Newton



Historical Notes One of a series of cartridges developed by Charles Newton, this one did not appear in full commercial version. It was designed about 1912, following the introduction of the 22 Savage Hi-Power for the Model 99 lever-action rifle. Newton concluded during his development work on the 22 Savage that it was not entirely adequate for deer. He believed the 70-grain bullet at 2800 fps could be improved by using a larger case. Newton may have used the 7x57mm Mauser case for some of his early experiments. However, the final version of the 22 Newton appears to have been based on the 30-06 case shortened about 1/4-inch and necked-down to take .228-inch-diameter bullets. The 22 Newton did not appear as a Newton rifle caliber until about 1914 or later, and did not have a very long life. The original loading had a 90-grain bullet driven at 3100 fps. The 22 Newton was soon displaced by the 256 Newton, which had superior potential as a big game cartridge.

General Comments This is another cartridge somewhat ahead of its time. The new 5.6x57 developed by RWS is very similar in performance and case capacity. It has a 74-grain bullet at 3400 fps (.224-inch diameter), and is a necked-down 7x57 case. With a 90-grain bullet, the 5.6mm would probably just about duplicate the 22 Newton's performance. Because of the relatively heavy 22-caliber bullet, the 22 Newton would be a satisfactory deer, antelope or similar game cartridge, provided proper bullet construction was used. The 220/257 Gipson is a very similar cartridge based on the 257 Roberts case necked-down to 22-caliber. This latter cartridge was designed by Vernon Gipson, a gunsmith and wildcatter from Worth, Illinois. (The 22 Gebby was a similar round on the 257 case.) Rifles for the 22 Newton require a very fast twist (1 in 8 inches) to stabilize this long, small-caliber bullet.

22 Newton Loading Data

Bullet (grs.)	Powder/grs.		MV	ME
70 SP	IMR 4350	40	3250	1640
90 SP	IMR 4350	38	3100	1920

228 Ackley Magnum

Historical Notes The 228 Ackley Magnum dates back to about 1938 and, although it has been around for a number of years, it developed only a limited popularity. Like the 22 Newton, it was designed as a combination varmint and big game cartridge. Ammunition is made by necking-down and shortening 30-06 or 308 Winchester brass. There are several versions of this cartridge, but the Ackley design is the most popular.

General Comments Rifles in 228-caliber using heavy-jacketed bullets designed for big game have been used very successfully all over the world. Bullets of this type were made in weights from 70 to over 100 grains by Fred Barnes, but are now difficult to obtain. Rifles in this class have proven rather conclusively that the difficulty encountered with the 220 Swift and other high-velocity 22s has been mostly a matter of improper bullet design. Factory 22-caliber centerfire loads are all made for varmint shooting and don't hold together or penetrate deeply enough on big game. Sometimes they do, and the result is spectacular, but mostly they blow up on contact and inflict a horrible, but not immediately fatal, wound. As a result, hunting deer with any 22-caliber centerfire rifle is illegal in most states. I have witnessed some instant one-shot kills on deer and antelope with high-velocity 22 rifles using proper bullets for the job. Bear this matter of bullet construction in mind next time you get in an argument over the effectiveness of small-caliber rifles on big game.

228 Ackley Magnum Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
70 SP	IMR 4350	46	3650	2070	P.O. Ackley
90 SP	IMR 4350	43	3480	2420	P.O. Ackley

6x45mm (6mm-223 Remington)

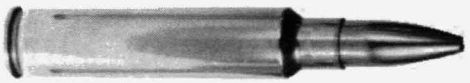
Historical Notes The 6mm-223 Remington, also known as the 6x45mm, came into being in late 1965, shortly after Remington introduced the 223 Remington as a sporting round. Various experimenters built rifles for the cartridge (in order to take advantage of the reduced wind drift offered by the 6mm caliber, as opposed to the original 22-caliber bullet) for benchrest or varmint shooting. Jim Stekl, then manager of Remington's custom shop, set an IBS 200-yard Sporter aggregate record of .3069 MOA in 1973 using the 6x45mm. For a time, some owners of AR-15 rifles rebarreled their rifles to this caliber for use in NRA National Match Course competition. However, the 6x45mm can not compete successfully with the 7.62x51mm NATO (308 Winchester) round at ranges beyond 300 yards. After its brief flurry as a benchrest and match cartridge, the 6x45mm has now been relegated as primarily a varmint cartridge, used by those who want more power than the 223 with the added advantage of being able to use cheap military brass for forming cases. Reloading dies are available from RCBS and chambering reamers from Clymer.

General Comments The 6x45mm is one of a series of 6mm benchrest cartridges based on necking-up the 223 Remington and 222 Remington Magnum brass. None have any great advantage over the other, and all are capable of extremely fine accuracy. Probably the only advantage of the 6x45mm is that it is based on the 5.56mm (223 Remington) military case, which assures a good supply of brass. On the other hand, its shorter case permits the use of bullets of up to 100 grains in weight to be seated to an overall length that will feed through magazine rifles such as the Colt AR-15, Ruger Mini-14 or Remington 788. In power, the 6x45mm is between the old 25-35 and the 250 Savage, which would make it rather marginal as a deer cartridge except under ideal conditions. It is, however, as close to ideal as a varmint and small game cartridge out to 300 yards. This cartridge has become very popular in the Thompson/Center Contender and Remington XP-100 handguns. Bob Milek, the late Field Editor of *Guns & Ammo* and *Peterson's Hunting* magazines shot a custom XP-100 in 6x45mm for a number of years. Rifles chambered for cartridges in this group are pleasant to shoot, have a relatively low report and are noted for long barrel life.

6x45mm (6mm-223 Remington) Loading Data

Bullet (grs.)	Powder/grs.		MV	ME
70 HP	W748	27.5	2890	1295
75 HP	H-335	27.0	2900	1400
80 HP	W748	27.0	2780	1370

6mm TCU



Historical Notes The 6mm TCU was developed by Wes Ugalde of Fallon, Nevada for Thompson/Center as one of the chamberings for the Contender single shot pistol. It is the 223 Remington necked-up to 243-caliber and is practically identical to the older (1965) 6mm 223 Remington or 6x45mm. The 6mm TCU is intended primarily as a metallic silhouette pistol cartridge, whereas the 6mm-223 Remington was developed as a rifle cartridge for benchrest and varmint shooting.

General Comments Necking the 223 Remington up to 6mm provides an advantage over the 22-caliber by reducing wind drift and, with the heavier bullets, providing more energy down range. Also, 6mm cartridges in this class have a relatively mild report and less recoil than, say, the 243 Winchester or 6mm Remington. T/C cautions against the use of military brass and recommends commercial 223 Remington brass for forming 6mm TCU cases. The 6mm TCU is adequate for small- to medium-sized varmints, but is on the light side for deer.

6mm TCU Reloading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
60 HP	W748	29	2610	905	14″ barrel
70 HP	H-4895	26	2585	1045	14″ barrel
80 HP	H-4895	25	2515	1065	14″ barrel

T/C SST 16½″ Contender

6x47mm (6mm-222 Rem. Magnum)

General Comments Mike Walker is responsible, at least in part, for this 6mm-caliber cartridge. A note from him dated July 25, 1963, said that Bob Hutton asked him for a rifle using this case after Mike had told him, "It would probably be more accurate than anything available at that time (1961) in the 6mm." Used primarily for benchrest competition, cases can be made by simply necking up 222 Remington Magnum brass to 6mm. According to Walker, best accuracy is obtained with 70-75-grain bullets. The 6x47mm has lost popularity recently to the 6mm PPC and the 6x45mm (the 223 Remington necked up to 6mm). Federal made cases in this caliber in the late 1970s, but has since discontinued them.

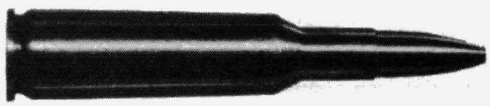
General Comments Although used primarily for competition, the 6x47mm is a good mid-range varmint and small game number. It is not a good choice for deer as 100-grain bullets can not be driven at sufficient velocity to assure clean kills.

6x47mm Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
70-75 HP	IMR 4198	23.5	3000	1499	
75	3031	26.5	2650	1165	Ackley

6mm-250 (6mm International)

Walker Version



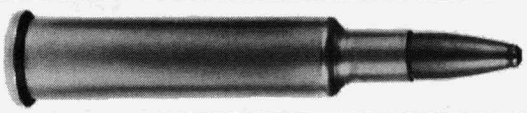
Historical Notes Prior to WWII, the 6mm (243-caliber) was nearly exclusively a British and European development, with some cartridges dating back to the early 1900s. Immediately after WWII, American wildcatters began to work with this caliber. The simple process of necking the 250 Savage case down to take 243 bullets probably occurred to several individuals, but was obscured by other 6mm developments. Several versions exist, but two of these have become popular with benchrest and match shooters. The Donaldson 6mm International was developed by Harvey Donaldson of Fultonville, New York, known as the father of modern benchrest shooting. The Remington 6mm International originated with Mike Walker of the Remington Arms Company.

General Comments Cartridges of 6mm based on the 250 Savage case are all similar, but vary slightly in length and shoulder angle. Original design was the 250 case necked-down with no other change. The Donaldson version uses a case .25-inch shorter than the standard 250 and with the shoulder pushed back, giving a shorter body. Shoulder angle is 30 degrees. The Walker 6mm retains the standard length, but pushes the shoulder back, creating a long neck. Body taper and shoulder angle are the same as the 250. The Remington 40X match rifle has been chambered, on special order, for the Walker cartridge. Robert Hutton, long-time experimenter and gun writer, has worked with these cartridges and his results were presented in the 1962 (16th edition) of *Gun Digest*. The late John T. Amber reported 5/8-inch averages for five-shot, 100-yard groups with the Walker cartridge in the Remington 40X target rifle.

6mm-250 (6mm International) Loading Data

Bullet (grs.)	Powder/grs.		MV	ME
60 HP	IMR 3031	32	3450	1630
75 HP	IMR 3031	32	3390	1910
90 SP	IMR 3031	30	3160	2000
100 SP	IMR 3031	28	2900	1870

6mm/30-30 Improved



Historical Notes There are actually two versions of the 6mm/30-30, one based on the 30-30 Winchester case necked-down without any other change, and the other using the Improved configuration. The Improved version was the most popular and the one recommended. The 6mm/30-30 has the same dimensions as the 22/30-30 except for a larger .243-inch neck diameter. The cartridge dates back to the 1940s or earlier, and the version referred to here is the Ackley Improved, although there may be others. One of the original purposes of the 6mm/30-30 was for use in rebored and rechambered 22 Hi-Power Model 99 Savage lever actions. It has also been used in single shot actions. Cases can be formed from 30-30 or 32 Special brass and might require a set of forming dies plus a final fire-forming. There are more recent versions that use a shortened case for use in single shot pistols.

General Comments The 6mm/30-30, when used in a strong action, can be loaded to almost equal the 243 Winchester. However, when chambered in Model 94 Winchester-class rifles, it must be loaded down so it does not exceed the working pressure of that action. It is a good varmint through deer cartridge, but its usefulness at the present time is primarily as a chambering for single shot actions. Pointed bullets should not be used in any tubular magazine.

6mm/30-30 Improved Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
75 HP	IMR 3031	37	3450	1980	P.O. Ackley
75 HP	IMR 4895	36	3265	1770	P.O. Ackley
*85 HP	IMR 4895	37	3300	2060	P.O. Ackley
90 SP	IMR 4320	38	3065	1880	P.O. Ackley

*Ackley, *op cit*

6mm-284

Historical Notes It is anybody's guess who might have been first to size Winchester's rebated rim 284 down to 6mm. The conversion is a good one for those interested in achieving maximum velocity with this bullet size. This cartridge can be chambered in medium-length actions.

General Comments The 6mm-284 has practically the same capacity as the 240 Weatherby magnum and the 6mm-06. If loaded to similar chamber pressures it will produce similar velocity. Therefore, ballistics are indistinguishable. However, it has advantages over the Weatherby offering. Cases are easier to come by and non-belted. The 6mm-284 can also be chambered in medium-length actions. Just like the 6mm-06 and 240 Weatherby, when loaded with 100 grain bullets, the 6mm-284 offers only about 100 fps more velocity than the 6mm Remington—if loaded to the same peak pressures and fired from equal-length barrels. Likely, with heavier than standard bullets this difference could reach 200 fps. As to whether such an advantage might justify conversion of a 243 Winchester of 6mm Remington chambered rifle to 6mm-284, consider that this is just about the same performance difference as is found between the 280 Remington and 7mm Remington Magnum!

6mm-284 Loading Data (26″ barrel)

Bullet (grs.)	Powder/grs.		MV	ME	Source
70	IMR 4320	45.0	3600	2015	Hornady
70	IMR 4350	49.5	3600	2015	Hornady
70	H4831	52.5	3600	2015	Hornady
75	H4831	54.1	3600	2155	Hornady
87	H4831	51.7	3400	2230	Hornady
100	IMR 4350	49.0	3200	2275	Hornady
100	H4831	51.4	3200	2275	Hornady

25 Ugalde (7mm TCU)

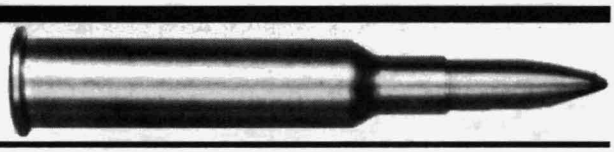
Historical Notes The 25 Ugalde, also known as the 25 Thompson/Center Ugalde, was developed by Wes Ugalde of Fallon, Nevada, in 1987. Dean Grennell, then managing editor extraordinaire of *Gun World* magazine, also had a hand in the original iteration. The cartridge, like the other TCU cartridges, is based on the necked-up and Improved 223 Remington case. Results of the original testing by Dean Grennell were carried in the August, 1988 issue of *Gun World*. He used a Thompson/Center single shot pistol with a 14-inch heavy barrel made up by Wes Ugalde.

General Comments The 25 TCU is intended for metallic silhouette shooting, but would also make a good varmint cartridge at moderate ranges. There is a good selection of 25-caliber bullets available in weights from 60 to 120 grains. By the standards of today, ballistics are not spectacular, but quite adequate for the intended purpose. Dean Grennell reported less than minute-of-angle groups. It is in about the same class as the old 25-35 and would be marginal for deer. RCBS can furnish loading dies, and no special case-forming dies are required.

25 Ugalde (7mm TCU) Loading Data

Bullet (grs.)	Powder/grs.		MV	ME
75 HP	H-335	26.2	2455	1010
75 HP	H-335	27.2	2680	1195
75 HP	BL-C2	27.9	2280	860
75 HP	W748	28.3	2490	1030
75 HP	RL-12	28.0	2530	1070
90 SP	AA2520	24.0	2455	1205
100 SP	H-335	26.2	2365	1245

25 Krag



Historical Notes The 25 Krag is certainly one of the oldest wildcat cartridges in existence. It is illustrated on page 176 of Dr. Mann's book, *The Bullet's Flight From Powder to Target*, published in 1909. Mann makes reference to firing tests involving this cartridge on page 166, Test No. 114, and dates these tests as having taken place during 1906.

The original cartridge was based on necking-down the 30-40 Krag case to accept 257-caliber bullets without any other change except reaming the neck. However, actual chamber dimensions were never standardized and varied widely between gunsmiths. A.O. Niedner, a well-known gunsmith of the 1920s and 1930s, chambered many single shot rifles for the 25 Krag, and it was also called the 25 Krag Niedner. There are, in addition, several Improved versions of the 25 Krag with the usual blown-out case and 40-degree shoulder. Some of these were made up on a shortened Krag case and some employ the full-length case. Probably the most popular of the Improved 25 Krag cartridges were the Ackley versions. The various 25 Krag cartridges were used almost exclusively in single shot rifles or those built up on the P14 Enfield bolt action. Top loads of this cartridge develop pressures very much in excess of the 42,000 psi working pressure of the U.S. military Krag action and should never be used in this rifle.

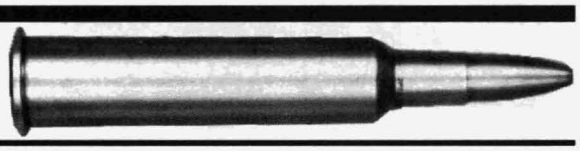
General Comments The 25 Krag has nearly the same case capacity as the 250 Savage or the 257 Roberts, depending on whether we are dealing with the short or long version. In a strong action, either version is capable of generating 3200 fps or more with the 100-grain bullet, which puts the 25 Krag in the same class as the 25-06. It is a flat-shooting varmint-through-deer class cartridge and has been used successfully on larger game. Although fairly popular in the 1920s and 1930s, it began to decline after the 257 Roberts was adopted as a commercial cartridge in 1934. Although a good cartridge, there is very little need for the 25 Krag in the present scheme of things. The recommended twist is either 1 in 10 inches or 1 in 12 inches, with the faster twist preferred for the heavier bullets.

It isn't practical to list loading data for the 25 Krag because there are too many different versions and case capacity can vary by as much as 5 to 10 grains, or more.

25 Krag Loading Data

It isn't practical to list loading data for the 25 Krag because there are too many different versions, and case capacity varies by as much as 10 grains.

25 Ackley Krag



Historical Notes Mr. Ackley offered at least two versions of this cartridge. The 25 Ackley Krag Short holds about 50 grains of IMR type powder, compared to the full-length 25 Ackley Krag, which holds about 55 grains. The shorter version seems to have been Mr. Ackley's favorite and he preferred it for chambering in P14 Enfields and various single-shot actions. In the heyday of Mr. Ackley's developments the slowest powders available limited performance gains with case capacity increases much beyond this level in the quarter-bore. This fact explains the similar performance he reported for the two versions.

General Comments The Short version of the 25 Ackley Krag offers very impressive performance when properly loaded in a strong modern action but it is now overshadowed by the full-length version of the 25 Ackley Krag and other larger-capacity cases, such as the 25-06. Nevertheless, either of these cartridges are fully capable as big game cartridges for smaller North American species. These can be highly recommended for single shot rifle conversions.

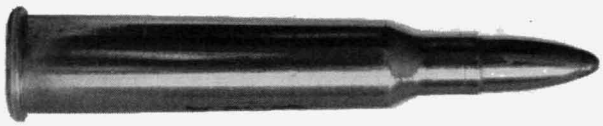
25 Ackley Krag Short Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
87	H380	49.0	3460	2310	Ackley
100	IMR 4064	43.0	3265	2365	Ackley
100	H380	49.0	3412	2585	Ackley
100	IMR 4350	50.0	3300	2415	Ackley
117	H4831	50.0	3285	2855	Ackley

25 Ackley Krag (Full-Length 30-40 conversion) Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
87	4064	48.0	3360	2180	Ackley
100	IMR 4350	50.0	3090	2120	Ackley
100	IMR 4895	49.0	3414	2585	Ackley
125	IMR 4350	50.0	3000	2495	Ackley

25/303



Historical Notes The various wildcats based on the 303 British case have never achieved any degree of popularity in the U.S. This is not because there is anything wrong with them, but we have had available for many years our own 30-40 Krag (which is very similar to the 303 British) and also the 30-06 with its greater powder capacity and rimless case. However, in many areas of the British Commonwealth, mainly Australia, Canada and New Zealand, the 303 British case forms the basis of a whole series of wildcats including 22, 6mm, 25, 270 and 7mm versions. In fact, some of these cartridges are loaded commercially in Australia. Some of the 303-based wildcats were originated by Ellwood Epps of Ontario, Canada, some by W. Harrison, J. Black and others in Australia. Most of them originated in the post-WWII years between about 1946 and 1960. There is more than one version of almost all of these 303-derived wildcats. The 25/303 is based on the 303 British case necked-down to 25-caliber without any other change. It is presented here as a means of acquainting the reader with the group and because it is the only one the author has had any actual experience with.

General Comments Most rifles chambered for the 25/303 are based on either the British SMLE (Enfield) military rifle action, the P14 Enfield or the Martini single shot action. This is also true of the other wildcats based on the rimmed 303 British case. The performance of the 25/303 is similar to the 257 Roberts, and it is suitable for the same range of game and shooting conditions. It is a very good cartridge, as are the others based on this case. However, it does not fulfill any particular need in the U.S. and so will probably never attain much of a following here. *Editor's Note: It must be noted that rimmed cartridges are a better choice than any rimless case for single shot custom rifle chamberings.*

25/303 Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
87 SP	IMR 4064	35.5	3010	1750	Ackley
87 SP	IMR 3031	35.0	3000	1740	Ackley
100 SP	IMR 3031	34.0	2800	1740	Ackley
100 SP	IMR 4895	33.0	2750	1675	Ackley
117 SP	IMR 4064	35.0	2800	1740	Ackley

250/3000 Ackley Improved

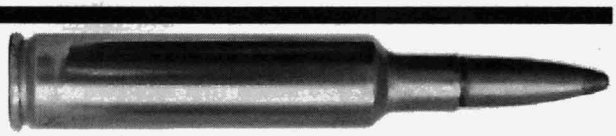
Historical Notes The 250/3000 Improved was originated by P. O. Ackley in the late 1940s and, although one of the best of the Ackley "Improved" line of cartridges, has never achieved great popularity. This statement is based on the fact that it offers the greatest percentage velocity increase of any of the Improved line of wildcats. Increased shoulder angle affects performance chiefly because it increases case capacity. However, it also improves headspacing and decreases case stretching. There are no significant internal ballistic effects related to any particular shoulder design. There are several versions of the 250 Improved, but the Ackley configuration is the best known. The Savage Model 99 lever action has recently been offered in 250/3000-caliber, and there are tens of thousands of these fine rifles in the hands of hunters. Handloading owners of these rifles should be interested in this excellent improved chambering which improves extraction, extends case life and increases performance markedly.

General Comments The 250/3000 Improved offers performance equal to or better than the 257 Roberts. It will, for example, push the 100-grain bullet at a muzzle velocity of 3200 fps, as compared to the factory 257 loading of the same bullet that is listed at 2900 fps. The commercial 250/3000 loading of the 100-grain bullet, incidentally, is rated at 2820 fps.

250/3000 Ackley Improved Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
87 SP	IMR 4350	42	3310	2110	P.O. Ackley
100 SP	IMR 4350	41	3045	2060	P.O. Ackley
100 SP	IMR 4350	42	3200	2275	P.O. Ackley
120 SP	IMR 4350	40	2650	1870	P.O. Ackley
120 SP	IMR 4350	41	2750	2020	P.O. Ackley

257 Improved (Ackley)



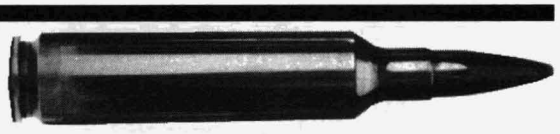
Historical Notes There are a number of "Improved" versions of the 257 Roberts, developed mostly in the late 1940s and early 1950s. The 257 Ackley Improved is one of the best, and certainly the most popular of the crop. This cartridge has rather straight, blown-out case walls with very little taper and a 40-degree shoulder angle. As with the other Ackley Improved cartridges, cases are made by firing factory ammunition in the Improved chamber. The 257 Improved has about the ideal case capacity for the 25-caliber and is quite efficient in the velocity it produces with a given charge of powder. The gains achieved by Improved cartridges is a matter of increasing the case capacity by changing the shoulder angle and sometimes moving the shoulder forward to lengthen the body, and at the same time reducing the body taper. Shoulder angle affects performance chiefly because it increases case capacity. It also improves headspacing and decreases case stretching. However, there are no significant internal ballistic effects related to any particular shoulder design. The 257 Improved will develop from 100 to 300 fps more velocity than the standard 257 Roberts, depending on bullet weight. In fact, velocities are only slightly below those developed by the larger 25-06 with the same weight bullets.

General Comments The 257 Improved has proven to be an excellent cartridge for long-range varmint shooting and also for big game such as deer, antelope, black bear, big horn sheep, etc. It is one of the best of the Improved line of cartridges in terms of useful velocity and energy gain.

257 Improved (Ackley) Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
75 HP	IMR 4895	44	3570	2365	P.O. Ackley
87 SP	IMR 4895	43	3352	2160	P.O. Ackley
100 SP	IMR 4831	51	3200	2280	P.O. Ackley
100 SP	IMR 4350	49	3160	2220	P.O. Ackley
117 SP	IMR 4831	47	2850	2112	P.O. Ackley
120 SP	IMR 4831	46	2875	2210	P.O. Ackley

25-284



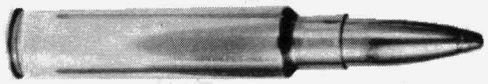
Historical Notes It is anybody's guess who might have been the first to size the 284 Winchester down to the quarter-bore. This conversion is a good one, offering usable capacity practically identical to the 25-06 in a cartridge that can be chambered in medium-length actions.

General Comments The 25-284 is ballistically indistinguishable from the 25-06 but offers several advantages. First, the sharper case shoulder of the shorter case reduces case stretching and extends case life, compared to the 25-06. Second, the shorter powder column promises superior accuracy potential. Finally, this more compact cartridge is easier to handle. Nevertheless, the 25-06 was easier to make because 30-06 cases have long been almost ubiquitous. Further, the 25-06 enjoyed decades of wildcat history. For these reasons it is not surprising this was the choice to achieve factory chambering. This is too bad because the 25-06 offers no ballistic advantages over the 25-284 and the aforementioned facts would tend to suggest the 25-284 as a better all-around choice.

25-284 Load Data

(Capacity and chamber pressure are identical to the 25-06 and that data can be used, providing a prudent reduction in starting loads and adherence to standard loading practices to insure against inadvertent use of too-hot loads.)

6.5mm TCU



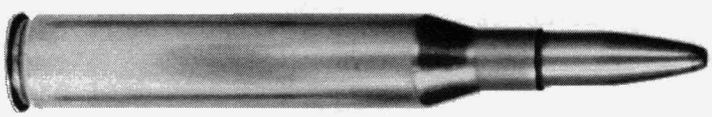
Historical Notes Designed by West Ugalde for use in the Thompson/Center Contender. This cartridge was initially developed for use in Metallic Silhouette Competition but has found considerable success as a varmint handgun chambering.

General Comments The 6.5mm TCU is easily converted from commercial 223 cases by simply running a tapered expander through the case neck. Fireforming is accomplished with a slightly reduced load. The finished case is exactly reminiscent of the Ackley line of improved cartridges and features just about the same body taper and exactly the same shoulder angle. Due to the larger neck diameter, compared to the parent case, case neck length is increased and provides adequate purchase to properly secure the larger, longer bullets. Silhouette shooters have found that this cartridge is marginal for toppling the distant ram target; some hits do not result in a felled target. For this reason popularity has been limited in that sport. The 6.5 TCU does, however, provide excellent varmint results with comparatively mild recoil. Many good bullets are available for that purpose.

6.5mm TCU Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
85 Sierra	A2015BR	28.0	2577	1250	Accurate (14″ barrel)
100 Sierra	A2230	28.0	2402	1280	Accurate (14″ barrel)
100 Hornady SP	RL-7	24.6	2200	1075	Hornady (10″ barrel)
100 Hornady SP	H322	28.0	2200	1075	Hornady (10″ barrel)
120 Sierra	A2520	28.0	2198	1285	Accurate (14″ barrel)
129 Hornady SP	W748	29.5	2050	1245	Hornady (10″ barrel)
140 Hornady HPBT	A2520	26.5	2075	1335	Accurate (14″ barrel)
140 Hornady SP/HPBT	IMR 3031	25.1	1950	1180	Hornady (10″ barrel)
140 Hornady SP/HPBT	W748	28.0	1950	1180	Hornady (10″ barrel)
160 Hornady RN	A2520	26.5	1952	1350	Accurate (14″ barrel)
100 Hornady	W296	11.0	1600	565	Hornady

6.5mm/06
256/06



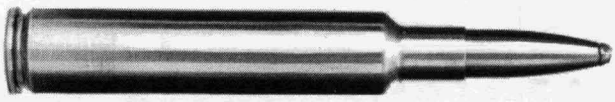
Historical Notes The venerable 30-06 brass case has been necked both up and down to cover just about every caliber in existence. The 6.5mm, or 256-caliber, is yet another, and also one of the oldest. The original was developed by the late Charles Newton and introduced in 1913. There is very little difference between the 256 Newton and the 6.5mm/06, the latter being the wildcat version. There is also an Improved cartridge, favored by some. The 6.5mm/06 achieved a degree of popularity in the immediate post-WWII era because of the influx of surplus 6.5x55mm military rifles. The 6.5mm/06 is a very practical cartridge, cases are easy to form and it will work through any standard-length bolt action with little or no alteration. Today, most shooters prefer to go with the factory 264 Winchester Magnum; however, the 6.5mm/06, being less powerful, is much easier on barrels.

General Comments The 6.5mm/06 is a very good long-range, medium game cartridge, provided one loads the proper bullet. It is quite flexible because of the wide range of bullets available and it can be adopted to varying conditions by using the lighter, faster bullets for plains hunting and the heavier ones in brush or wooded country. It can also double for varmint hunting by using bullets weighing 80 to 100 grains.

6.5mm/06 Loading Data

Bullet (grs.)	Powder/grs.		MV	ME
85 SP	H-414	55	3610	2460
100 SP	H-4831	62	3445	2625
120 SP	H-4831	58	3175	2680
140 SP	H-4831	56	3000	2800
165 SP	H-4831	54	2825	2920

6.5mm-06 Ackley Improved



Historical Notes This cartridge was a natural outgrowth from the 6.5-06. After WWII many military rifles of 6.5mm caliber were surplused by various countries. Most found their way to the shores of the U.S. as a means of bringing much-needed cash to countries that would have otherwise simply scrapped them. Since ammunition for these chamberings was difficult or impossible to obtain, it was natural for gunsmiths to consider rechambering to the 6.5-06 since abundant, inexpensive 30-06 cases are easily necked down to 6.5 and the conversion offered the promise of more power than the original chambering in the bargain. Similarly, bullet manufacturers responded to the availability of 6.5mm guns by offering component bullets for handloading. This later only served to increase demand for wildcat conversions. It was only reasonable for customers to want to chamber for the improved version of the 6.5mm-06 because this added nothing to the cost of the conversion and promised a ballistic benefit and increased case life. The latter was delivered; the former was not.

General Comments Mr. Ackley's experiences with this chambering are most interesting. He first chambered a 6.5mm barrel to 6.5mm-06 and worked up load data for that. Then he rechambered the same barrel to the improved version and again worked up data. We can only assume that he used the same pressure criteria and the same components for both studies, but, perhaps, this is an erroneous assumption. The reason for doubt stems from the fact that Mr. Ackley reported *higher* velocities with the standard 6.5-06 than with the improved version. It must be noted that he was limited to powders no slower burning than H4831. Given the slower powders now available, he might have found the improved version to have the ballistic edge. In any case, the difference in ballistics is marginal. It should be noted that the 25-06 and the 6.5mm-06 Improved have almost exactly the same relative case capacity. Therefore, considering bullet availability, including light varmint-style bullets and hunting bullets that are much heavier than anything available in 0.257-inch, the 6.5mm-06 Improved is everything the 25-06 will ever be and more.

6.5mm-06 Ackley Improved Load Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
120	IMR 4350	53.0	3100	2560	Ackley
140	IMR 4350	51.0	2920	2650	Ackley
140	H4831	53.0	2950	2705	Ackley
150	IMR 4350	49.0	2780	2575	Ackley
150	H4831	51.0	2760	2535	Ackley
165	IMR 4350	46.0	2550	2090	Ackley
165	H4831	48.0	2550	2090	Ackley

270 REN

Historical Notes Designed in 1985 by Charles Rensing and Jim Rock, this cartridge was developed in response to NRA Hunter Pistol Silhouette competition rules. This category allows only straight-walled cartridge cases to be used. This diminutive number fulfills that requirement while producing minimal recoil, as intended by the inventors.

General Comments The 270 REN is based on the 22 Hornet simply necked straight to accept 270 bullets. Recoil is very mild in typical guns and this little chambering can propel the excellent 90-, 100- and 110-grain bullets available to considerable velocity with modest powder charges. Guns chambered for the 270 REN are currently available from several manufacturers including RPM, Thompson Center and Merrill.

270 REN Loading Data (10" barrel)

Bullet (grs.)	Powder/grs.		MV	ME	Source
90	No.7	8.2	1650	540	Accurate
90	No.9	11.1	1888	710	Accurate
90	A1680	14.5	1811	655	Accurate
100 Hornady	H110	10.2	1600	565	Hornady
100 Hornady	XMP5744	10.4	1600	565	Hornady
100 Hornady	W296	11.0	1600	565	Hornady
100 Hornady	No.7	8.2	1566	540	Accurate
100 Hornady	No.9	10.8	1799	715	Accurate
100 Hornady	A1680	14.5	1815	730	Accurate
110 Sierra	No.7	8.0	1474	530	Accurate
110 Sierra	No.9	10.2	1666	675	Accurate
110 Sierra	A1680	14.0	1675	685	Accurate

270 IHMSA

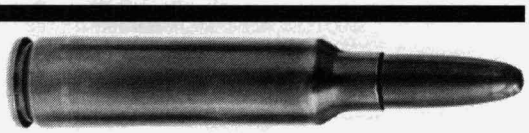
Historical Notes Just one of an entire series of cartridges designed by Elgin Gates, the 270 IHMSA (International Handgun Metallic Silhouette Association) is among the more popular of the group, which ranges from 25 through 35 caliber. All are similar and are designed specifically for chambering in single shot handguns. The intention was to offer competitors a choice of easy to make chamberings that could deliver the desired momentum to distant targets. In this endeavor Mr. Gates appears to have been eminently successful.

General Comments The 270 IHMSA is based on the 300 Savage case. Cases are formed by simply necking the case down to accept 270 bullets. The sizing die also drives the inside of the shoulder back to achieve a 38-degree shoulder angle, providing superior headspace control and a longer case neck. The same treatment is utilized for all cases in the IHMSA line.

270 IHMSA Loading Data (14″ barrel)

Bullet (grs.)	Powder/grs.		MV	ME	Source
90	H414	45.0	2691	1445	Hodgdon
90	BL-C(2)	40.0	2719	1475	Hodgdon
100	H414	45.0	2654	1560	Hodgdon
100	H4895	38.0	2654	1560	Hodgdon
110	H414	44.0	2626	1680	Hodgdon
110	H4895	37.0	2590	1635	Hodgdon
130	H414	41.0	2442	1720	Hodgdon
130	H450	44.0	2423	1695	Hodgdon
140	H4831	43.0	2449	1860	Hodgdon
140	H4350	41.0	2394	1780	Hodgdon
150	H4350	40.0	2291	1745	Hodgdon
150	H4895	33.0	2274	1720	Hodgdon

270 Savage

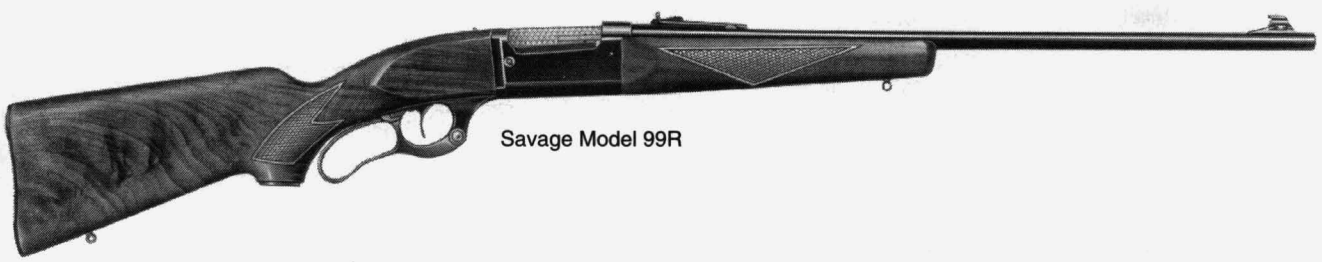


Historical Comments The 270 Savage was, in its day, a very good cartridge for the Model 99 Savage, and it remains so. With the standard 130-grain bullet it delivers performance reasonably close to factory 270 Winchester loads. Heavier bullets intrude much of the available powder space and, therefore, don't perform as well. The Ackley improved version comes very close to 270 Winchester ballistics and is a much better Model 99 chambering option in all respects, see discussion at 250-300 Ackley Improved.

General Comments The 270 Savage was, in its day, a very good cartridge for the Model 99 Savage rifle, and it remains so today. With the standard 130-grain bullet, it delivers performance reasonably close to factory 270 Winchester loads. Heavier bullets intrude much of the available powder space and, therefore, don't perform as well. The Ackley improved version comes very close to 270 Winchester ballistics and is a much better Model 99 chambering option in all respects. (See 250-3000 Ackley Improved page 170.)

270 Savage Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
100 SP	IMR 4064	42.0	3107	2140	Ackley
100 SP	IMR 3031	39.0	2950	1930	Ackley
130 SP	IMR 4064	39.0	2763	2200	Ackley
150 SP	IMR 4350	43.0	2574	2205	Ackley



Savage Model 99R

7mm TCU

Historical Notes The 7mm TCU is another of the series of cartridges developed by Wes Ugalde for Thompson/Center and offered as a standard chambering in the single shot Contender pistol. All are based on the 223 Remington case necked-up, this one to 7mm (.284-inch). The 7mm TCU dates back to 1980, or thereabouts, and has become quite popular for metallic silhouette pistol shooting. It is also known as the 7mmx223.

General Comments The 7mm TCU has a reputation for exceptional accuracy and makes a good varmint cartridge in the T/C Contender pistol, particularly with the 14-inch barrel, which provides an extra couple of hundred fps over the 10-inch barrel. It is on the marginal side for deer or other medium game. The originators recommend that only commercial 223 Remington brass be used for forming cases. Don't use military brass. Cases are easy to make and can be formed in one operation once the dies are properly adjusted. Proper case length is 1.740 inches.

7mm TCU Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	
100 SP	BL-C2	28	2100	980	14″ barrel
115 SP	IMR 4198	23	2185	1220	14″ barrel
130 SP	IMR 4198	22	2050	1215	14″ barrel
140 SP	H-4895	24	1880	1100	14″ barrel
150 SP	BL-C2	25	1910	1220	14″ barrel

T/C Super "14" Contender

7mm International Rimmed

Historical Notes The 7mm International Rimmed was developed as a silhouette cartridge for use in the Thompson/Center single shot pistol. It is based on the 30-30 Winchester case necked-down to .284-inch (7mm) caliber, then fire-formed to create a 38-degree shoulder. It was developed by Elgin Gates in the late 1970s as one of a series of wildcat silhouette cartridges ranging from 25- to 35-caliber for I.H.M.S.A. matches. The 7mm International Rimmed cartridge is similar to the commercial 7-30 Waters except for the sharper shoulder and less body taper. Both are made by necking-down the 30-30 Winchester case. The 7mm International Rimmed is popular among handgun silhouette shooters and is a very effective cartridge for this sport.

General Comments The 7mm (284) caliber has emerged as a popular choice for handgun silhouette shooting, and a fairly large number of 7mm cartridges have emerged for this purpose. The 7mm International Rimmed is one of the better ones and also makes a good field cartridge for anything from varmints up to deer-size animals when loaded with proper bullets at top velocities. It will push the 130-grain bullet at over 2000 fps muzzle velocity out of a 10-inch barrel, and the same bullet at around 2200 fps from a 14-inch barrel. The 7-30 Waters loaded by Federal can do as well or better, and it is a commercial cartridge requiring no neck-sizing or other changes. For these reasons it may replace the 7mm International Rimmed and some of the other rimmed 7mm cartridges as a favorite handgun silhouette round.

7mm International Rimmed Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	
120 SP	RL-7	27.5	2085	1160	12″ bbl.
130 SP	H-4895	31	2040	1200	12″ bbl.
139 SP	H-4895	30	1830	1040	12″ bbl.
145 SP	H-322	28	1925	1200	12″ bbl.

7mm IHMSA

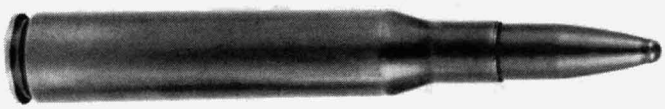
Historical Notes Just one of an entire series of cartridges designed by Elgin Gates, the 7mm IHMSA (International Handgun Metallic Silhouette Association) is among the more popular of the group that ranges from 25 through 35 caliber. All are similar and are designed specifically for chambering in single shot handguns. The intention was to offer competitors a choice of easy to make chamberings that could deliver the desired momentum to distant targets. In this endeavor Mr. Gates appears to have been eminently successful.

General Comments The 7mm IHMSA is based on the 300 Savage case. Cases are formed by simply necking the case down to accept 7mm bullets. The sizing die also drives the inside of the shoulder back to achieve a 38-degree shoulder angle, providing superior headspace control and a longer case neck. The same treatment is utilized for all cases in the IHMSA line, which seems to include every feasible bore size from 25- through 35-caliber.

7mm IHMSA Loading Data (14" barrel)

Bullet (grs.)	Powder/grs.		MV	ME	Source
100	H414	45.0	2515	1400	Hodgdon
100	H4198	33.0	2514	1400	Hodgdon
115-120	H4350	44.0	2431	1505-1570	Hodgdon
115-120	H414	44.0	2414	1485-1550	Hodgdon
130	H4350	43.0	2388	1645	Hodgdon
130	H414	43.0	2334	1570	Hodgdon
139-145	H4350	42.0	2269	1585-1655	Hodgdon
139-145	H414	42.0	2246	1555-1625	Hodgdon
150-154	H4831	43.0	2223	1645-1690	Hodgdon
150-154	H4350	41.0	2210	1625-1670	Hodgdon
160-162	H450	44.0	2198	1715-1735	Hodgdon
160-162	H4350	40.5	2163	1660-1680	Hodgdon
168	H450	43.0	2182	1775	Hodgdon
168	H4350	40.0	2152	1725	Hodgdon
175	H4831	41.0	2094	1700	Hodgdon
175	H450	42.0	2073	1670	Hodgdon

285 OKH
7mm-06 Mashburn
7mm-06



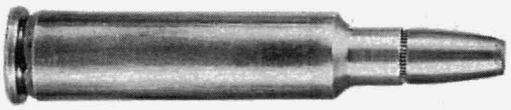
Historical Notes These cartridges are lumped together because they are practically identical and, except for headspace specification, are also very similar to the 280 Remington. The 285 OKH is another O'Neil-Keith-Hopkins development which originally used a duplex loading consisting of different powders with different burning rates loaded one on top of the other. It also employed a long flash tube that ignited the powder at the front of the case instead of the rear. This was supposed to improve ballistics and apparently did to a slight extent, but was a lot of trouble and rather impractical for the average reloader. All of these cartridges originated in the late 1940s and early 1950s.

General Comments Because these cartridges hold about 2 grains less powder than the 280 Remington, maximum 280 Remington loads are not recommended. The various 7mms based on the 30-06 case are worthy of mention because they were the wildcat forerunners of the commercial 280.

285 OKH Loading Data

Bullet (grs.)	Powder/grs.		MV	ME
100 SP	IMR 3031	45.0	3110	2150
125 SP	IMR 4350	57.0	3195	2840
150 SP	IMR 4895	48.0	2890	2780
165 SP	IMR 4350	52.0	2820	2920
175 SP	IMR 4350	55.0	2720	2880

7mm Shooting Times Easterner (7mm STE)



Historical Notes The 7mm Shooting Times Easterner (7mm STE) was designed in 1987 by gun writer Layne Simpson for Marlin 336 and Winchester Model 94 lever-action rifles. This cartridge is the 307 Winchester case necked down and fireformed to the Improved configuration with minimum body taper and a 40-degree shoulder. The 307 Winchester is actually a rimmed version of the 308 Winchester, thus providing the 7mm STE with more powder capacity than either the 30-30 Winchester or the 7-30 Waters. Load data for the 7mm STE was developed with the Nosler 120-grain and Hornady 139-grain flat-nosed bullet, as they are compatible with the tubular magazines of the lever guns. Maximum velocities for these bullets in a 22-inch barrel are 2900 fps and 2700 fps respectively.

General Comments This cartridge has enjoyed fair success on whitetails, mule deer, pronghorn antelope, black bear, caribou and wild hogs. Performance of the Nosler bullet on all of these has been nothing less than outstanding. A favorite open country "single shot" recipe for loading directly into the chamber (not for use in a tubular magazine) is the Nosler 140-grain Ballistic Tip loaded to 2700 fps. Chamber pressures generated by the 7mm STE are comparable to those developed by the 307 Winchester. Consequently, only Model 336 and 94 rifles of recent manufacture and in excellent condition should be considered for this conversion. Those rifles in 30-30 Winchester, 307 Winchester, 356 Winchester and 444 Marlin are easily converted to the 7mm STE by rebarreling with no other modifications necessary.

7mm Shooting Times Easterner (STE) Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
120 SP	H-414	47.0	2915	2265	Layne Simpson
120 SP	H-4895	41.0	2910	2250	Layne Simpson
139 SP	W760	45.0	2710	2265	Layne Simpson
139 SP	RL-22	50.0	2710	2265	Layne Simpson

Marlin 336CS

30 Kurz

Historical Notes The 30 Kurz is made by shortening the 30-06 or 308 Winchester to 1.290 inches. This produces a short cartridge very similar to the German 7.92 Kurz assault rifle cartridge of WWII. The idea originated in the 1960s, and there are other versions of this cartridge. It is intended for use in modified M1 carbines and is the same length as the 30 Carbine case.

General Comments The 30 Carbine cartridge is not very flexible and isn't a particularly good choice for hunting. Because of this, many efforts have been made to improve the performance of the handy little M1 Carbine through wildcat cartridge designs. The 30 Kurz is one of these. The problem is that the cartridge has capabilities beyond the ability of the M1 Carbine. When loaded within the pressure limits of the M1 Carbine, it doesn't provide all that much of an improvement. It is, however, an interesting development as one of the shortest of the short 30 calibers. It is usually loaded with a 110-grain bullet.

308x1.5″ Barnes

Historical Notes The 308x1.5 inch was developed by the author in March of 1961. It is based on the 308 Winchester case shortened from the original 2.01 inches to a length of 1.50 inches. The only other difference is in the shoulder diameter which is .003-inch larger than the original cartridge. Two rifles were made up for the developmental work; one on a Swedish Model 96 short military bolt action (1 in 12-inch twist) by Les Corbett, and the other on a Remington rolling block single shot action (1 in 10-inch twist) by P.O. Ackley. Both rifles proved to be extremely accurate although the 1 in 12-inch twist appears to be the one that has become more or less standard for this cartridge. The 308x1.5 inch is similar to the Russian 7.62x39mm (M43) military round, but is larger in base diameter and has a greater powder capacity. Consequently it can be loaded to produce higher velocity with any given bullet weight. At the time the cartridge was introduced, several gun designers, working on assault rifle designs they hoped to sell to the government, chambered their weapons to handle the 308x1.5 inch. However, nothing came of these efforts, and the cartridge has never been seriously considered as a military round. A number of individual experimenters have worked with variations of the original 308x1.5-inch case configuration by lengthening it to 1.6 inches, 1.7 inches, etc., and it has been necked-down to 22-, 6mm- and 7mm-caliber and necked-up to 375. The case capacity of the 308x1.5 inch is close to that of the 223 Remington, and if necked-down to 22-caliber, it delivers approximately the same ballistics. The original case-forming and loading dies were made up by RCBS in Oroville, California, and these can still be ordered as a regular stock item.

General Comments As originally conceived, the 308x1.5 inch was envisioned by the author as a varmint-through-deer class sporting cartridge that could be chambered in very lightweight, short-action rifles for hunting under conditions where reduced bulk and heft would be at a premium. As a secondary possibility, it could provide a very efficient 30-caliber match or even a benchrest cartridge. However, it has emerged as more of a special-purpose handgun cartridge for use in custom single shot pistols for silhouette shooting. Many custom barrels have been made for the popular Thompson/Center Contender single shot pistol in 308x1.5 inch caliber, and in addition, the Wichita Silhouette Pistol, made by Wichita Engineering and Supply, Inc. of Wichita, Kansas, offers it as a standard caliber. Also, a number of custom pistolsmiths who make up single shot pistols based on the Remington XP-100 bolt action offer it as a caliber choice.

As a rifle cartridge, the 308x1.5 inch delivers initial velocities in excess of the factory-loaded 30-30 Winchester. (A true 2530 to 2540 fps with the 150-grain bullet as opposed to the advertised 2410 fps of the commercial 30-30.) Actually, as demonstrated through chronograph tests made by the author and others, the factory 150-grain loading of the 30-30 develops only about 2250 fps from a 22-inch barrel and most ofthe 30-30s sold have 20-inch barrels. Since the 308x1.5 inch is used exclusively in bolt- or single shot actions, this allows the use of spitzer bullets, which means that the retained velocity at the longer ranges will also be greater than the flat-pointed 30-30 bullet. The author has had great success with this little cartridge in hunting deer, feral pigs and feral goats. Properly loaded, it has good killing power on animals up to deer-size at ranges out to about 150 yards or so.

Small cartridges such as the 308x1.5 inch are very efficient and deliver performance out of all proportion to their size. However this is only achieved at relatively high pressure levels of around 50,000 to 52,000 psi. Commercial 30-30 ammunition, by comparison, is not loaded to over about 40,000 psi. When loading the 308x1.5 inch, or any similar cartridges, to maximum performance levels, only a few tenths of a grain of powder can run the pressure up to unsafe pressure levels. Also, if military brass is used for forming cases, all maximum charges must be reduced because the heavier brass reduces the case capacity and increases the loading density, thereby increasing pressure. A number of shooters have been using the 308x1.5 inch for shooting cast bullets. Lou Delgado of Thousand Oaks, California, has been experimenting with cast bullets and various twists from 1 in 12 inches through 1 in 16 inches.

308x1.5″ Barnes Loading Data

Bullet (grs.)	Powder/grs.		MV	ME
80	IMR 4198	28.0	2875	
80	IMR 4198	29.0	2938	
93	IMR 4198	28.5	2835	
100	IMR 4198	28.5	2810	1755
125	H-380	30.0	2015	1125
125	H-380	30.0	2015	
125	IMR 3031	29.0	2352	
125	IMR 4198	27.0	2557	
125	IMR 3031	29.0	2350	1535
125	IMR 4198	28.0	2640	1935
150	IMR 4198	27.0	2530	2130
150	H-380	23.0	1589	
150	IMR 4064	27.0	2032	
150	IMR 4198	21.0	2027	
150	IMR 4198	26.0	2456	
150	IMR 3031	28.0	2370	1870
170	IMR 3031	27.5	2112	
170	IMR 4198	24.5	2233	
180	IMR 4198	24.0	2180	1900
180	IMR 3031	26.0	2035	

30 Herrett

Historical Notes The 30 Herrett was developed as a handgun hunting cartridge by grip maker Steve Herrett and noted gun writer Bob Milek. It was intended for use in the Thompson/Center single shot pistol, and the first barrels were made up in 1972, although Thompson/Center did not offer it as a standard chambering until 1973. The cartridge is based on a shortened and reformed 30-30 Winchester case reduced to 1.6 inches as compared to the original length of 2.04 inches. The case is longer and has greater powder capacity than the 30 Carbine, and when fired in the 10-inch barrel of the Thompson/Center pistol, delivers a rather impressive performance. Muzzle velocities of over 2000 fps are possible with the 125- or 130-grain bullet.

General Comments Conceived as a superior handgun hunting cartridge, the 30 Herrett has been used successfully on everything from varmints to deer. However, as loaded and used in the Thompson/Center pistol, it develops less velocity and energy than the standard 30/30 rifle and must be considered on the marginal side as a medium game cartridge in the hands of the average hunter. Much of its success has been due in no small part to the skill of the people who have used it. On the other hand, it offers greater power than the 357 Magnum cartridge which some consider adequate for big game in the hands of a skilled hunter and good shot. As with all big game hunting with a handgun, it boils down to the question of who is doing the hunting. What Bob Milek or someone in that class can do and what the average person can do are two different things. In any event, the 30 Herrett is an outstanding long-range handgun varmint cartridge, particularly with 110-, 125- or 130-grain bullets. It has also been used with success for silhouette shooting, although most shooters prefer the 357 Herrett for this sport. The 30 Herrett is a good example of a wildcat cartridge designed for a specific purpose not really covered by anything in the commercial line, and one that fulfills its design purpose extremely well.

30 Herrett Loading Data

Bullet (grs.)	Powder/grs.		MV	ME
100 SP	2400	19.0	2210	1090
110 HP	2400	20.0	2270	1260
125 SP	IMR 4227	23.0	2205	1350
130 SP	2400	19.0	2000	1160
150 SP	N200	27.0	2100	1470

30-30 Ackley Improved

Historical Notes The 30-30 Winchester is one of the most popular sporting cartridges ever produced. It is the standard American deer cartridge, but its popularity is due more to the light, handy carbines that chamber it than to its ballistics. Many hunters have wished that the 30-30 had a little more *oomph*. The 30-30 Improved does just that by providing an additional 200 to 300 fps within the working pressure limits of the standard Model 94 Winchester action, which is 38,000 CUP maximum. There are various versions of the 30-30 Improved, but the Ackley version is the most popular. The exact date of introduction is not known, but was probably sometime in the early 1950s or perhaps even earlier.

General Comments The 30-30 Improved basically requires only a simple rechambering job. Cases are made by firing standard 30-30 Winchester ammunition in the Improved chamber, then reloading them. However, anyone who favors the Model 94 Winchester or Marlin 336 and wants more power than the standard 30-30 offers can simply buy one in 307 Winchester caliber. This makes the Improved 30-30 pretty much obsolete for new rifles, but it is still a good modification for older Model 94s or Marlins.

30-30 Ackley Improved Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
100 SP	RL-7	36.0	2750	1680	
110 HP	RL-7	35.0	2610	1660	
130 SP	W-748	36.0	2385	1645	
150 SP	RL-7	30.0	2270	1720	
150 SP	IMR 3031	37.0	2617	2280	Ackley
170 SP	IMR 3031	35.0	2310	2020	

30 IHMSA

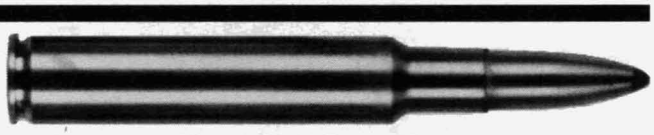
Historical Notes Just one of an entire series of cartridges designed by Elgin Gates, the 30 IHMSA (International Handgun Metallic Silhouette Association) is among the more popular of the group that ranges from 25- through 35-caliber. All are similar and are designed specifically for chambering in single shot handguns. The intention was to offer competitors a choice of easy to make chamberings that could deliver the desired momentum to distant targets. In this endeavor Mr. Gates appears to have been eminently successful.

General Comments The 30 IHMSA is based on the 300 Savage case. Cases are formed by simply sizing in the full-length die. This process drives the inside of the shoulder back to achieve a 38-degree shoulder angle, providing superior headspace control and a longer case neck. The same treatment, combined with necessary neck sizing, is utilized for all cases in the IHMSA line, which seems to accommodate every standard bullet size from 25- through 35-caliber.

30 IHMSA Loading Data (14" barrel)

Bullet (grs.)	Powder/grs.		MV	ME	Source
110	H4895	39.0	2468	1485	Hodgdon
110	H322	37.0	2409	1415	Hodgdon
125-130	H4895	38.0	2369	1555-1620	Hodgdon
125-130	H4198	33.0	2343	1520-1580	Hodgdon
150	H4895	37.0	2351	1840	Hodgdon
150	H414	44.0	2262	1700	Hodgdon
165-168	H414	43.0	2184	1745-1775	Hodgdon
165-168	H4350	43.0	2177	1735-1765	Hodgdon
180	H4350	43.0	2177	1890	Hodgdon
180	H4895	35.0	2129	1810	Hodgdon
190	H4350	42.0	2133	1915	Hodgdon
190	H4895	34.0	2062	1795	Hodgdon
200	H414	39.0	1978	1735	Hodgdon
200	H4350	40.0	1967	1715	Hodgdon
220	H4350	39.0	1853	1675	Hodgdon
220	H450	42.0	1814	1605	Hodgdon

30-06 Ackley Improved



Historical Notes The 30-06 Ackley Improved is made by firing the standard 30-06 in the Improved chamber. Headspace is the same, but the Improved case has a more abrupt shoulder, less body taper and a larger shoulder diameter. The most popular version was developed by P.O. Ackley in 1944, but there are other versions as experiments go back to 1940 or even earlier. This has always been a controversial cartridge with its detractors claiming it was not as good as the standard '06, and its defenders claiming it was better than the 300 H&H Magnum. Actual chronograph tests have proven it to be definitely superior to the standard 30-06 cartridge with slow-burning powders, but not with the medium- to fast-burning powders.

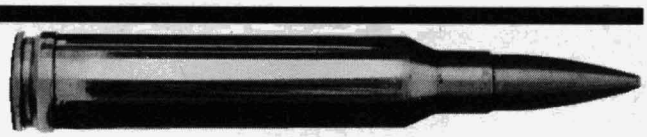
General Comments The advantage of owning a wildcat chambered rifle that will also shoot standard factory ammunition is obvious. The various Improved cartridges from 22- through 35-caliber are all designed to do exactly that. The idea is to provide superior performance by handloading the Improved case, without eliminating the standard factory round when an ammunition shortage or other occasion demands.

The 30-06 Ackley Improved is one of the most popular and widely used of the Improved breed. With the proper powder, it will add a little over 100 fps muzzle velocity to any bullet weight, as opposed to the standard factory-loaded cartridge. This does make it equal to the original factory-loaded 300 H&H Magnum with 150-, 180- and 220-grain bullets but, of course, the 300 Magnum can also be handloaded to exceed anything possible in the Improved '06. Best results are obtained with slow-burning powders such as IMR 4350 or Hodgdon 4831. The 30-06 Improved would be adequate for any North American game. As is typical of Ackley's improved series of cartridges, this design exhibits reduced case stretching and easier extraction compared to the more tapered standard version.

30-06 Ackley Improved Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
130 SP	IMR 4895	54.0	3150	2860	P.O. Ackley
150 SP	IMR 4350	59.0	3070	3150	P.O. Ackley
165 SP	IMR 4350	58.0	2940	3180	P.O. Ackley
180 SP	IMR 4350	56.0	2825	3200	P.O. Ackley
200 SP	H 4831	59.0	2760	3180	P.O. Ackley
200 SP	IMR 4350	54.0	2675	3190	P.O. Ackley
220 SP	IMR 4350	54.0	2620	3365	P.O. Ackley

30-338 Winchester Magnum



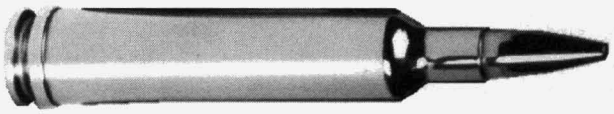
Historical Notes This cartridge was developed specifically for use in 1000-yard benchrest competition. It was created by simply necking the 338 Winchester Magnum to 30-caliber and almost exactly duplicates the 308 Norma magnum. (Norma's commercial offering has slightly less case taper and is slightly longer.)

General Comments The 30-338 Winchester Magnum fills a void in Winchester's Magnum line, created when Winchester introduced the 300 Magnum. The 264, 338 and 458 Magnum all share a 2.5-inch case length. Evidently to avoid direct competition with the existing 308 Norma magnum and to better compete with the well-established, and substantially longer, 300 Weatherby Magnum, Winchester opted to increase case length and push the shoulder forward on their new 30 caliber magnum (actual usable capacity increase was marginal). The Wildcat 30-338 is likely exactly what Winchester would have offered had Norma not beaten them to the punch. Ballistics are very similar to the 300 Winchester Magnum, despite the slight reduction in powder capacity. Compared to that commercial chambering, a slightly longer case-neck provides superior purchase for longer bullets.

30-338 Winchester Magnum Loading Data (26″ barrel)

Bullet (grs.)	Powder/grs.		MV	ME	Source
150 PSPCL (Rem)	A4350	71.5	3203	3415	Accurate
150 PSPCL (Rem)	A3100	76.0	3145	3295	Accurate
168 Sierra MK	A3100	68.5	3047	3460	Accurate
168 Sierra MK	A4350	73.5	3076	3530	Accurate
180 Sierra MK	A3100	72.5	2964	3510	Accurate
180 Sierra MK	A4350	66.0	2929	3430	Accurate
190 Sierra MK	A3100	72.3	3006	3810	Accurate
190 Sierra MK	A4350	65.0	2888	3520	Accurate
200 Sierra MK	A3100	71.0	2921	3790	Accurate
200 Sierra MK	A4350	64.0	2811	3510	Accurate
220 Sierra MK	A3100	70.0	2735	3655	Accurate
220 Sierra MK	A4350	63.0	2646	3420	Accurate
220 Sierra MK	A8700	80.0	2528	3120	Accurate (Very mild pressure)

30-378 Weatherby



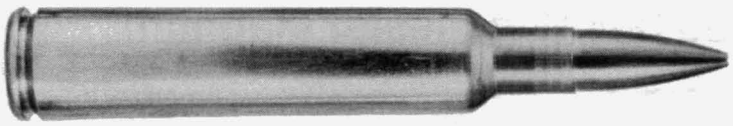
Historical Notes This cartridge was developed specifically for use in 1000-yard benchrest competition. It was created by simply necking the 378 Weatherby case to accept 30-caliber bullets. The standard design retains the trademark Weatherby double-radius shoulder.

General Comments The 30-378 case can hold over 120 grains of powder, compared to about 90 grains for the 300 Weatherby—the largest commercial 30-caliber case. With the advent of new slower-burning powders, increased capacity promises a useful advantage to the handloader. (Recent availability of match-grade bullets weighing 250 grains served to increase potential benefit, and resultant demand, for a chambering with increased powder capacity.) The 30-378 Weatherby certainly delivers on this promise: It is a simple matter to load 250-grain Sierra Match King bullets to produce almost 3000 fps muzzle velocity without exceeding 30-06 pressure levels and that from a 26-inch barrel! Lighter bullets can be driven faster but with those this chambering offers less advantage over standard 300 Magnum chamberings. When bullets lighter than 200 grains are fired from a 26-inch barrel, this cartridge is only marginally superior to the 300 Weatherby. However, with 30-inch barrels installed, ballistic difference is significant with all bullets weights. Those looking for the ultimate long-range hunting rifle for smaller species might give this chambering a hard look. A single shot rifle equipped with a 30-inch tube offers reasonable handling ease and, if chambered for this cartridge, would deliver huge doses of energy to a distant target with the flattest trajectory available. Accurate Arms data shows the 250-grain MK generating the same muzzle energy as the 458 Winchester Magnum when loaded to about the same pressure! How about a 300-grain VLD launched from a 30-inch barrel at 2800 fps?

30-378 Weatherby Loading Data (26″ barrel)

Bullet (grs.)	Powder/grs.		MV	ME	Source
180 Barnes-X	A8700	118.0	3283	4310	Accurate
200 Nosler Partition	A8700	117.0	3208	4570	Accurate
200 Sierra HPBT	A8700	117.0	3163	4440	Accurate
220 Sierra HPBT	A8700	115.0	3050	4545	Accurate
250 Sierra HPBT	A8700	111.0	2954	4840	Accurate

30 Cody Express



Historical Notes The 30 Cody Express was originally designed and built by Vinton W. (Vint) Knechtges II and Peter J. (Pete) Edquist, both of Minneapolis, Minnesota. The cartridge is named after Vint's grandfather, Michael W. (Mike) Cody, one of the top salesmen for Federal Cartridge Co. for over 30 years. This cartridge is a very long-range varmint shooting and deer hunting round, and is probably the ultimate 500- to 650-yard prairie dog number. It offers an extremely flat trajectory with very little wind drift. Velocities of 4050 fps can be achieved with 110-grain, 30-caliber bullets. The parent cartridge for the 30 Cody Express is the 416 Rigby.

General Comments Vint's test rifle was a Remington Model 721 with the bolt face opened up and a Sako extractor installed. The barrel is a 34-inch heavy Douglas Premium with a 1 in 9 inch twist, with a muzzlebrake of Vint's design. This is a highly specialized cartridge with a narrow spectrum of use. Though capable of taking large game at very long ranges, the author does not condone this practice. On the other hand, 600-yard prairie dog shooting proved to be quite enjoyable. This cartridge is capable of driving a 250-grain bullet to a velocity of 3900 fps, producing over 8000 fpe at the muzzle. Firing a load such as this in a sporting-weight rifle could prove extremely uncomfortable, so Vint's rifle weighs over 14 pounds to keep recoil down. Even when one takes into account that the approximately 300 fps of muzzle velocity advantage this chambering enjoys over the more mundane 300 Magnums is due to increased barrel length, the 30 Cody is most impressive. However, the higher velocities can only be achieved with heavier bullets and the penalties paid for the increased performance—extreme recoil, muzzle blast and very short barrel life—may offset any advantage.

30 Cody Express Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
110 HP	H-4831	95.0	4050	4010	Vint Knechtges
125 SP	H-4831	92.0	4000	4440	Vint Knechtges
168 HP	H-4831	82.0	3850	5530	Vint Knechtges
250 SP	H-4831	85.0	3900	8445	Vint Knechtges

Note: Federal 215 magnum primers used for all loads.

8mm-06

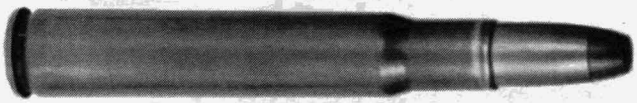
Historical Notes Immediately following WWII, many shooters found themselves in possession of 8mm Mauser military rifles for which they could not obtain suitable ammunition. What was more natural then but to rechamber these rifles for the 30-06 case, with the neck expanded to take .323-inch bullets? Presto! The 8mm-06 was born. It is impossible to state positively who first accomplished this as it probably happened at several places at about the same time.

General Comments The 8mm-06 in standard or improved form is one of the better wildcat developments. It is similar to the German 8x64mm (S) Brenneke in both dimensions and performance. Using European nomenclature, this would be the 8x63mm (S) caliber. With the 125-grain bullet, it makes a very good varmint cartridge, while with 200- to 250-grain bullets it would be adequate for any North American big game. For those who don't care for the performance of the standard 8mm cartridge, the 8mm-06 provides an inexpensive means of altering Mauser military rifles to a more powerful cartridge. However, the conversion eliminates the use of cheap, surplus military ammunition and has to be 100 percent handloaded. These two factors should be considered in light of how they affect the overall use of the rifle.

8mm-06 Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
150	4895	59.0	3026	3050	Ackley
170 SP	IMR 4064	57.0	2930	3240	Ackley
200 SP	IMR 4350	61.0	2700	3260	
225 SP	IMR 4350	58.0	2515	3165	
250 SP	IMR 4831	62.0	2380	3145	Ackley

333 OKH



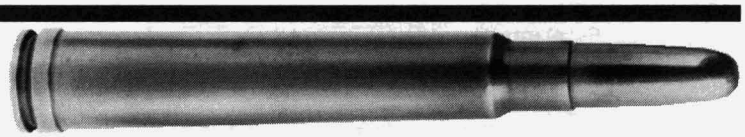
Historical Notes The 333 OKH was developed by Charles O'Neil, Elmer Keith and Don Hopkins in 1945. It is the 30-06 case necked-up to accept .333-inch diameter bullets. At the time the cartridge was developed .338-inch diameter bullets were not generally available, but .333-inch bullets were. When the 338 Winchester Magnum was introduced in 1958, a wide variety of 338 bullets became available which led to rifles being made for the 338-06 cartridge. The difference between the 333 OKH and the 338-06 is miniscule and one can use loading data interchangeably. However, the two bullet diameters are *not* interchangeable. For additional information see the 338-06.

General Comments The 333 OKH was a very good cartridge, but is now obsolete.

333 OKH Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
250	4350	62.0	2400	3200	Ackley
275	4895	45.0	2202	2960	Ackley
275	4831	57.0	2314	3270	Ackley

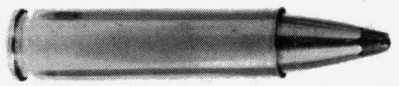
334 OKH



Historical Notes The 334 OKH is another development by O'Neil, Keith and Hopkins dating back to the late 1940s. This one is based on the 300 H&H Magnum necked-up to 333-caliber. Bullets of this size were made by Fred Barnes in weights from 200 to 300 grains. The 334 OKH is the forerunner of a number of developments leading up to the 338 Winchester Magnum. After the Winchester Magnum was introduced, everyone switched to .338-inch diameter bullets.

General Comments The 334 OKH is an excellent big game cartridge for North American hunting and is also adequate for most soft-skinned African big game. Like all other 333-caliber cartridges, it was made obsolete by the 338 Winchester Magnum. Bullets are no longer available in 333-caliber.

338-223 Straight



Historical Notes The 338-223 Straight originated with Max Atchisson of Atlanta, Georgia in 1972. It was intended as the cartridge for a blow-back semi-auto rifle he designed. It also had a secondary purpose as a possible cartridge for use in rebarreled Model 1907 Winchester self-loading rifles chambered for the 351 Winchester SL. At that time 351SL ammunition was no longer manufactured and was difficult to obtain in shooting quantities. However, Winchester reintroduced 351SL ammunition and eliminated that problem.

Although strictly an experimental development, the 338-223 is interesting because it is the ultimate possibility in necking up the 223 Remington or similar brass cases. There are two versions of the cartridge, one made by necking up the full-length 223 case and the other based on cutting off the 223 case at the shoulder and trimming it to 1.412 inches. The full-length version presented two problems: It is difficult to make without splitting the case neck, and with an overall length of 2.54 inches, it is too long to function through the action of rebarreled Model 1907 Winchester rifles. The short case, on the other hand, is almost the same length as the 351 Winchester SL and can be made to work in the Model 1907 riflle.

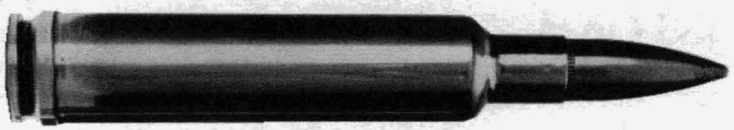
General Comments The 351 Winchester SL is loaded with a 180-grain bullet at a muzzle velocity of 1850 fps. The 338-223 has a 200-grain bullet at 1820 fps, so the two are ballistically almost identical. Both cartridges are considered marginal for deer, but do very well on coyote, bobcat, mountain lion or similar predators at close range. The 338-223 project was eventually dropped because the reappearance of 351 Winchester ammunition made such a cartridge non-viable. One problem with the 338-223 is that it is a rimless case which must headspace on the case mouth. This works well with short pistol cartridges, but not as well with high-powered rifle calibers. Finally, there doesn't seem to be any real need for such a cartridge.

338-223 Loading Data

Bullet (grs.)	Powder/grs.		MV	ME
200 SP	2400	18.3	1820	1880
200 SP	IMR 4227	19.0	1750	1370

Loading data for the short case only.

338-378 KT (338-378 Weatherby)



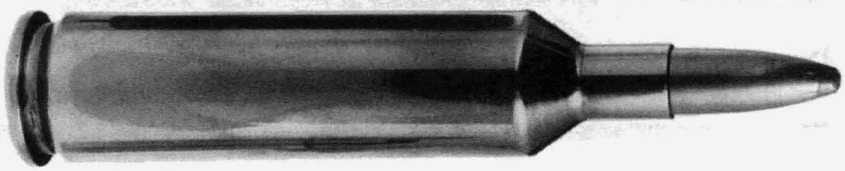
Historical Notes The 338-378 Keith-Thompson was developed specifically to deliver big heavy bullets to distant big game animals with a flat trajectory. Elmer Keith always advocated the 33 bore as minimum for elk hunting. The advent of the 378 Weatherby case gave him ready access to a larger capacity case that would allow equal weight bullets to be launched several hundred feet per second faster than was safely possible with existing 0.338-inch Magnums. Evidently this was an opportunity Elmer could not pass up.

General Comments The 338-378 KT holds more than 120 grains of powder, compared to about 90 grains for the 340 Weatherby—then the largest commercial 0.338-inch case. With the advent of new slower-burning powders, suitable for handloading in this cartridge, the 338-387 KT should gain added support among the "Bigger is Better" genre of hunters. Should loading data become available for some of the newer powders between H4831 to H870 in burning rates this cartridge could soon gain new popularity. The only data we could find is for H4831, which is decidedly too fast burning for this number. Still, velocities exceed what the 340 Weatherby can offer by about 10 percent when loaded to similar pressures. Properly loaded with a somewhat slower powder this chambering should be able to gain about 100 fps more velocity advantage. When combined with the more aerodynamic hunting bullets available, this number can *easily* deliver substantially more energy at one-quarter of a mile than the 30-06 produces at the muzzle.

338-378 KT Loading Data (26″ barrel)

Bullet (grs.)	Powder/grs.		MV	ME	Source
250	H4831	98.0	3009	5030	Hodgdon
275	H4831	95.0	2859	4990	Hodgdon
300	H4831	90.0	2731	4965	Hodgdon

338/50 Talbot



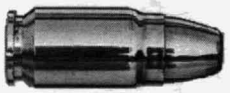
Historical Notes The 338/50 is the work of Skip Talbot, Talbot's Custom Equipment in Fallon, Nevada. Skip began development of the cartridge in 1984 as an outgrowth of working with the 50-caliber Browning Machine Gun cartridge. The 338/50 is the 50BMG necked-down to 338-caliber and with the shoulder angle increased to 35 degrees. The primary purpose of the 338/50 is long-range target shooting at ranges out to 3000 yards. Forming dies are made by RCBS.

General Comments The 338/50 is a highly specialized cartridge and not intended for hunting. It would, of course, be adequate for any North American big game and the same would apply to Africa. The cartridge is over bore capacity and severe throat erosion occurred within only 250 rounds. Talbot also tried a shortened version of the cartridge, about 1-inch shorter than the full-length case, in order to increase the loading density. The maximum load of 170 grains of Accurate Arms 8700 powder occupied only about 77 percent of the volumetric capacity. However, the short version was not successful because muzzle velocity was reduced by about 500 fps. The full-length case developed a muzzle velocity of 3700 fps with the 250-grain bullet when fired from a 44-inch barrel. By comparison, the 340 Weatherby Magnum pushes the 250-grain bullet at an initial velocity of 2850 fps from a 26-inch barrel, so the 338/50 develops an additional 850 fps with the same bullet. When one considers that, perhaps, 500 fps of the muzzle velocity results solely from a longer than standard barrel, these ballistics are not so impressive. However, with a much slower powder and bullets of 300 grains or heavier, the results might be spectacular. It is an interesting cartridge, but not very practical for most purposes.

338/50 Talbot Loading Data

Bullet (grs.)	Powder/grs.		MV	ME
250 SP	AA8700	170.0	3700	7625

9mm Action Express



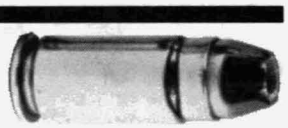
Historical Notes This is a 1988 innovation by Evan Whildin, who was Vice President of Action Arms, Ltd. at that time. The 9mm Action Express (9mm AE) is the 41 Action Express case necked-down to 9mm. It retains the 41AE rebated rim which is the same diameter as the standard 9mm Luger. The advantage of this in the 9mm AE is that the cartridge offers a larger case that can be used in firearms originally designed for the 9mm Luger without the necessity of changing the bolt or breech face. This will allow a number of 41AE semi-auto pistols and carbines to be changed to the 9mm version by the installation of kits made available for specific weapons.

General Comments The 9mm AE has been tested in the Uzi semi-auto pistol and in specially altered 1911 Colt pistols. As a commercial round, it appeared chambered in the Action Arms TZ-75S88. It is a sort of super 9mm and as such is more powerful than the 38 Colt Super Auto. It has an advantage over the 9mm Winchester Magnum since it is shorter and most 9mm pistols can be adapted to it. Tests in a 10-inch pressure barrel gave muzzle velocities with a 95-grain bullet of 1880 fps at 31,760 CUP and 1903 fps with a 100-grain bullet at 34,880 CUP. These pressures are a bit on the high side for many semi-auto pistols. On the other hand, these are top loads and can be reduced and still maintain impressive velocities. A 124-grain bullet was measured at 1590 fps and 28,550 CUP, a load which could be digested by most 9mm autos. The 9mm AE is a potentially good self-defense and field cartridge. Of course, converted auto pistols are not likely to have 10-inch barrels, 5 inches being more normal. However, safe loads of around 1500 fps with the 124-grain bullet have been tested in converted Colt 1911 autos with 5-inch barrels. This beats the 38 Colt Super Automatic and its 130-grain bullet at 1275 fps. This caliber is not being manufactured at this time.

9mm Action Express Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
115 JHP	No. 9	16.1	1825	850	Action Arms
124 JHP	IMR 4227	13.3	1225	415	Action Arms
124 JHP	H-110	16.5	1530	645	Action Arms

9x25mm Dillon



Historical Notes Final design of the 9x25mm was completed in 1988 but the cartridge languished until top IPSC competitor Rob Latham began testing in 1991. This cartridge was developed by a group of people at Dillon, but was chiefly Randy Shelly's concept and he is primarily responsible for the design. Randy's intention was to create a 9mm cartridge that would function through standard pistols and still produce major IPSC Power-Factor without requiring excessive pressures. In an effort to achieve Major Power Factor ratings with light bullets, which reduce recoil, many IPSC competitors have routinely used 38 Super loads generating rifle-type peak pressures! The 9x25mm is based on the 10mm Automatic case necked to 9mm and with its increased capacity it allows loads to achieve Major Power within more reasonable pressure envelopes.

General Comments The 9x25 Dillon is formed by necking the 10mm Automatic case to 9mm with a sharp shoulder and a short neck. This creates a relatively high capacity pistol cartridge which is based on a high-pressure case. With the proper bullet and powder the 9x25mm Dillon can generate significant muzzle energy and it easily achieves IPSC Major-Power momentum levels. Vihtavuori has recently designed a powder (tentatively called N105) specifically for this and similar cartridges. Hodgdon will soon announce a similar new powder in their extensive product line. Appropriate 9mm bullets are readily available. The future is bright for this cartridge, which might very well achieve commercialization very soon. Springfield Armory offers guns in this chambering and several custom barrel makers chamber their tubes for this round. Representing an increasingly unique example of the breed, the 9x25mm Dillon meets a recognized need. Those interested in more information on the 9x25mm and Randy's newest development, the 9x30mm, can contact him at Tombstone Smoke 'N' Deals in Phoenix, AZ.

9x25mm Dillon Loading Data (8" barrel)

Bullet (grs.)	Powder/grs.		MV	ME	Source
100 FMJ/RN	No. 9	15.3	1751	680	Lyman
100 FMJ/RN	W296	17.2	1769	690	Lyman
115 JHP	Her-2400	13.0	1587	640	Lyman
115 JHP	W296	15.0	1566	625	Lyman
124 FMJ/FP	W296	14.4	1529	640	Lyman
130 Cast	W296	13.5	1479	630	Lyman (#356634)

38-45 Auto
45-38 Auto Pistol
45-38 Clarke

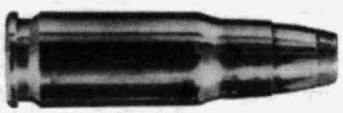
Historical Notes Designed by Bo Clerke of Armory Gunshop, Burbank, California, the 45-38 was first announced publicly in the October, 1963 issue of *Guns and Ammo* magazine in an article by Howard French. The 45-38 Auto is based on the 45 ACP case necked-down to accept standard 357 bullets. Super 38 ACP barrels are rechambered to the new caliber and used in the 45 Colt Auto without any other change.

General Comments One of the inherent faults of most semi-auto pistols is their inability to digest cast or swaged lead bullets. Much time and effort has been devoted to correcting this so that the individual handloader can effect considerable improvement. The necked design of the 45-38 cartridge eliminated any and all feed and chambering problems with light or standard loads. With a straight case, such things as bullet shape, seating depth, hardness of the alloy, etc., are critical. With the necked case they can be ignored. The idea behind the 45-38 was to produce a satisfactory target round that would function with any type bullet and any load sufficient to operate the gun mechanism. However, it should also be an excellent field cartridge because it will allow the use of hunting-type bullets. There is a definite need for an Improved auto pistol hunting cartridge. Case configuration is the same as the 38-45 Hard Head but loading data is not interchangeable.

38-45 Auto, 45-38 Auto Pistol, 45-38 Clerke Loading Data

Bullet (grs.)	Powder/grs.		MV	ME
130 FMJ	Unique	7.5	1275	475

357 Auto Mag



Historical Notes The 357 Auto Mag is an outgrowth of the 44 Auto Mag (*qv*) and is based on the 44 Auto Mag case necked-down to 357-caliber. The 44 Auto Mag in turn is made by cutting off 30-06 or 308 Winchester brass to a length of 1.298 inches and inside reaming to accept a .429-inch diameter bullet. The first Auto Mag pistols were announced in 1970 and delivered in late 1971. These were, of course, in 44-caliber. The 357 Auto Mag didn't appear until 1973. For an extra $150 one could purchase both the 357 and 44 barrel and slide assembly units to convert the pistol to handle either caliber with a relatively easy change of units. The 357 Auto Mag cartridge was never made commercially. However, Auto Mag ammunition was made in Mexico for a time and also by Norma in Sweden so conversions of these to the smaller caliber can be encountered. The Auto Mag semi-auto pistols are no longer in production.

General Comments The 357 and 44 Auto Mag pistols were made of stainless steel, had a 6½-inch barrel, an overall length of 11½ inches and weighed 3.4 pounds. In other words, they were quite large and heavy, much like the Desert Eagle pistols currently available from Magnum Research. The 357 Auto Mag pushed the 158-grain jacketed bullet at a muzzle velocity of 1600 fps and the 110-grain bullet at over 1900 fps when loaded to maximum performance levels. This is certainly well in excess of anything possible from the 357 Magnum revolver. Auto Mag pistols in 357 have been used with success on everything from varmint to deer. Like many of the more powerful handgun cartridges, the ballistics of the 357 Auto Mag are marginal for big game, but like the others, it can do the job in the hands of a good shot and accomplished hunter. As a self-defense weapon, the Auto Mag pistols are a bit unwieldy and overpowered. They are strictly for sporting use.

357 Auto Mag Loading Data

Bullet (grs.)	Powder/grs.		MV	ME
110 JHP	Blue Dot	19.0	1935	920
125 JHP	Blue Dot	18.0	1810	915
140 JHP	Blue Dot	17.0	1725	930
158 JSP	Blue Dot	16.0	1500	795
158 JSP	H-110	22.0	1635	940

357/44 Bain & Davis

Historical Notes The 357/44 Bain & Davis was listed in the First Edition of *CARTRIDGES OF THE WORLD* (p.139) as the 44-357 Davis. That was almost 30 years ago! Intended for use in special, rebuilt 44 Magnum revolvers, the cartridge had a rather short life and then fell into disuse. However, in more recent times it has resurfaced as a chambering for Thompson/Center Contender single shot pistols, and in this application, it really comes into its own. The cartridge was developed by gunsmith Keith Davis and first announced in an article by Dan Cotterman appearing in the January 1964 issue of *Gun World* magazine. The original purpose for the design was to bring the velocity of the 38-caliber revolver up to 1410 fps with the 158-grain bullet. Actual velocity is, of course, some 200 to 300 fps below that figure. Ammunition catalogs no longer list the 158-grain 357 Magnum at anything like 1410 fps. In any event, the 357/44 B&D did achieve its goal by developing velocities in the revolver of over 1400 fps. The case is based on the 44 Magnum necked-down without any other change.

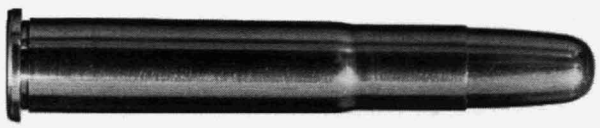
General Comments The 357/44 B&D is another wildcat that started off as one thing (a high-velocity 38 revolver cartridge) and ended up as something else (a silhouette and hunting round for single shot pistols). What is interesting about this cartridge is that although smaller than the 357 Herrett, it produces equal or slightly superior ballistics. It is a potent and effective cartridge for either metallic silhouette or small game hunting with bullets of 110 to 158 grains. As a field cartridge, it will cover the spectrum from small game and varmints up to deer, although it's a bit marginal for the latter. Cases are very easy to make, requiring only a full-length sizing and seating die.

357/44 Bain & Davis Loading Data

Bullet (grs.)	Powder/grs.		MV	ME
110 JHP	W-296	24.0	2120	1100
110 JHP	W-296	28.0	2365	1370
125 JHP	IMR 4227	26.0	2085	1205
125 JHP	W-296	25.0	2170	1310
158 JSP	W-296	24.0	2045	1465
158 JSP	2400	18.0	1700	1020

All data for a 10-inch barrel Thompson/Center Contender pistol only.

35-30/30 (35-30)



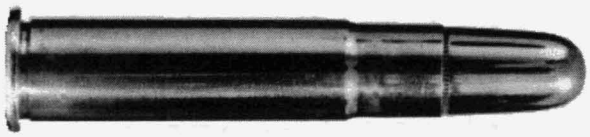
Historical Notes Although not widely known, the 35-30/30 is one of our oldest wildcats, having originated around the turn of the century. Its original purpose was to salvage worn-out 32-40 and 32 Winchester Special barrels by reboring them to 35-caliber. The idea was also applied to improve the performance of Winchester Model 1894 rifles and carbines while staying within the cartridge length and pressure limitations of this action. The 35-30/30 cartridge is based on necking-up 30-30 or 32 Winchester Special brass without any other change, although a few rifles have been made up to accept the Ackley Improved version of this case. Recently there has been a rebirth of interest in this cartridge by silhouette shooters who like to use cast bullets. In 1976, Arizona gunsmith Paul Marquart built several 35-30/30 silhouette rifles based on the Remington 788 action, and these quickly established a reputation as being both accurate and effective for the intended sport. Information on these rifles was published in *The Fouling Shot*, published by the Cast Bullet Association, and other shooters found it promising as a target and hunting cartridge. The 35-30/30 can be loaded to about equal the ballistics of the 35 Remington, and in fact, if Remington hadn't introduced their rimless 35 in 1908, it is highly possible that the necked-up 30-30 would have become much more popular than it did. In any event, it is picking up a new but modest following.

General Comments With jacketed bullets there is little, if any, difference between the ballistics and killing power of the 35-30/30 and the 35 Remington. On paper the 35 Remington appears to have an edge over the 35-30/30 because it has about a 14 percent greater powder capacity, but the factory 200-grain bullet loading rarely attains 2000 fps except in a 24-inch test barrel chiefly because of rather anemic loading pressures. As a cast bullet cartridge, the 35-30/30 with its longer neck permits use of cast bullets as heavy as 270 grains seated to a depth that will feed through magazine rifles designed for the 30-30. This is not possible with the 35 Remington and its short neck. In a strong action, the 35-30/30 can be loaded to deliver performance approaching the 375 Winchester. However, in a strong action, the 35 Remington can be stepped up quite a bit too. It is possible to attain 1800 fps with a 300-grain bullet in a strong action chambered for the 35-30/30, which would make it suitable for elk or moose at short range. It is a good cartridge for upping the performance of 30-30 rifles or for salvaging worn-out 32 Special barrels. For a wildcat, it is rather a special purpose cartridge, but one that may fill the needs of a number of shooters. Dies are available from RCBS and chambering reamers from Clymer.

35/30-30 Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
200 JSP	IMR 4198	25.0	1925	1650	
208 Lead	IMR 4198	25.0	1895	1660	
210 Lead	W630	15.0	1520	1080	Lyman 35875
245 Lead	H-335	30.0	1770	1710	Lyman 358318
282 Lead	H-335	28.0	1700	1810	Lyman 3589
292 Lead	W748	33.5	1620	1580	

357 Herrett



Historical Notes Although the 30 Herrett proved a good handgun hunting cartridge when used in the 10- or 14-inch barrel of the Thompson/Center Contender single shot pistol, it needed to be improved for hunting heavy game. One solution was to neck it up to 357-caliber to take advantage of larger diameter, heavier bullets. This was done in the initial development. However, it appeared desirable to increase the powder capacity of the original 30 Herrett case and so the final design used a case length of 1.75 inches which is .15-inch longer than the 30 Herrett case. The development of the 357 Herrett was the work of Steve Herrett and gun writer Bob Milek. It was introduced as a standard caliber for the Thompson/Center pistol in 1974. Cases are made by reforming, shortening, and necking-up 30-30 or 32 Winchester Special brass. The case has a 30-degree shoulder angle. After forming, the cases are fire-formed to the final configuration.

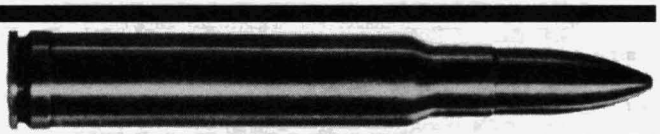
General Comments The 357 Herrett is another example of a wildcat cartridge developed for a specific firearm and purpose where there is a gap in the commercial line of ammunition. It was intended primarily as a hunting cartridge for the heavier varieties of medium game, however it has also become quite popular among silhouette shooters. It serves both purposes well, but one must bear in mind that as a hunting cartridge, it delivers ballistics inferior to the 35 Remington fired from a rifle. While it is perfectly capable of handling large animals under average conditions, much depends on the skill of the user, something that is true of all handguns and handgun cartridges when used for hunting. The 357 Herrett is, nevertheless, one of the best of the handgun cartridges for field use on medium or small game and varmints. But all hunting success relies upon either skill or luck.

357 Herrett Loading Data

Bullet (grs.)	Powder/grs.		MV	ME
110 JHP	2400	28.0	2600	1650
110 JHP	IMR 4227	33.0	2685	1710
125 JHP	IMR 4227	31.0	2565	1820
150 JHP	IMR 4227	30.0	2380	1910
158 JSP	IMR 4227	29.0	2310	1870
180 JSP	IMR 4227	27.0	2130	1820
180 JSP	N200	32.0	2125	1810

Above loads are for the Thompson/Center Pistol with 14-inch barrel.

35 Ackley Magnum



Historical Notes The original 35 Ackley Magnum was developed in 1939 and was based on the Ackley short 30 Magnum No. 1 necked-up to 35-caliber. Later the Ackley short 30 Magnum No. 2 was developed to make possible the rechambering of 30-06 rifles without setting back the barrel. This second 30 Magnum case was necked-up to 35-caliber in 1946, and the older case discarded. It is this second version that has become standard and is listed here. In 1959 Norma introduced their 358 Magnum, which for all practical purposes is identical to the 35 Ackley Magnum. There is also an Ackley improved 35 Magnum which has a case length of 2.85-inch, based on the blown-out, full-length 300 H&H Magnum.

General Comments The 35 Ackley Magnum is representative of the 35 short, belted Magnum group, so named because they are based on a shortened case that will work through the standard-length action. These cartridges will all deliver ballistics equal to the 375 H&H Magnum, but don't require a special magnum-length action or magazine. There are a number of very similar versions, such as the Mashburn 350 Short Magnum or the Barnes 358 B-J Express and so on. They are all so similar that loading data for one can be safely used for the other, and there is little use in listing all of them individually. P.O. Ackley told the author that he believed a 35 short magnum is the best and most efficient of the 35 magnums, regardless of whose version it may be. Cartridges in this class are all more than adequate for any North American big game and, with proper bullets, just about any African or Asiatic game as well. Their performance is parallel to the proven 375 H&H Magnum. The Norma version has the advantage of being available on a commercial basis.

35 Ackley Magnum Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
200 SP	IMR 3031	64.0	3130	4365	P.O. Ackley
220 SP	IMR 4064	76.0	3040	4540	P.O. Ackley
250 SP	IMR 4350	63.0	2750	4210	P.O. Ackley
275 SP	IMR 4895	69.0	2760	4665	P.O. Ackley
300 SP	IMR 4350	73.0	2655	4710	P.O. Ackley

375 Whelen/ 375 Whelen Improved

Historical Notes The 375 Whelen, also known as the 375-06, is another cartridge that was not developed by the late Col. Townsend Whelen, but was named in his honor. The cartridge was actually the work of the late gunsmith and writer L.R. "Bob" Wallack in 1951 and is based on the 30-06 case necked-up. There are two versions, one based on the standard case and retaining the original 17-degree, 30-minute shoulder angle, the other the Improved case with a 40-degree shoulder angle. The Improved case holds slightly more powder and provides better headspace control, so it is the more popular version. The 375-inch caliber is as far as one can go in expanding the 30-06 case without running into headspace problems due to lack of a distinct shoulder. Experiments with larger diameter bullets have invariably led to headspace problems. An example of this was the 400 Whelen which never became popular and is no longer chambered.

General Comments The 375 Whelen is not as powerful as the 375 H&H Magnum or the 375 Weatherby Magnum but is nevertheless a good medium bore for most dangerous game. It is certainly adequate for any North American big game. It uses bullets from 200 to 300 grains, and because it is strictly a handloading proposition, can be quite flexible. There is no reason why it can't be loaded down with 200- or 250-grain bullets for deer hunting as well as loaded to full power for larger animals. This is one advantage of wildcat cartridges; they must be handloaded and so can be tailored to fit different game and hunting situations. As with the 338 and 35 versions of the '06, Ackley's improved design is much superior. In this instance, it is mandatory to ensure adequate headspace control.

375 Whelen Improved Loading Data*

Bullet (grs.)	Powder/grs.		MV	ME
200 SP	IMR 4895	58	2450	2265
235 SP	IMR 4064	60	2475	3205
270 SP	IMR 4064	57	2380	3400
300 SP	IMR 4064	52	2110	2975

*This loading data should not be used for loading the standard 375 Whelen or for fireforming improved cases.

401 Herter Powermag

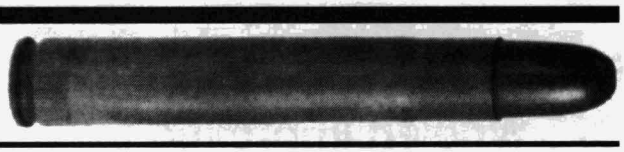
Historical Notes This is a proprietary cartridge developed by Herter's, Inc. of Waseca, Minnesota in 1961. Herter's was a mail-order gun, ammunition and loading supply house that once offered a series of excellent products to the gun trade. The 401 Powermag was chambered in the Herter Powermag single-action revolver. The cartridge is very similar to the 41 Remington Magnum, but the two are not interchangeable. The case of the 41 Remington Magnum is .005-inch larger in diameter and .009-inch longer than the 401 Powermag. Since the 401 Powermag preceded the 41 Magnum by 3 years, it is difficult to escape the possibility that it served as the inspiration for the Remington Magnum. On the other hand, the wildcat 400 Eimer existed in 1924. It is also similar to the 401 and the 41 Magnums, so it is difficult to decide who influenced who. Ammunition and loading components for the 401 Powermag are no longer available.

General Comments The 401 Powermag is an excellent self-defense or field cartridge. It is capable of doing anything the 41 Magnum can do. It has been used successfully on everything from small game and varmints on up to deer and black bear. With the availability of the commercial 41 Magnum and the many fine guns chambered for it, there isn't any need for the 401 Powermag, even though it was, and still is, a fine cartridge.

401 Herter Powermag Loading Data

Bullet (grs.)	Powder/grs.		MV	ME
160 JSP	Unique	11.0	1325	625
180 JSP	Unique	10.0	1270	650
200 JSP	Unique	8.5	1140	580
200 JSP	Blue Dot	13.0	1280	735

400 Whelen



Historical Notes Of the various cartridges named after the late Col. Townsend Whelen, the 400 is the only one he actually developed. According to Phil Sharpe,* Col. Whelen developed this cartridge while he was commanding officer at Frankford Arsenal during the early 1920s. The 400 Whelen is based on the 30-06 case necked-up.

General Comments The 400 Whelen was not a successful development because when the 30-06 case neck is expanded to this size it leaves only a very slight shoulder which gives rise to serious headspace problems. Nonetheless, rifles of this caliber were used in the U.S., Canada and Africa on big game with excellent results. The maximum caliber that the 30-06 case can be necked up to without creating headspace problems when cases are resized is 375.

*Sharpe, Phillip B., *Complete Guide to Handloading*, Funk & Wagnalls Co., 1941, p.398.

400 Whelen Loading Data

Bullet (grs.)	Powder/grs.		MV	ME
300	IMR 3031	60.0	2265	3415
350	IMR 3031	57.0	2100	3430

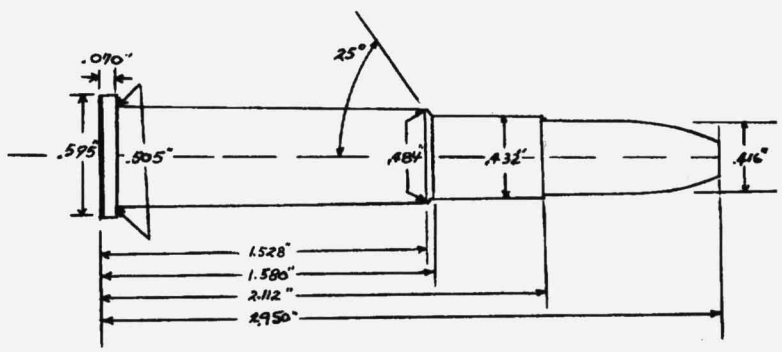
416 Barnes

Historical Notes The 416 Barnes was the last cartridge design of the late Frank Barnes. In the late 1980s, Frank began to think about various 40-caliber rifle cartridges. He realized that though there were many available, most were designed for use in Africa. Frank felt there would be strong interest in a 416 designed for American game and hunting conditions rather than the dangerous African species. Additionally, he felt it would be advantageous if it could be adapted to several different rifle actions rather than being limited to a single type. After studying the old 40-caliber cartridges which are too long for today's actions, Frank settled on the final version which uses the 45-70 Government cartridge as its base. By using the 45-70, there are a number of current actions available, which would make easy conversions to the 416 Barnes. Readily available and very reasonably priced in particular was the Marlin 95 lever action. Unfortunately, few commercial bullets in 416 are available in the weight range intended for tubular magazine rifles.

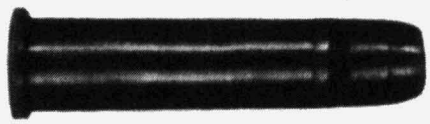
General Comments The 416 Barnes would be an excellent cartridge for North American big game. Loading data for this cartridge is limited. Frank recommended using 37 grains of RL-7 to push a 400-grain bullet at 1625 fps. IMR 3031 is another good general purpose powder for the 416 Barnes in a lever-action rifle. With jacketed bullets, it would most likely give the best accuracy of any of the potential propellants. Frank found an accurate load of 50 grains of IMR 3031 behind a 330-grain bullet. It gave him a velocity of 2045 fps. This cartridge really comes into its own when used with 270- and 330-grain bullets. Though it provides no real advantage for the deer hunter, it would prove to be an excellent elk, moose or brown bear cartridge.

416 Barnes Loading Data

Bullet (grs.)	Powder/grs.		MV	ME
300 SP	IMR 4198	52	2355	3695
300 SP	RL7	54	2270	3435
330 Lead	IMR 3031	50	2045	3065
400 SP	IMR 4198	44	1920	3275
400 SP	IMR 4064	58	2140	4070
400 SP	H335	59	2155	4125
400 Lead	IMR 4198	39	1830	2975



445 Super Magnum



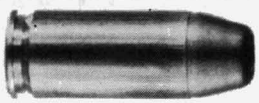
Historical Notes The challenge of knocking down metallic silhouettes at ranges of 200 meters with a handgun requires considerable momentum and energy. Elgin Gates designed the 445 Super Magnum with this task in mind. The cartridge is essentially a 44 Magnum case with approximately 3/8-inch added to the overall length. As is the case with the 44 Magnum, the name is somewhat misleading as it uses bullets of .429-inch diameter. The 445 Super Mag, however, can drive the same bullets nearly 300 fps faster than the 44 Magnum. Dan Wesson Arms Co. is the only company manufacturing a production gun for this cartridge. And Starline Brass Co. is the only company producing brass. Custom loaded ammunition is available from various custom loading companies.

General Comments Due to the pressures involved and the overall length of the cartridge, guns chambered for this cartridge tend to be somewhat large and heavy. This has proved to be a very accurate cartridge and a fine performer with bullets weighing up to 300 grains. There is a price to pay for such performance and it comes in the form of considerable muzzle blast and recoil. The barrel compensator on some of the Wesson firearms has tamed this cartridge considerably, reducing its recoil to that of a 44 Magnum. For those willing to put up with the recoil and muzzle blast, this caliber could prove to be an excellent choice for competition silhouette shooting or handgun hunting of large game. With more and more bullet manufacturers producing heavy jacketed bullets in this caliber of 300 grains and up this cartridge can really come into its own. A note of caution may be advised here. In my experience with this particular cartridge, I have found that different guns reach maximum loads at different rates. While some work comfortably at the maximum loads listed in loading manuals, others peak out well before this. As with any load, work up to maximum loads with care. The case is a shortened 444 Marlin and it is not safe to shoot 44 Magnums in guns so chambered.

445 Super Mag Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
240 JHP	H-110	31.7	1400	1045	Hornady
240 JHP	W-680	35.2	1500	1200	Hornady
300 SP	H-110	28.2	1300	1125	Hornady
300 SP	AAC1680	33.6	1350	1215	Hornady

451 Detonics



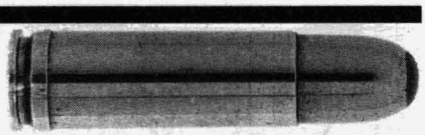
Historical Notes Various mechanical features of the Colt M1911 A1 auto pistol have prevented any significant ballistic advance in the cartridges it chambers. One of these weaknesses is that a portion of the cartridge head is unsupported so operating pressures are dictated by the strength of that portion of the case. The 45 Winchester Magnum has a substantially stronger case head and dimensions identical to the 45 ACP except for a greater length. In their search for a more potent 45-caliber round for their 45-caliber pistols, the Detonics Mfg. Co. decided to take advantage of this by trimming the 45 Winchester Magnum from its nominal length of 1.198 inches back to .942-inch. This is still sufficiently longer than the 45 ACP so that the 451 Detonics cartridge will not chamber in handguns intended for the 45 ACP. The newly created case will handle much higher pressures than the original 45 ACP and still function through actions of the same length. Detonics not only chambered their Scoremaster and Combat Master semi-auto pistols for the 451 Detonics. They also offered a conversion kit for the Colt Government, Gold Cup and Commander pistols. The cartridge was introduced in 1983 and Detonics furnished empty cases headstamped 451 Det/Mag. Alternately, cases can be made from cut down 308 Winchester brass. The Detonics company has since gone out of business. Brass in this caliber is no longer available.

General Comments The idea of a more powerful 45 ACP cartridge has long intrigued 45 auto buffs. The 451 Detonics was a viable solution to what has heretofore been an insoluble problem. A 185-grain bullet at 1353 fps and a 200-grain at 1281 fps is a significant boost to the usual 45 ACP performance of a 230-grain bullet at 850 fps. Recoil at this top loading gets rather heavy, so most users of the 451 will want to stay below the top loads. The 451 Detonics is a good self-defense or field cartridge for small game or varmint shooting.

451 Detonics Loading Data

Bullet (grs.)	Powder/grs.		MV	ME
185 JHP	SR 4756	9.0	1110	510
200 JHP	Blue Dot	11.0	1010	660
200 JHP	Blue Dot	14.0	1200	645
225 JHP	Blue Dot	11.0	1005	510

458x1½" Barnes



Historical Notes The 458x1½-inch, which was never intended to be anything except an abstract experiment, has surfaced in a number of roles including a military one (see Chapter 7). It all goes back to 1962 when the author was playing around with the 458 Winchester Magnum and cutting it off to various lengths that finally culminated in the 458x2-inch. All this was reported in the June 1963 issue of *Guns & Ammo* magazine. Nothing noteworthy developed with this very short version as a sporting round until the metallic silhouette game came into bloom, at which point several individuals built up special silhouette pistols based on the Remington XP-100 action and chambered for the 458x1½-inch. One of these was Larry Stevens of Carson City, Nevada, who won a number of matches in the unlimited class with this combination. He reports the recoil with bullets of over 300 grains as being rather heavy.

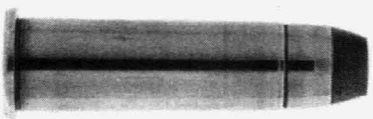
General Comments The 458x1½-inch will certainly knock down the metallic pigs and rams when fired from either a pistol or a rifle. Also, a 300-grain bullet exiting the muzzle at 1500 to 1800 fps is a potent field load and could be effective for anything from small game and varmints on up to deer-size animals. The cases are easy to make by cutting off a standard magnum case for a length of 1.50 inches. No one makes loading dies for the cartridge, but one can improvise by using 45 Colt or other 45 pistol dies. I had this cartridge picked as a loser that would never go beyond the initial test firing, but all in all, it has had a rather interesting history. *Quien sabe?*

458x1½" Barnes Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
300 JSP	IMR 4198	40.0	1805	2180	24" bbl.
300 JSP	IMR 4198	40.0	1680	1885	15" bbl.
*350 JSP	2400	23.0	1376	1470	12" bbl.
*350 JSP	2400	24.0	1435	1602	12" bbl.
*430 Lead	IMR 4227	26.0	1348	1740	12" bbl.

*Loading data furnished by Larry Stevens

45 Silhouette



Historical Notes The 45 Silhouette is an approach to a big bore silhouette cartridge using the full-length 45-70 government case, which is inefficient when used in 10- or 12-inch barrels. The initial development was carried out by the author and Dick Smith of the Washoe County Crime Laboratory during 1984. The idea resulted from earlier experience with the 458x1½-inch cartridge which is based on the 458 Winchester Magnum shortened to 1½ inches. The 45 Silhouette is made by cutting back the 45-70 case from 2.1 inches to 1½ inches. The performance of the two is similar, the difference being that the 45 Silhouette is a rimmed case whereas the 458x1½-inch is a belted rimless case. The rimmed case is better suited to break-open type actions such as the Thompson/Center Contender and might even be used in a revolver. Original testing was in a Siamese Mauser bolt-action rifle with a 20-inch barrel. The idea is neither brilliant nor highly original. The end result is very similar to the old 45-50 Peabody sporting cartridge or the 11.75Rmm Montenegrin revolver cartridge, both of blackpowder vintage. In any event, those wanting to work with the 45 Silhouette can obtain a set of trim and loading dies from RCBS in Oroville, California.

General Comments The 45 Silhouette is intended primarily to shoot a 300-grain bullet of .457- or .458-inch diameter. Lighter or heavier bullets can be used, but this detracts somewhat from the original purpose, which is to provide a 45-caliber handgun cartridge that shoots a 300-grain bullet. I think the late Elmer Keith would approve of this although he did not like some of my other bright ideas. Although developed as a silhouette cartridge, it would obviously also make a pretty good hunting number for anything from small game on up through deer and black bear, at least when fired from a 20-inch or longer rifle barrel. After all, a 300-grain bullet with a muzzle velocity of over 1800 fps and 2100 foot pounds of energy out performs a number of popular deer-class cartridges. Loading data listed below was developed in a Siamese Mauser bolt-action rifle with 20-inch barrel and a custom-barreled and modified Thompson/Center Contender pistol with a 10-inch barrel. A twist of 1:16 or 1:18 is recommended with ¼-inch of freebore.

45 Silhouette Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
	20-inch barrel				
300 Lead	IMR 4198	36.0	1610	1732	Lyman 456191
300 Lead	Blk-Ffg	44.0	1170	930	Lyman 456191
300 JHP	IMR 4198	35.0	1485	1470	
300 JHP	IMR 4198	38.0	1670	1860	
300 JHP	IMR 4198	40.0*	1810	2180	
	10-inch barrel				
200 Lead	Unique	12.0	1325	785	
300 Lead	SR 4759	23.0	1420	1350	
300 JHP	IMR 4198	34.0	1240	1030	

*Compressed charge

458x2″ American

Historical Notes This belted cartridge was designed by the author in mid-1962. It is the 458 Winchester Magnum shortened from a case length of 2½ inches back to an even 2 inches. It is designed as a medium-power, big bore cartridge for North American hunting conditions and game. It is short enough to work through either standard- or medium-length rifle actions. The original rifle was made up on the short Remington Model 722 action as a lightweight carbine with 21-inch barrel. This provides an extremely powerful rifle for its size and weight of 7¼ pounds. The cartridge also works very well in the rebarreled Winchester Model 94 Big Bore rifles.

General Comments The standard 458 Winchester Magnum and the 460 Weatherby Magnum are overpowered for North American big game. Both have very heavy recoil and require heavy, expensive rifles. Efforts have been made by various designers to provide a medium-power big bore cartridge more suited to American needs. The 450-348 and 450 Alaskan are examples of this, but they are rimmed cases suitable only for lever-action or single shot rifles. The 458x2″ fills the need for a bolt-action round of modern design tailored to game found on the North American continent. The 458x2″ American is intended for 300- to 405-grain bullets. It gives good performance with these and is adequate for the heaviest North American game at short to medium range. It would also be quite handy for any but the more dangerous varieties of African game in close cover. Case dimensions and capacity are similar to the 45-70, but modern actions permit heavier loads. This cartridge is, in effect, a belted 45-70 rather than just a shortened 458 Magnum. Ammunition can be made from 458 Magnum brass. Dies are available from RCBS and chambering reamers from H&M Tool Co.

458x2″ Loading Data for Cast Bullets

Bullet (grs.)	Powder/grs.		MV	ME	Source
210	IMR 4198	23	1285	778	Lyman #457127 Light plinking load
250	IMR 4198	28	1828	1860	Lyman #454485 GC sized .457″
300	IMR 4198	25	1370	1257	Lyman #457191
405	IMR 3031	45	1535	2120	Lyman #457483 GC

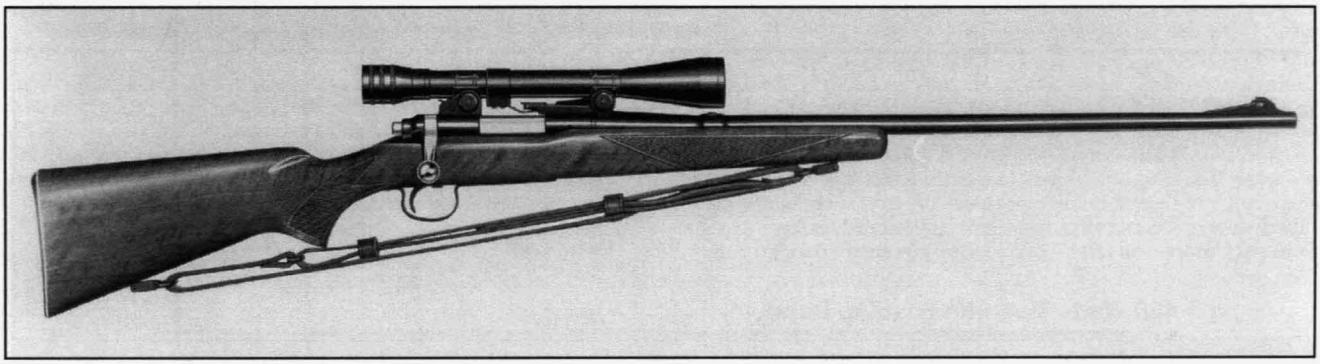
Above loads are all economical, accurate and pleasant to shoot. All but the 210-grain bullet are adequate for deer out to 150 yards.

Loading Data for Jacketed Bullets

Bullet (grs.)	Powder/grs.		MV	ME	Source
300	IMR 4198	36	1650	1820	Hornady SJ 45 rifle bullet
300	IMR 4198	40	1825	2223	Very accurate load fine on deer
300	IMR 4198	55	2412	3900	Fred Barnes softpoint
300	HiVel	58	1984	2635	
350	IMR 4198	51	2209	3810	Hornady softpoint
350	HiVel	56	2034	3240	
405	IMR 4198	51	2110	4005	Winchester softpoint
405	HiVel	56	1949	3422	

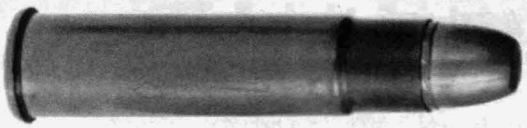
Jacketed bullet loads are intended for big game.

Note: All loads fired from 24-inch barrel, average temperature 78 deg. F. Winchester 458 Mag. cases and Federal #215 primers used for all loads. Velocity measured with Avtron Model T333 electronic chronograph.



Barnes' original rifle used the Remington Model 722 action and made up a lightweight carbine with 21-inch barrel. Standard model 722 rifle shown.

450 Alaskan (45-348 Winchester Improved)



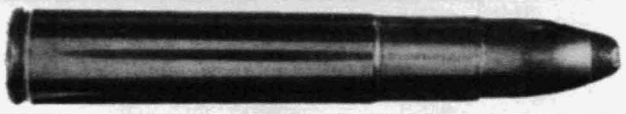
Historical Notes The 450 Alaskan was designed by Harold Johnson who was a resident of Cooper's Landing, Alaska. This cartridge was designed to meet the demands of hunters who wanted a lever-action rifle that could deliver substantial energy and bullet mass for use against the largest and most dangerous of Alaskan game. Model 71s converted to this chambering are among the most prized rifles in Alaska. Belted Magnum bolt-action rifles are legion on the used gun racks in Alaska at certain times of the year. Alaskan chambered Model 71s are never seen for sale at any price! This is ample testimony to the power, dependability, accuracy and ruggedness this combination delivers.

General Comments Ackley might have been the first to open the hole through the barrel and improve the chamber of a Model 71 Winchester. However, by Ackley's own testimony, Mr. Johnson's version of the 45 caliber 348 Improved is a better choice. The 450 Alaskan will function through the Model-71's action with little or no alteration to the rifle's feed mechanism, Ackley's version will not. Ackley's version has slightly less body taper and holds slightly more powder but ballistics are very similar. The 450 Fuller is essentially identical to the 450 Alaskan excepting a different shoulder angle. Conversion to any of these cartridges produces a Model 71 lever-action rifle capable of delivering ballistics practically duplicating the 458 Winchester Magnum. Any such conversion necessitates special attachment measures to prevent the magazine and forend from being separated from the receiver under the stresses of substantial recoil these cartridges generate. The data shown below is based on Mr. Ackley's recommendation of reducing 450-348 Ackley Improved data 5 percent for use in the 450 Alaskan chambering, velocities are estimates only.

450 Alaskan Loading Data (26″barrel)

Bullet (grs.)	Powder/grs.		MV	ME	Source
350	IMR3031	67.0	2415	4535	Adapted 450-348 Ackley data, see text
400	IMR4064	67.0	2095	3900	Adapted 450-348 Ackley data, see text
400	IMR3031	67.0	2215	4360	Adapted 450-348 Ackley data, see text
500	IMR4064	66.0	2005	4465	Adapted 450-348 Ackley data, see text

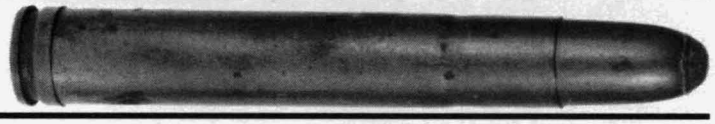
450 Howell



Historical Notes The 375 Howell is one of three cartridges designed by Ken Howell, of Stevensville, Montana. Ken's idea was to design a series of cartridges capable of taking African game that would fit in a standard length bolt action. Ken began his design sometime in the mid 1970s when Magnum Mauser actions were prohibitively expensive and relatively rare. The cartridge cases of the 375 H&H Magnum and 416 Rigby were much longer than needed for efficient use with modern smokeless powders. The 375 Howell was designed for approximately the optimum smokeless powder capacity for its bore size. All cartridges are based on the 404 Jeffery case which measures 0.540-inch in diameter at the base versus the 0.532-inch diameter of the H&H base, thus offering a fairly substantial powder capacity in a short case. The 450 Howell is actually based on Ken's 416 Howell which was the first of the three to be designed. The 450 was just a necked-up version. The design of these non-belted magnums is exceptional and unfortunately was never picked up by any of the commercial cartridge companies.

General Comments With about a 10 percent increase in capacity over the 458 Winchester Magnum, this cartridge can generate fully 100 fps more velcity at the same pressure and with the same cartridge length. It has the further significant advantage of superior accuracy potential because it headspaces on the shoulder rather than a belt and, therefore, can be aligned better in the chamber.

450 Watts Magnum



Historical Notes The 450 Watts Magnum is made by necking-up 375 H&H Magnum brass to accept .458-inch diameter bullets. According to P.O. Ackley *, it was originated by a Mr. Watts and Mr. Anderson of Yakima, Washington. It dates back to the 1950s or earlier. The case is 0.35-inch longer than the 458 Winchester Magnum. Because it holds more powder, it can be loaded to slightly higher velocity than the 458 Winchester Magnum.

General Comments The 450 Watts is a powerful cartridge that can push a 500-grain bullet a couple of hundred fps higher than the 458 Winchester. However, the 458 is a more practical choice because ammunition and rifles are readily available on a commercial basis. The difference in power is not that great and the two will handle the same range of big game. Guns so chambered can shoot 458 Winchester Magnum loads.

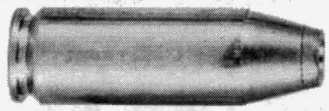
**op cit*, p. 501

450 Watts Magnum Loading Data*

Bullet (grs.)	Powder/grs.		MV	ME	Source
400 SP	IMR 4198	85.0	2670	6320	Ackley
500 SP	IMR 4320	98.0	2500	6920	Ackley

*P.O. Ackley, p. 501

475 Wildey Magnum



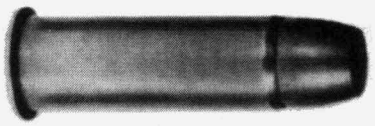
Historical Notes The 475 Wildey is the brainchild of Wildey J. Moore. This cartridge was designed to be used in a big bore gas-operated, semi-automatic handgun which was also designed by Wildey Moore. The original pistol was chambered for the 45 Winchester Magnum. In order to build the gun, Moore decided to sell stock in his company to raise capital for production. In time, some of the investors wanted to take active roles in production and marketing of this particular handgun. Unfortunately, many of these were not shooters or people knowledgeable about firearms. Moore's share in the Wildey company was diluted to 25 percent, and without his knowledge, other shareholders in the company formed a separate investment company to gain control of Wildey Incorporated. In January 1983, Moore was fired from his company, but the new management ended up in bankruptcy less than a year later. It took a few years for Moore to get back on his feet. Using this time to advantage, he designed an entirely new pistol with improved ballistics and a new cartridge, the 475 Wildey Magnum. The 475 Wildey is based on the 284 Winchester cartridge cut off to 1.395 inches then neck reamed to handle the 475 bullets. The cartridge is the same length as the 45 Winchester Magnum, however, of greater diameter. Case forming dies for this cartridge are available from both RCBS Inc. and Wildey Incorporated. Bullets for the 475 Wildey are available from Barnes bullets in American Fork, Utah. Several designs are available both softpoints and solids. A real shot in the arm came for the Wildey when the pistol was featured in Charles Bronson's movie, *Death Wish III*.

General Comments The Wildey is a very heavy handgun designed to handle breech pressures exceeding 48,000 psi. Due to its size and weight, its usefulness will be most likely limited to hunting and some sport shooting, however, accuracy has proven to be outstanding. Five-shot 25-yard groups consistently average less than 1-inch. Ballistics are also impressive with 100-yard remaining energies exceeding that of the muzzle from a 44 Magnum. Load data from Wildey indicates that 18 grains of Blue Dot powder should be used with a 300-grain jacketed bullet. With that load, a 300-grain Barnes JSP gives a muzzle velocity of 1610 fps with a muzzle energy of 1727, most impressive. At this time, preformed cases for the 475 Wildey are available directly from Wildey.

475 Wildey Magnum Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
250 SP	Blue Dot	21.0	1850	1900	Wildey, Inc.
300 SP	Blue Dot	18.0	1610	1727	Wildey, Inc.

475 Linebaugh



Historical Notes The 475 Linebaugh is the creation of John Linebaugh of Maryville, MO. It is the current favorite in the contest to develop the world's most powerful revolver cartridge, a role that, at least at this writing, it fills rather well. The cartridge is based on the 45-70 government case cut off at 1½ inches and loaded with .475-inch diameter bullets weighing from 320 to 440 grains. The gun used is a modified, large-frame Ruger Bisley revolver fitted with a five-shot cylinder and 5½-inch barrel. Longer barrels are available if so desired.

Cutting off the 45-70 case to a length of 1½ inches is not a new idea—the author did this back in 1984 to make the 45 Silhouette, covered elsewhere in this chapter. However, adapting the 1½-inch rimmed case to handle 475-caliber bullets is definitely an innovative move.

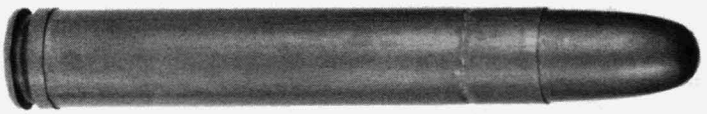
The 475 Linebaugh was first announced in an article written by Ross Seyfried appearing in the May 1988 issue of *Guns & Ammo* magazine, a publication that has always featured information on new wildcat cartridge developments. Loading dies are available from RCBS.

General Comments The 475 Linebaugh, like all the other super-magnum handgun cartridges, is intended primarily for hunting big game or as a backup when confronting dangerous animals. A 370-grain bullet starting out at 1495 fps develops 1840 fpe, and a 440-grain bullet at 1360 fps develops 1800 fpe. This is 108 foot pounds greater energy than the top 454 Casull loading, so we can accept the claim that the 475 Linebaugh is the world's most powerful revolver cartridge. However, there are other factors that would probably make it even more effective, because the top energy load for the 454 Casull is a 260-grain bullet at 1723 fps muzzle velocity. If we compare the 300-grain 454 bullet at 1353 fps and 1220 fpe with the 370-grain 475 bullet at 1495 fps and 1840 fpe, the difference is even more pronounced in favor of the 475. In fact, this works out to be 620 foot pounds greater energy on the side of the 475 Linebaugh. On the other hand, if we are talking about handgun cartridges in general, there are a number of silhouette cartridges fired in single shot pistols that will beat the 475 in terms of power. In any event, the 475 Linebaugh should make a very fine big game revolver cartridge for those who insist on the biggest or the most.

475 Linebaugh Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
370 SP	W-296	25.0	1000	825	John Linebaugh
370 SP	H-110	29.0	1285	1360	John Linebaugh
370 SP	H-110	33.0	1495	1840	John Linebaugh
440 SP	W-296	27.0	1280	1605	John Linebaugh
440 SP	W-296	29.0	1360	1800	John Linebaugh

475 Ackley Magnum
475 OKH Magnum



Historical Notes These two cartridges are listed together because they are virtually identical. Both can be formed by necking-up 375 H&H brass without any other change. The Ackley 475 Magnum originated in the middle 1950s. The bullet used is the Barnes 600-grain softpoint or solid at a muzzle velocity of 2250 fps. The cartridge is normally chambered in bolt-action rifles.

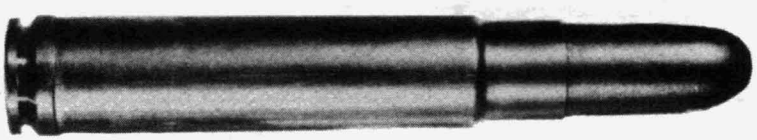
General Comments A 600-grain bullet at 2250 fps develops 6752 fpe of energy, making for a very powerful cartridge adequate for any dangerous African game. However, for those who like lots of energy and power the 475 Ackley/OKH is not as powerful as either the 460 Weatherby or the 475 A&M Magnum. In actual practice, it probably wouldn't make much difference because any of these cartridges is capable of dispatching an elephant or Cape buffalo with one shot. Of course, this has also been done with smaller calibers developing less energy. So in the final analysis, a great deal depends on the hunter and his skill. The cartridge is, of course, overpowered for North American big game.

475 Ackley Magnum Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
600*	IMR 4320	90	2250	6750	P.O. Ackley

*Ackley, *op. cit.*

475 A&M Magnum



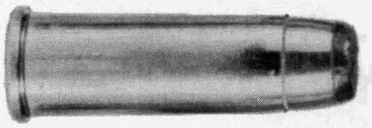
Historical Notes This monster was developed by the Atkinson & Marquart Rifle Co. of Prescott, Arizona, in 1958-59. It is based on the 378 Weatherby case necked-up to 475-caliber. Bullets of this diameter are made by Barnes. Only a few custom-made rifles have been turned out in this caliber.

General Comments The 475 A&M Magnum can develop nearly 10,000 fp of muzzle energy, which makes it one of the most powerful sporting cartridges ever developed. However, it is not available on a commercial basis and is neither widely used nor known. Until the advent of the 470 Nitro Express, the 460 Weatherby held the title as the most powerful commercial cartridge available. No doubt some wildcatter could develop a more powerful round, particularly if it were based on the 50-caliber Browning machinegun cartridge. However, there is really no need for cartridges of this power for hunting anything on this planet. Rifles in this class have little practical value for North American hunting conditions. Recoil is around 90 fp, so six or eight shots should provide a workout equal to going a couple of rounds with the world's heavyweight boxing champ. What fun!

475 A&M Magnum Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
400 SP	IMR 3031	120	3227	9250	Ackley
500 SP	IMR 3031	110	2980	9860	Ackley
600 SP	IMR 3031	105	2502	8340	Ackley

500 Linebaugh



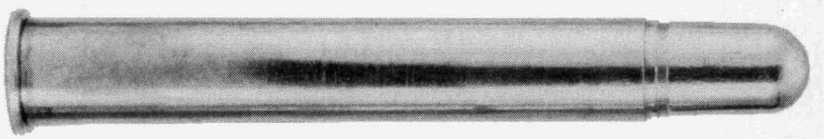
Historical Notes The 500 Linebaugh is the design creation of John Linebaugh, of Maryville, MO. John started out by converting a 45 Colt revolver from 6-shot to 5-shot, thus offering more strength in the cylinder. It was a successful venture, but John continued to search for a more powerful handgun. The result is the 500 Linebaugh. The 500 Linebaugh is based on the 348 Winchester cartridge which is cut down to 1½ inches and inside reamed to 500-caliber. John uses a large-frame Ruger Bisley revolver as he has found the Ruger frame is the only one that can withstand the severe recoil of this cartridge. He replaces the Ruger barrel with one of 50-caliber, usually 5½ inches long. However, he will cut a barrel of any length that the customer desires. The 500 proved to be a very successful round pushing 500-grain bullets at over 1200 fps. Accuracy is outstanding, but recoil can only be described as severe. Not long after John designed this cartridge, the supply of 348 Winchester brass began to dry up which is why John designed the 475 Linebaugh based on the readily available 45-70 Government case. Not long after the 475 was designed, Browning reintroduced their Model 1871 rifle in 348 Winchester, and those cases are again readily available.

General Comments There are more powerful pistol cartridges, but for single shot handguns such as the Thompson Contender. When it comes to the revolver, this is close to the ultimate in power. Due to its accuracy and easy handling, this cartridge could prove to be an excellent heavy game handgun cartridge and possibly the revolver cartridge suitable for taking African game. Specialized bullets are made by Golden Bear of San Jose, CA. The jackets for these bullets are turned on a screw machine and a lead core is swaged in. I found these bullets to be excellent performers both in terms of accuracy and penetration. The 500 Linebaugh should find a strong following in the wilds of Alaska or the plains of Africa, where it could be used as a primary hunting gun or a backup.

500 Linebaugh Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
400 Cast	H-110	27.0	1200	1280	John Linebaugh
410 SP	H-110	29.0	1250	1425	John Linebaugh
410 SP	H-110	31.0	1320	1590	John Linebaugh
500 SP			1200	1599	John Linebaugh

510 Nitro Express



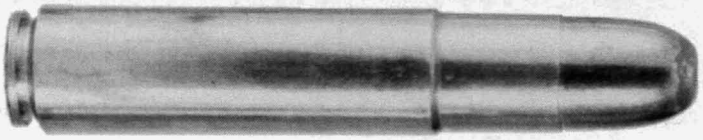
Historical Notes The 510 Nitro Express is the brainchild of Bob Schneidmiller and custom gun maker D'arcy Echols. Bob grew up in the West and from early childhood developed a passion for buffalo hunting. He read virtually everything he could get his hands on and dreamed of owning a 50 Sharps. As Bob grew up, the boyhood dreams remained and his interests broadened to include the Dark Continent of Africa. On Bob's first trip to Africa, he carried a 50-90 Sharps, with which he took a Cape buffalo, but the performance of the 50-90 left much to be desired. After his return, Bob met D'arcy Echols and thoughts of building a bigger, more powerful rifle were discussed. Bob had hoped to build a 500 Nitro, but the brass supply for that particular cartridge was drying up fast. He had a good supply of Sharps 50-140 3¼-inch brass, but D'arcy was not keen about building a custom rifle for an obsolete cartridge. They compromised. They used the same basic case design as the 50-140-3¼ Sharps with modern bullets and powders to achieve or better 500 Nitro Express ballistics. Bob suggested they call the new cartridge the 510 Echols Express, however, D'arcy did not favor the idea. They finally settled on the 510 Nitro Express. The rifle was built on a Martin Hagn falling block action and proved to be superbly accurate. Originally the rifle was built without a muzzlebrake. However, recoil was so heavy that the forearm was torn off with the first shot. The barrel was then so equipped and Bob claims it is now a pussycat.

General Comments The 510 Nitro Express is a superb cartridge for anyone desiring a single shot rifle for dangerous game. This cartridge and rifle combination can offer plenty of power without having to go to the expense of a double rifle. Though many hunters shy away from the thought of a single shot rifle for dangerous game, there is still a strong following for the single shot. For those not wishing to spend the time and money for a custom rifle, the Ruger No. 1 action would probably be an excellent choice for this cartridge.

510 Nitro Express Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
500 SP/FMJ	IMR 4895	90.0	2337	6062	Bob Schniedmiller
550 SP	IMR 4895	88.0	2172	5762	Bob Schniedmiller
600 SP	IMR 4831	102.0	2053	5614	Bob Schniedmiller
700 SP	IMR 4350	85.0	1942	5860	Bob Schniedmiller

585 Nyati



Historical Notes With available muzzle energy exceeding 10,000 fpe, the 585 Nyati deserves mention as very likely the world's most powerful shoulder gun cartridge. The 50 Browning Machine Gun cartridge is used for sporting purposes and it generates vastly more power than the 585, launching bullets of the same weight 300 to 400 fps faster. However the 50 BMG is not by any stretch of the imagination, a shoulder firearm cartridge. The 585 is.

This cartridge was created by Ross Seyfried by modifying 577 Nitro cases. Besides case forming, the rim has to be turned down to fit the bolt face. Either standard belted-magnum or 416 Rigby rim size is used as the bolt requires. Length allows chambering in magnum Mauser cactions with minimal modifications. Modified magazine capacity is three cartridges. Seyfried reports very satisfactory accuracy, no doubt a result of careful chambering and quality workmanship throughout the rifle and load. Nyati (n-ya-te) mean Cape buffalo in several African languages and this is certainly a good name for a cartridge delivering so much bullet and energy.

General Comments The 585 gives those who really want power a much more affordable option, compared to the big British double rifles which can often demand tens of thousands of dollars. However, one must mention recoil. It is an open question as to how many among us can tolerate the kind of recoil this cartridge will generate with full power loads. In a 10-pound rifle with a good muzzlebrake, top loads will generate over 150 foot pounds of recoil energy. Compare this to a 30-06, generating a mere 20 foot pounds. Perhaps a better understanding of what this means is this: Imagine having this 10-pound rifle dropped off a 32-foot cliff and catching it with your shoulder. The originator suggests maximum loads defeat the design purpose. He recommmends loads in the 2200 fps range. Sound advice.

Bullets for the 585 are available from Barnes, Woodleigh and numerous custom manufacturers. This caliber also performs superbly with pure lead cast bullets.

585 Nyati Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Recoil*
650 Barnes TC Solid	4350	160.0	2402	8330	112
750 Barnes	IMR 4350	130.0	1925	6175	92
750 Barnes	IMR 4350	140.0	2040	6935	104
750 Woodleigh	IMR 4350	140.0	2196	8035	118
750 Barnes Solid	IMR 4350	140.0	2210	8135	119
750 Barnes	IMR 4350	150.0	2287	8715	129
750 Barnes	IMR 4350	160.0	2487	10,300	152
750 Barnes	RL-15	120.0	2070	7140	102
750 Barnes	RL-15	130.0	2235	8320	119
750 Barnes	RL-15	140.0	2420	9755	139
750 Barnes	RL-15	Max	2525	10,620	151
545 Lead Patched	4198	72.0	1641	3255	34
650 Lead Patched	4198	73.0	1660	3975	48

* In 10-pound rifle with vented barrel.

WILDCAT CARTRIDGES

Rifle and Handgun

Dimensional Data

Cartridge	Case type	Bullet dia.	Neck dia.	Shoulder dia.	Base dia.	Rim dia.	Case length	Ctge. length	Twist	Primer
14-222	C	.144	.165	.356	.375	.375	1.70	1.92	10	S
17 Ackley Hornet	A	.172	.195	.290	.295	.345	1.39	1.47	10	S
17 Ackley Bee	A	.172	.201	.341	.350	.408	1.35	1.78	10	S
17 Mach IV	C	.172	.199	.361	.375	.378	1.40	—	10	S
17/222	C	.172	.199	.355	.375	.375	1.69	1.82	10-12	S
17-223	C	.172	.199	.354	.375	.378	1.76	—	10-12	S
MMJ-5.7mm	C	.224	.253	.332	.353	.356	1.29	1.65	14	L
222 Rimmed	A	.223	.249	.352	.374	.462	1.682	2.144	14	S
224 Kay-Chuk	A	.224	.243	.293	.294	.347	1.35	1.60	10-15	S
22 Kilbourn Hornet	A	.224	.242	.286	.294	.345	1.39	1.70	14-16	S
R-2 Lovell	A	.224	.246	.295	.315	.382	1.63	1.80	16	S
22 Super Jet	A	.224	.248	.372	.379	.440	1.266	1.75	16	S
218 Mashburn Bee	A	.224	.241	.340	.349	.408	1.34	1.75	16	S
224 R-C Maxi	A	.224	.252	.354	.375	.431	1.576	2.048	14	S
22 Waldog	C	.224	.245	.431	.440	.441	1.375	1.820	14	S
219 Donaldson Wasp	A	.224	.251	.402	.418	.497	1.71	2.10	14	L
22 BR Remington	C	.224	.245	.450	.466	.468	1.502	2.00	14-16	S
22/30-30 Improved	A	.224	.253	.391	.422	.502	2.03	2.48	14	L
22-303	A	.224	.254	.4085	.455	?	2.031	2.48	14	L
220 Wotkyns-Wilson Arrow	G	.224	.261	.402	.443	.472	2.205	2.70	14	L
220 Weatherby Rocket	G	.224	.260	.430	.443	.472	2.21	2.68	14	L
22 CHeetah	C	.224	.250	.451	.466	.470	2.00	2.36	14	S
22-243	C	.224	.260	.454	.471	.473	2.045	V**	9-14	L
224 Clark	C	.225	.275	.455	.471	.473	2.237	3.075	9	L
22 Newton	C	.228	.256	.420	.471	.474	2.23	2.85	14-16	L
228 Ackley Mag.	C	.228	.265	.445	.470	.473	2.25	2.55	12	L
6mm-223	C	.243	.266	.354	.376	.378	1.76	2.26	10-12	S
6mm TCU	C	.243	.265	.354	.376	.378	1.74	2.25	12	S
6mm-47	C	.243	.267	.348	.372	.373	1.81	2.31	12	L
6mm-250 Walker	C	.243	.274	.420	.468	.470	1.91	2.21	12	L
6mm/30-30 Improved	A	.243	.275	.392	.422	.502	2.03	2.55	9-10	L
6mm-284	I	.243	.276	.475	.500	.473	2.165	2.80	9-10	L
25 Ugalde	C	.257	.275	.368	.373	.375	1.76	2.27	10	S
25 Krag	A	.257	.293	.415	.457	.540	2.24-2.31	V	10	L
25 Ackley Krag	A	.257	.293	.442	.457	.540	2.31	—	10	L
25/303	A	.257	.294	.400	.455	.541	2.22	3.05	10	L
250/3000 Improved	C	.257	.284	.445	.467	.473	1.91	2.52	10	L
257 Improved	C	.257	.288	.457	.471	.474	2.23	2.78	10	L
25-284	I	.257	.285	.495	.500	.473	2.17	2.80	10	L
6.5 TCU	C	.264	.292	.368	.376	.378	1.749	2.60	9-10	S
6.5/06-256/06	C	.264	.300	.439	.471	.473	2.50	3.30	9-10	L
6.5-06 Improved	C	.264	.300	.455	.471	.473	2.50	3.30	9-10	L
270 REN	B	.277	.295	—	.298	.350	1.29	—	10	S
270 IHSMA	C	.277	.305	.448	.471	.473	1.866	2.60	10	L
270 Savage	C	.277	.308	.450	.470	.470	1.88	2.62	10	L
7mm TCU	C	.284	.302	.350	.373	.375	1.74	2.28	10	S
7mm Int-R	A	.284	.311	.402	.422	.502	2.04	2.52	10	L
7mm IHSMA	C	.284	.312	.448	.471	.473	1.866	2.60	9-10	L
285 OKH	C	.284	.315	.442	.470	.472	2.55	3.35	10	L
7 STE	A	.284	.315	.353	.467	?	2.1	2.54	10	L
30 Kurz	C	.308	.334	.443	.470	.473	1.29	1.65	12	L
30 Herrett	A	.308	.329	.405	.421	.505	1.61	2.01	14	L
308x1.5-Inch	C	.308	.338	.450	.466	.470	1.50	2.05	10-12	L
30-30 Ackley Improved	A	.308	.328	.405	.422	.502	2.04	2.54	12	L
30 IHSMA	C	.308	.339	.448	.471	.473	1.866	2.60	10-12	L
30-06 Improved	C	.308	.340	.454	.470	.473	2.49	3.35	10	L
30-338 Winchester Magnum	E	.308	.340	.491	.513	.532	2.50	—	10	L
30-378	E	.308	.330	.560	.603	.603	2.90	3.865	10	L
30 Cody	C	.308	.34	.544	.589	.586	2.875	3.67	10	L
8mm-06	C	.323	.351	.441	.470	.473	2.47	3.25	9-10	L
333 OKH	C	.333	.365	.443	.470	.473	2.49	3.37	10	L
334 OKH	E	.333	.367	.480	.513	.530	2.86	3.65	10	L
338-223 Straight	D	.338	.362	—	.376	.378	1.41	2.25	10	S
338-378 KT	E	.338	.362	.560	.603	.603	2.90	3.865	10	L
338/50 Talbot	C	.338	.380	.748	.774	.782	3.76	4.25	10	**

WILDCAT CARTRIDGES (Continued)

Cartridge	Case type	Bullet dia.	Neck dia.	Shoulder dia.	Base dia.	Rim dia.	Case length	Ctge. length	Twist	Primer
9mm Action Express	J	.355	.390	.433	.435	.394	.866	1.152	18	S
9x25 Dillon	C	.355	.382	.423	.423	.424	0.99	1.26	10-12	SP
38-45 Hard Head	C	.355	.381	.475	.476	.476	.90	1.20	14	L
357 Auto Mag.	C	.357	.382	.461	.470	.473	1.298	1.60	18	LP
357/44 B&D	A	.357	.383	.454	.455	.515	1.28	1.55	14	L
357 Herrett	A	.358	.375	.405	.420	.505	1.75	2.10	14	L
35-30/30	A	.358	.378	.401	.422	.506	2.04	2.55	12-14	L
35 Ackley Magnum	E	.358	.388	.495	.513	.532	?	3.30	12	L
375 Whelen	C	.375	.403	.442	.470	.473	2.50	3.42	12	L
401 Powermag	B	.401	.425	—	.426	.483	1.29	1.64	18	L
400 Whelen	C	.405	.436	.462	.470	.473	2.49	3.10	16	L
416 Barnes	A	.416	.432	.484	.505	.608	2.112	2.95	14	L
445 Super Magnum	B	.432	.456	—	.457	.514	1.60	1.985	20	LP
451 Detonics	D	.452	.476	—	.476	.476	.942	1.17	16	L
458x1½" Barnes	F	.458	.481	—	.513	.532	V	—	14-16	L
458x2" American	F	.458	.478	—	.508	.532	2.00	2.60	14-16	L
45 Silhouette	B	.458	.477	—	.501	.600	1.51	1.97	18	L
450 Alaskan	A	.458	.480	.515	.547	.605	2.25	2.79	14	L
450 Howell	C	.458	.480	.515	.545	.534	2.5	3.25	14	L
450 Watts Magnum	E	.458	.481	—	.513	.530	2.85	3.65	14	L
475 Wildey	D	.475	.497	—	.500	.473	1.295	1.58	?	L
475 Linebaugh	B	.475	.495	—	.501	.600	1.50	?	?	L
475 Ackley/OKH	F	.474	.496	—	.508	.528	2.739	3.518	16-18	L
475 A&M Mag.	E	.475	.502	.560	.584	.533	2.90	3.75	14	L
500 Linebaugh	B	.510	.540	—	.553	.610	1.405	1.755	?	L
510 Nitro	B	.510	.535	—	.565	.665	3.245	4.185	?	L
585 Nyati	V	.585	.605	.650	.660	.586	2.79	3.525	?	L

A—Rim, bottleneck B—Rim, straight C—Rimless, necked D—Rimless, straight E—Belted, bottleneck F—Belted, straight G—Semi-rimmed, bottleneck J—Rebated, straight I—Rebated, bottleneck
Primer: S—Small rifle (.175"). L—Large rifle (.210"). LP—Large pistol (.210"). **—CCI-35/Vihtauori-110. **—50 Caliber Machinegun. SP—Small Pistol.

Chapter 5

PROPRIETARY CARTRIDGES

(Rifle and Handgun)

PAST EDITIONS OF CARTRIDGES OF THE WORLD listed *most* proprietary cartridges in Chapter 4: Wildcat and Proprietary Cartridges because it was felt there simply were not enough entries to justify a separate chapter. That is no longer true. Therefore, we have created a separate chapter for those cartridges which best fit the definition of "proprietary."

Proprietary cartridges are defined as those not *generally* available over-the-counter in typical sporting goods stores but which are proprietarily loaded and available from a single source. This is not true of typical wildcats. This significant distinction separates these from custom wildcat cartridges. For legal and other reasons, chambering specifications for many of these cartridges are proprietary, that is, not set up by SAAMI or other gunmaker groups. Further, proprietary cartridges are not generally chambered in over-the-counter rifles.

Thus, both proprietary cartridges and the guns chambered for that ammunition are special. These developments represent the culmination of efforts of serious gunsmiths to provide guns and ammunition that are a cut above the ordinary. The guns all represent a level of hand fitting and precision that is simply not feasible in run-of-the-mill guns. For those willing to pay a premium price, these offer the option of a factory firearm that is, in many cases, equal to the best of the fully-custom numbers in both fit and function. The cartridges used in these guns all represent an effort toward ballistic perfection; some are more successful than others.

There is a history of proprietary chamberings that was well developed in Great Britain beginning in the late 1800s and continuing until quite recently. Many of the more or less well known cartridges associated with such firms as Holland & Holland were strictly proprietary, by our current definition. They were designed to fill some specific need in the best possible way. An example would be the belted 375 Holland & Holland Magnum, which was designed to assure solid and controllable headspacing while facilitating function in bolt-action magazine guns. Considerations included functionality under extremely hot conditions and in situations when either the rifle chamber or ammunition might not be perfectly clean. The belt provided solid headspacing, despite a comparatively loose fit between the unfired cartridge and the rifle's chamber. Caliber and capacity were also chosen with consideration of the uses for which the chambering was intended—chiefly short- to medium-range shots on smaller species of dangerous African game.

Similarly, Sharps and many other stateside manufacturers had followed the same route during the era of the buffalo market hunter, developing accurate long-range cartridges and rifles for that use as well as long-range target competitions. Most of those cartridge developments are long-since obsolete; others moved into the mainstream and are still with us: the 44-100 Remington being an example of the former; the 38-55 Ballard (38-55 Winchester) an example of the latter.

Many cartridges we now think of as standard were once essentially proprietary. A good example is the 348 Winchester. Here was a cartridge designed by Winchester and commercially chambered in only one commercially available rifle—Winchester's Model 71. For many years Winchester was also the only source of 348 ammunition. Similarly, the 444 Marlin was designed for use in only Marlin's Model 444 and has never been commercially loaded by anyone other than Remington. While these are SAAMI standard chamberings, both are in some sense proprietary. In fact, practically every factory chambering that did not originate as a military cartridge was once proprietary.

Some of our standard cartridges, like the 35 Whelen, began as wildcats and because of popular demand were widely chambered but not commercially loaded. While these fine cartridges might seem to fit the proprietary bill, really they do not. Today the 35 Whelen and others are commercially loaded and chambered as mainstream offerings. They are too widely known and chambered to be considered in the same class as the cartridges in this chapter.

Most of the proprietary offerings detailed in this chapter followed a developmental path that is entirely similar

to the aforementioned historical British proprietary cartridges. Some custom gun manufacturer noted a void in the offerings from mainline arms manufacturers and then designed a cartridge to fill that void in the best way possible. The result was cartridge performance equal to any established cartridge of similar purpose while providing superior chambering, accuracy and handloading characteristics. A number of these cartridges offer a superior level of performance and do so without a belt. Most proprietary cartridges use the generally superior bottleneck configuration, either rimmed, rimless or rebated. However, we must add that the original purpose of the belt is still a valid consideration.

To dwell a bit longer on the subject of belted cartridges, their common usage in mainstream commercial magnum chamberings today reflects nothing more than the consequences of an historical incident: Western Cartridge Company's U.S. introduction of the 300 H&H Magnum as a U.S. factory offering in 1925. This event marked our forebears' first experience with a readily available large-diameter high-pressure cartridge case. It was natural for wildcatters to turn to this casing in their attempts to improve performance of existing rifles.

Folklore grew that the belt strengthened the case. This was simply untrue. It was nothing more than a design modification intended to facilitate solid headspacing with otherwise tolerant (loose) chambering specifications. In reality, the belt is nothing more than a wide rim with a groove cut in it. Calling this design feature a belt might make the cartridge sound sexy but that does not change what the belt is or what it does. In modern practice the belt has come to create several problems, especially for the handloader. Also, beltless cases generally feed better from box magazine rifles.

Availability of 404 Jeffery cases (a rimless case with a rim about the same diameter as the standard belted cases and much larger body diameter) has opened an entire genre of options for custom rifle manufacturers. Those companies can offer rifles chambered to take advantage of existing nonbelted cases, which provide superior ballistic potential. However, there is nothing magic about any proprietary cartridge. What makes these cartridges and guns special lies in the details: Semi-custom or fully custom chambering in guns featuring "handmade quality," which run-of-the-mill guns cannot match; better loading into and feeding from a box magazine; fulfillment of some esoteric or exceptional need.

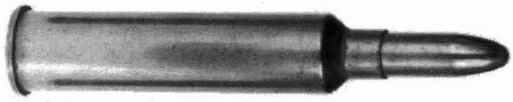
SSK Industries, for example, is filling a void in the long-range and hunting handgun market by perfecting wildcat chamberings for that esoteric application. Here, the designers look to the same concepts: Find a void, find the best cartridge design to fill that void and build guns to handle that combination in the best possible manner.

A-Square has gone one step further. They are now manufacturing an entirely new cartridge size. This larger based case provides a significant increase in usable capacity and, therefore, offers the potential of superior ballistics—no different from what Jeffery did when they introduced the 600 Nitro Express in 1903.

Finally, note that practically all of these cartridges incorporate what is now recognized as the standard Ackley case configuration. The basic concept combines a limited amount of case body taper combined with a relatively sharp shoulder. The exact degree of body taper, shoulder angle and the relationship of length to body diameter are of limited importance. Conversely, a case neck of sufficient length to properly hold the bullet is of recognized value. A perusal of the photographs in this section will suggest the general similarity of most of these designs.

We expect this section to grow in the next edition; it is a lively field. What you will see here represents a substantial portion of this class of cartridges, as it exists today.

226 JDJ



Historical Notes Designed by J.D. Jones in 1979, this cartridge is the 225 Winchester imroved. It provides a reduction in chamber pressure, which improves Contender functioning. Factory 225 Winchester ammunition sometimes gave extraction difficulties in Contender barrels. This design solved that problem while allowing the handloader to achieve 225 Winchester Thompson/Center performance without extraction difficulties. Factory 225 Winchester ammunition can be used.

General Comments As is typical of the JDJ line, this chambering offers ½ MOA accuracy potential with proper handloads. New barrels feature a 1-9" twist for use with heavier bullets, which are gaining popularity in the 22-caliber bore. Typical loads with the 40-grain bullet easily exceed 3600 fps from a 16-inch barrel. The Barnes 45-grain XBT is an effective choice for peccary size game species. However, use of this bullet requires special handloading techniques (deeper bullet seating and a reduction in powder charge).

226 JDJ Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
50 Hornady	IMR-3031	32.0	2864	905	SSK/SSK barrels only, max. load
55	IMR-4064	33.0	2808	960	SSK/SSK barrels only, max. load
55 Hornady SX	BL-C(2)	32.0	2637	849	SSK/SSK barrels only, max. load
60 Hornady SP	H-414	35.0	2732	995	SSK/SSK barrels only, max. load
63 Sierra	H-4831	38.5	2831	1115	SSK/SSK barrels only, max. load

6mm JDJ

Historical Notes This cartridge was designed and developed by noted gun writer and experimenter J.D. Jones, hence the "JDJ" designation. J.D. began development of his series of cartridges around 1978, and they are generally fired in barrels furnished by his company, SSK Industries. The purpose of this cartridge is to give added range and power to the Thompson/Center Contender pistol for the primary purpose of hunting varmints and small game. Some of J.D.'s cartridges have proved to be excellent metallic silhouette numbers, as well. The JDJ series cases are easy to make. All of the JDJ cartridges are proprietary and SSK neither sells reamers nor permits the reamer maker to duplicate any of the reamers. Should you desire to chamber a JDJ cartridge, contact SSK Industries, 421 Woodvue Lane, Wintersville, OH 43952.

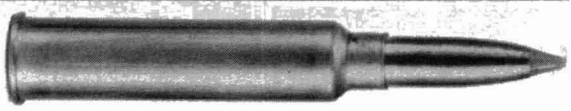
General Comments Based on the 225 Winchester case (itself a modified 30-30 case) this improved chambering provides ample capacity to deliver maximum 6mm velocity from handgun-length barrels (14-16 inches). Best applications are in handgun varminting and hunting of the smallest big game species. With the proper 70-75 grain bullet this chambering can deliver 300-yard varmint accuracy and trajectory. Heavier bullets can deliver adequate energy for smaller big game to, perhaps, 100 yards. The Barnes 75-grain and 85-grain X bullets offer serious hunting performance. However, the use of these bullets requires special handloading techniques (deeper bullet seating and a reduction in powder charge).

6 JDJ #2 Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
70 HP	RL-7	29	2845	1260	SSK
70 HP	AAC 2700	35	2540	1000	SSK
80 HP	RL-19	37	2370	1000	SSK

Note: These loads for use only in SSK barrels

257 JDJ



Historical Notes This is another cartridge designed and developed by J.D. Jones, hence the JDJ designation. J.D. began development of his cartridges around 1978 and they are generally fired in barrels furnished by his company SSK Industries. The purpose of these cartridges is to give added range and power to the Thompson/Center Contender pistol. Some of J.D.'s cartridges have also proved to be excellent metallic silhouette numbers. The JDJ cartridges are relatively easy to make. All of the JDJ cartridges are proprietary and SSK neither sells reamers nor has permitted the reamer maker to duplicate any of the reamers for the series. Should you desire a JDJ cartridge, contact SSK Industries, 421 Woodvue Lane, Wintersville, OH 43952.
General Comments Based on the 225 Winchester case (itself a modified 30-30 case) this improved chambering provides ample capacity to deliver near maximum quarter-bore velocity from handgun-length barrels (14-16 inches). Best applications are in handgun varminting and hunting of smaller big game species. A preferred bullet for the latter application is Nosler's 85-grain Ballistic Tip. This cartridge can launch this bullet to about 2900 fps with top loads with a 14-inch barrel. This combination is said to provide good terminal performance to 300 yards. One can use heavier bullets to deliver more energy. However, reduced velocity limits expansion and trajectory errors increase. Therefore, hunters should limit use of such bullets to shorter ranges. The 75-90 grain Barnes X bullets offer potential advantages for hunting applications. However, the use of these bullets requires special handloading techniques (deeper bullet seating and a reduction in powder charge).

257 JDJ Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
75 HP	H-322	30	2310	890	SSK
75 HP	W748	37	2645	1165	SSK
100 SP	W748	34	1405	1285	SSK
117 SP	IMR 4350	35	2195	1250	SSK

6.5mm Whisper

Historical Notes Designed by JDJ in the early 1990s. The design intent was application in sound-suppressed M-15s, bolt-action rifles and T/C Contenders. As with most of JDJ's line, this cartridge was designed at SSK Industries. This cartridge is based upon the 221 Remington case.
General Comments When combined with a very quick rifling twist this chambering will deliver 155-grain very low drag (VLD) bullets from SSK Contender barrels with 1/2 MOA accuracy at subsonic velocities (1040 fps). Lighter bullets can achieve a more typical muzzle velocity but such applications sacrifice the design purpose of this chambering.

6.5mm Whisper Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
100 Hornady	H-110	19.0	2300	1170	SSK barrels only, max., 10″ bbl.
120 Nosler BT	A-1680	19.0	2150	1230	SSK barrels only, max., 10″ bbl.
155	H-110	8.3	970	320	SSK/M-16 (gas port open)
155	H-110	8.3	1051	375	SSK/M-16 (gas port blocked)
155	A#9	8.4	1050	375	SSK/M-16 (gas port open)
155	A#9	8.4	1074	395	SSK/M-16 (gas port blocked)

6.5mm JDJ

Historical Notes Designed by J.D. Jones at SSK Industries, this is the 225 Winchester case improved and necked up to 6mm. The purpose was to provide a Contender hunting cartridge for smaller big game species.
General Comments Excellent bullets are available and with proper loads and in the hands of a good shot, this chambering is capable of 300-yard shots on smaller big game species. JDJ considers this to be one of the premier small-bore hunting choices. The Barnes 100-grain X offers superior terminal performance for hunting applications. However, the use of this bullet requires special handloading techniques (deeper bullet seating and a reduction in powder charge).

6.5mm JDJ Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
85 Sierra	IMR-4320	35.0	2644	1315	SSK/SSK barrel only, max., 14″ bbl.
100 Sierra HP	H-322	35.0	2714	1635	SSK/SSK barrel only, max., 14″ bbl.
120 Speer	IMR-4350	38.5	2467	1620	SSK/SSK barrel only, max., 14″ bbl.
125 Nosler Part	IMR-4320	33.0	2410	1610	SSK/SSK barrel only, max., 14″ bbl.
129 Hornady	IMR-4320	32.0	2342	1570	SSK/SSK barrel only, max., 14″ bbl.
140 Speer	IMR-4350	34.0	2097	1365	SSK/SSK barrel only, max., 14″ bbl.

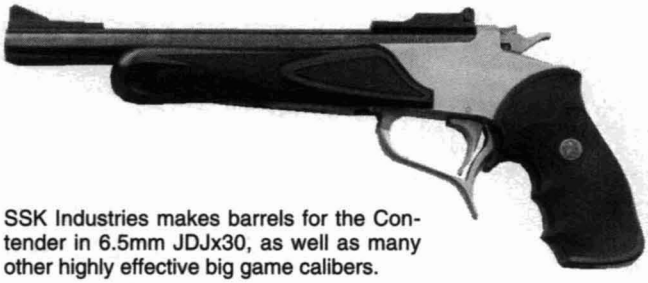
6.5mm JDJx30

Historical Notes This JDJ cartridge is the 7-30 Waters necked down to 6.5mm and improved. The purpose: To meet customer demand for improved performance with readily obtained cases. Since the 7-30 is based on the 30-30 Winchester, one can easily use those abundant cases to form this round. Other than the rim and a slight increase in length, this is essentially similar to the 6.5mm JDJ.

General Comments Excellent bullets are available and with proper loads and in the hands of a good shot, this chambering is capable of 300-yard shots on the smaller species. JDJ considers this to be one of the premier small-bore hunting choices. The Barnes 100-grain X offers superior terminal performance for hunting applications. However, the use of this bullet requires special handloading techniques (deeper bullet seating and a reduction in powder charge).

6.5mm JDJ x30 Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
85 Sierra	W-760	42.0	2710	1385	SSK/SSK barrel only, max., 14″ bbl.
120 Speer	W-760	40.0	2477	1635	SSK/SSK barrel only, max., 14″ bbl.
120 Nosler BT	IMR-4064	37.5	2580	1770	SSK/SSK barrel only, max., 14″ bbl.
129 Hornady	IMR-4350	40.7	2481	1760	SSK/SSK barrel only, max., 14″ bbl.
140 Sierra	IMR-4350	40.7	2376	1755	SSK/SSK barrel only, max., 14″ bbl.



SSK Industries makes barrels for the Contender in 6.5mm JDJx30, as well as many other highly effective big game calibers.

6.5mm JDJ #2

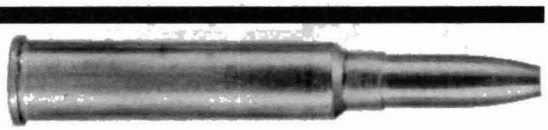
Historical Notes This JDJ cartridge is the 307 Winchester necked down to 6.5mm and improved. The purpose: Provision of a 6.5mm chambering based upon the 307 Winchester case.

General Comments Excellent bullets are available and with proper loads and in the hands of a good shot, this chambering is capable for 300-yard shots on the smaller species. In handgun-length barrels, ballistics are not significantly superior to the smaller 6.5mm JDJ cartridges to justify this chambering's existence. The Barnes 100-grain X offers superior terminal performance for hunting applications. However, the use of this bullet requires special handloading techniques (deeper bullet seating and a reduction in powder charge).

6.5mm JDJ #2 Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
120	IMR-4350	43.0	—	—	SSK/SSK barrel only, max. load
129	IMR-4350	42.0	—	—	SSK/SSK barrel only, max. load
140	IMR-4350	41.0	—	—	SSK/SSK barrel only, max. load

270 JDJ



Historical Notes This is another cartridge designed and developed by J.D. Jones around 1978. It is generally fired in barrels furnished by his company SSK Industries. The purpose of these cartridges is to give added range and power to the Thompson/Center Contender pistol for hunting medium game. All of the JDJ cartridges are proprietary and SSK neither sells reamers nor has permitted the reamer maker to duplicate any of the reamers for the series. Should you desire a JDJ cartridge, contact SSK Industries, 421 Woodvue Lane, Wintersville, OH 43952.

General Comments Based on the 225 Winchester case (itself a modified 30-30 case) this improved chambering provides ample capacity to deliver impressive velocity from handgun-length barrels, now commonly 14-16 inches. Best applications are in handgun varminting and hunting of smaller big game species, through mule deer size. For varminting, best performance is probably achieved with bullets of 100 grains. Either Hornady's or Sierra's 110-grain bullets would be good choices for pronghorn hunting. For hunting deer and similar sized game the best bullet weight is 130 grains. Heavier bullets can deliver more energy but expansion is unreliable. This chambering has seen considerable use in various types of handgun competition. This is ample testimony to the potential accuracy of this chambering and the quality of gunsmithing involved in such alterations. The Barnes 100-grain X offers superior terminal performance for hunting applications. However, the use of this bullet requires special handloading techniques (deeper bullet seating and a reduction in powder charge).

270 JDJ Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
100 SP	RL-7	34.0	2795	1735	SSK
110 SP	IMR 4320	36.0	2520	1555	SSK
130 SP	RL-7	30.7	2370	1625	SSK
130 SP	IMR 3031	35.0	2470	1765	SSK

7mm JDJ

Historical Notes This is another cartridge designed and developed by J.D. Jones. Its purpose is to give added range and power to the Thompson/Center Contender pistol for the primary purpose of hunting medium game. This cartridge has also proved to be excellent choice for metallic silhouette competition. All JDJ cartridges are relatively easy to make. They are proprietary and SSK neither sells reamers nor has permitted the reamer maker to duplicate any of the reamers for the series. Should you desire a JDJ cartridge, contact SSK Industries, 421 Woodvue Lane, Wintersville, OH 43952.

General Comments Based on the 225 Winchester case (itself a modified 30-30 case) this improved chambering provides ample capacity to deliver impressive velocity, especially with longer handgun-length barrels (14-16 inches). Best applications are in handgun hunting of smaller big game species, through mule deer size. Best hunting performance is probably achieved with bullets of 120-140 grains. Experts have tallied many kills at ranges exceeding 200 yards. Heavier bullets can deliver more energy but expansion is not reliable. Heavier bullets have proven effective in the handgun silhouette game. Bullets of about 150 grains are noted for effectiveness in toppling the silhouette ram target. This chambering has seen considerable use in various types of handgun competition. This is ample testimony to the potential accuracy of this chambering and the quality of gunsmithing involved in such alterations. The Barnes 100-grain and 120-grain X bullets offer superior terminal performance for hunting applications. However, the use of these bullets requires special handloading techniques (deeper bullet seating and a reduction in powder charge).

7mm JDJ Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
120 SP	H-4895	34.0	2480	1640	SSK
139-140 SP	IMR 4320	34.0	2145	1420	SSK
150-154 SP	IMR 4320	34.0	2110	1520	SSK

7mm Whisper

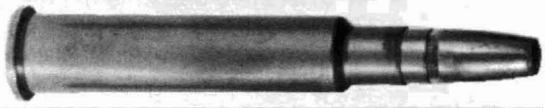
Historical Notes Designed by J.D. Jones in the early 1990s. The design intent was application in sound-suppressed M-15s, bolt-action rifles and T/C Contenders. As with most of the JDJ line, this cartridge was designed at SSK Industries. The 7mm Whisper is based upon the 221 Remington case.

General Comments When combined with a very quick rifling twist, this chambering will deliver heavy 7mm bullets from SSK Contender barrels with 1/2 MOA accuracy at subsonic velocities (1040 fps). Lighter bullets can achieve more typical velocity but sacrifice the design purpose of this chambering.

7mm Whisper

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
120	A-1680	20.0	2250	1345	SSK/Max. load, 16 1/2" barrel
140 Nosler BT	A-1680	18.5	2060	1315	SSK/Max. load, 16 1/2" barrel
168	A-1680	9.5	1056	415	SSK/Subsonic
168	N-540	12.6	1064	420	SSK/Subsonic
168	A-1680	15.5	1790	1195	SSK/Max. load, 16 1/2" barrel

7mm-30 JDJ



Historical Notes This JDJ cartridge is the 7-30 Waters improved. The purpose is to meet customer demand for improved performance with readily obtained cases. Since the 7-30 is based on the 30-30 Winchester, one can easily use those abundant cases to form this round. Other than the rim and a slight increase in length, this chambering is essentially similar to the 7mm JDJ.

General Comments Excellent bullets are available. With proper loads and in the hands of a marksman, this chambering is capable for 300-yard shots on the smaller species. Significantly, it delivers substantially more energy than the 6.5mm JDJ offerings. Despite a shorter barrel, this improved cartridge will drive a 140-grain bullet at about the same velocity as the 7-30 Waters will drive the 120-grain bullet. The Barnes 100-grain and 120-grain X bullets offer superior terminal performance for hunting applications. However, use of these X bullets requires special handloading techniques (deeper bullet seating and a reduction in powder charge).

7mm JDJ #2

Historical Notes This JDJ cartridge is the 307 Winchester necked down to 7mm and improved. The purpose was to provide a 7mm chambering based upon the 307 Winchester case.

General Comments Excellent bullets are available for this cartridge. With proper loads and in the hands of a good shot, this chambering is capable of 300-yard shots on the smaller big game species. In handgun-length barrels, ballistics are not significantly superior to the smaller 7mm JDJ offerings to justify this chambering's existence. The Barnes 100-grain and 120-grain X bullets offer superior terminal performance for hunting applications. However, use of the X bullets requires special handloading techniques (deeper bullet seating and a reduction in powder charge).

7mm JDJ #2 Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
100 Hornady	W-760	47.0	2532	1420	SSK, max., 14" bbl.
115 Speer	W-760	46.0	2453	1535	SSK, max., 14" bbl.
139 Hornady	H-4350	45.0	2369	1730	SSK, max., 14" bbl.
140 Nosler SB	H-414	43.0	2257	1580	SSK, max., 14" bbl.
140 Nosler SB	W-760	44.0	2303	1645	SSK, max., 14" bbl.

7mm JRS

Historical Notes The 7mm JRS was designed by Jon R. Sundra. It is based on the 280/7mm Express Remington case, but is more than an Improved 280 in that it cannot be made by fireforming 280 Remington ammo in a 7mm JRS chamber. Attempting to do so is dangerous because the 7mm JRS pushes a 35-degree shoulder more than .050-inch forward of where it would be on the 280 Improved. Therefore, headspace is increased commensurately.

To give some idea of relative case capacities, the 280 Remington/7mm Express holds about 63 grains of water to the base of the neck; the 280 RCBS holds about 66 grains; the 7mm JRS about 70.5 grains (Norma brass). The 7mm Remington Magnum holds about 82 grains.

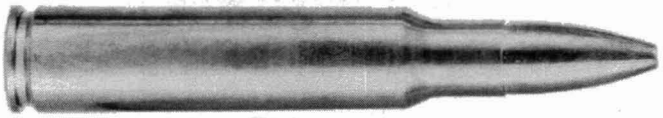
General Comments Chamber reamers for the 7mm JRS are made by Clymer Mfg. of Rochester, MI, reloading dies by Hornady. Sundra found that very little load development work was necessary with this cartridge. Norma MRP and Reloder 22 are the best powders, with H-4831 and IMR 4831 and IMR 7828 coming in a close second. Other slow burners like IMR 4831 and H-450 also do well. Depending on individual rifle and brass (Remington, Norma or Winchester), maximum loads range between 60.5 to 63.5 grains of RL22 with a 150-grain Nosler. Velocity has ranged from 3060 to 3120 fps in various barrels of 23.5 to 24 inches.

The 7mm JRS is chambered by E.R. Shaw of Bridgeville, PA. Standard length actions like the Ruger 77 and Mauser (commercial or military) can be used. To take full advantage of case capacity, the loads assume bullet bases seated no deeper than the shoulder (overall length of $3^{7}/_{16}$-inch with a 154-grain Hornady, $3^{3}/_{8}$-inch with a 150 Nosler). Sundra recommends chambers be throated so a dummy round with either of the above bullets will have a $^{1}/_{16}$ leade. To accommodate cartridges of this length, you'll need a Model 70, Remington 700 or long Sako action. Grayback Wildcats of Klamath Falls, OR offers fireformed (once fired) brass for the 7mm JRS. Similar "pushed shoulder '06-based" improved cartridges exist in 30, 338, 35 and 375 calibers. All are very good, but those in otherwise factory chamberings (280, 30-06 and now the 35 Whelen) create serious safety concerns. Any rifle thus chambered will chamber the factory cartridge of the proper bore diameter which will have enough headspace to separate and destroy the gun, perhaps, even the shooter and bystanders.

7mm JRS Load Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
145 SP	RL22	63.0	3130	3155	Jon Sundra
154 SP	RL22	61.5	3020	3120	Jon Sundra

7mm Dakota



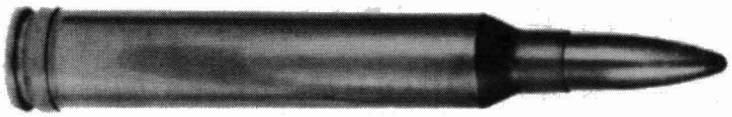
Historical Notes The 7mm Dakota is based on the 404 Jeffrey case. This case is long enough to create standard- or magnum-length cartridges. In any given cartridge length, use of the non-belted 404 Jeffrey case offers about 15 percent more case capacity, compared to the standard belted-magnum. Because maximum case diameter is slightly larger than the standard belted-magnum, rechambering to 7mm Dakota often reduces magazine capacity by one cartridge.

General Comments This cartridge functions properly through standard-length (3.35″) actions. Guns chambered for the 7mm Remington Magnum are easily converted to 7mm Dakota with only rechambering and slight bolt face alterations. This chambering offers capacity similar to the much longer 7mm STW (3.65″). If loaded to similar pressures with appropriate powders, the 7mm Dakota offers a useful velocity advantage over the 7mm Remington Magnum. With the heaviest bullets, this advantage might be significant. For those interested in getting all the performance possible from the 7mm bore, the 7mm Dakota is worth considering. The 7mm STW has a slight capacity advantage but the ballistic difference is marginal and the STW does require a longer action. Finally, because this cartridge headspaces between the shoulder and the bolt, it is easier to get it to line up properly in the rifle's chamber. This can lead to superior accuracy. It is worth noting that there are no disadvantages to the basic rimless bottleneck design.

7mm Dakota Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
140	IMR-4831	73.0	3355	3495	Dakota/Maximum load
140	H-4831	76.0	3295	3375	Dakota/Maximum load
140	RL-22	77.0	3365	3515	Dakota/Maximum load
140	IMR-7828	80.0	3421	3645	Dakota/Maximum load
160	IMR-4831	68.0	3064	3335	Dakota/Maximum load
160	H-4831	74.0	3156	3535	Dakota/Maximum load
160	RL-22	74.5	3212	3660	Dakota/Maximum load
160	IMR-7828	75.0	3171	3570	Dakota/Maximum load

7mm Shooting Times Westerner (7mm STW)



Historical Notes This wildcat chambering was designed in 1989 by Layne Simpson, a gun writer for *Shooting Times* magazine. This design includes a slight decrease in body taper, compared to the original 8mm Remington Magnum case. This provides clean rechambering of 7mm Remington Magnum chambers. Throat design was also changed to include a straight section. This improves accuracy potential. This cartridge takes advantage of the 3.65-inch magazine length of the long-action Remington Model 700.

General Comments The 7mm STW has impressive velocity potential and can deliver good ballistics with a variety of bullets and powders. Currently there is a paucity of data available but A-Square provides ammunition and data for a few of the more popular bullet weights and types. It is likely that the slowest handloader powders would show improved performance in this chambering. We can only speculate that barrel life would be very limited, especially for those who are incautious about barrel cooling between shots or proper cleaning.

7mm Shooting Times Westerner Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
140 Nosler BT	H-4831	75.0	3234	3250	A-Square/Max.
140 Nosler SP	RL-22	79.0	3410	3615	A-Square/Max.
140 Nosler BT	IMR-7828	83.0	3413	3620	A-Square/Max.
160 Nosler Part.	RL-22	72.0	3084	3380	A-Square/Max.
160 Nosler Part.	H-4831	75.0	3200	3635	A-Square/Max.
160 Nosler Part.	IMR-7828	77.0	3211	3660	A-Square/Max.
160 Sierra SBT	IMR-7828	75.0	3093	3400	A-Square/Max.
160 Sierra SBT	RL-22	75.5	3115	3445	A-Square/Max.
160 Sierra SBT	H-4831	75.0	3138	3500	A-Square/Max.
140 Nosler SBT	FL		3450	3700	A-Square/Max.
160 Sierra SBT	FL		3250	3750	A-Square/Max.
160 Nosler SBT	FL		3250	3750	A-Square/Max.

7mm Canadian Magnum

Historical Notes This cartridge was developed about 1989 by North American Shooting Systems (NASS) and is similar to the 7mm Imperial Magnum. This design features a slightly rebated rimless bottleneck case. The design intent was to provide the maximum powder capacity available in a standard action with minimal gunsmithing. (Without deepening the magazine well slightly, magazine capacity is usually reduced by one round.) Bolt face alteration is not necessary. Cartridge feeding and headspacing characteristics are improved.

General Comments The Canadian Magnum series is similar to the Dakota cartridge family both in design and purpose. However, Canadian Magnums all take advantage of the entire 3.65″ magazine length of the long-action Remington M700 and similar rifles. On these cartridges, body diameter is significantly larger than the standard belted-magnum (0.544″ versus 0.513″ at the base). Rechambering of nominal belted-magnums with the same bore diameter is generally quite simple, requiring no other rifle alterations. For any given case length, capacity is fully 15 percent greater than can be achieved with the belted version. Body taper is minimal and the shoulder is comparatively sharp. However, neck length is sufficiently generous to provide good bullet purchase for hunting ammunition. Performance is commensurate with the generous capacity and pressures used in these loadings. We must note that one should expect this chambering to be rather hard on barrels.

7mm Canadia Magnum Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
140	H-4831	82.0	3426	3645	NASS/Maximum load
140	RL-22	85.0	3523	3855	NASS/Maximum load
140	IMR-7828	86.5	3480	3760	NASS/Maximum load
160	RL-22	82.0	3264	3780	NASS/Maximum load
160	IMR-7828	83.5	3257	3765	NASS/Maximum load
160	H-1000	87.0	3288	3835	NASS/Maximum load
175	IMR-7828	79.0	3018	3540	NASS/Maximum load
175	H-1000	83.0	3098	3725	NASS/Maximum load
175	H-870	93.0	3109	3750	NASS/Maximum load
140	FL		3525	3860	NASS

7.62 Micro-Whisper

Historical Notes Designed by J.D. Jones at SSK Industries in the early 1990s, this is simply the 30 Luger case adapted to use 30-caliber rifle bullets. Case dimensions are identical but chambering specifications are different. The design intent was for an extremely quiet sound-suppressed load that would shoot 180-grain bullets to about 1040 fps.

General Comments This cartridge provides much better subsonic performance, compared to the 308 Winchester. Civilian applications are limited. Nevertheless, performance is startling. For those looking for minimal recoil and noise for short-range use, this is an interesting choice.

7.62 Micro-Whisper Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
93 Norma SP	A#9	11.5	1762	640	SSK/Max. load, 8¾″ barrel
150 Hornady FMJ	H-110	7.0	1018	345	SSK/Subsonic, 8¾″ barrel
150 Hornady FMJ	A#9	8.0	1259	525	SSK/Max. load, 8¾″ barrel
168 Hornady Match	A#9	7.1	1096	445	SSK/Subsonic, 8¾″ barrel
180 Speer	H-110	7.0	1025	420	SSK/Subsonic, 8¾″ barrel
180 Speer	H-110	8.0	1161	535	SSK/Max. load, 8¾″ barrel

7.63 Mini-Whisper

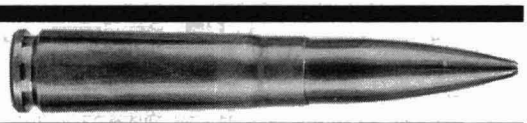
Historical Notes Designed by J.D. Jones at SSK Industries in the early 1990s, this is simply the 30 Mauser case adapted to use 30-caliber rifle bullets. Case dimensions are indentical but chambering specifications are different. The design intent was for an extremely quiet sound-suppressed load that would shoot 200-grain bullets to about 1040 fps.

General Comments This cartridge provides much better subsonic performance, compared to the 308 Winchester. Civilian applications are limited. Nevertheless, performance is startling. For those looking for minimal recoil and noise for short-range use, this is an interesting choice.

7.63 Mini-Whisper Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
93 Norma	Clays	7.5	1727	615	SSK/Max. load, 7″ barrel
110 Speer Carb	Clays	7.5	1588	615	SSK/Max. load, 7″ barrel (1.415″ OAL)
110 Speer Carb	A#7	11.4	1742	740	SSK/Max. load, 7″ barrel (1.415″ OAL)
150 Hornady FMJ	A#2	4.5	1025	350	SSK/Subsonic, 7″ barrel
150 Hornady FMJ	A#9	10.5	1445	695	SSK/Max. load, 7″ barrel
168 Hornady Match	A#2	5.2	1031	395	SSK/Subsonic, 7″ barrel
168 Hornady Match	HP-38	5.7	1035	395	SSK/Subsonic 7″ barrel

300 Whisper



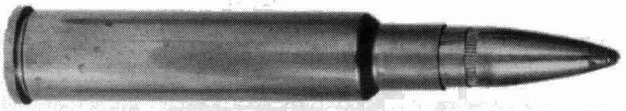
Historical Notes The 300 Whisper is a new concept in the development of small case capacity, highly efficient cartridges combined with bullets of extreme ballistic efficiency. This is a state-of-the-art, special purpose design by J.D. Jones of SSK Industries based on a 221 Remington case necked up to 308 caliber. It is intended to fire extremely heavy, accurate, ballistically efficient bullets at sub-sonic velocities in suppressed weapons. It delivers more energy more accurately than any existing sub-sonic round at 200 yards. In addition, it has interesting supersonic capabilities above 1160 fps, thus offering greater versatility than any other cartridge capable of performing in these vastly differing arenas. Because powder charges are very small, the size of the suppressor is proportionately smaller.

General Comments Bullet weights from 100 to 240 grains may be used. Best accuracy results are obtained with heavier bullets. For silhouette shooting, 220- to 240-grain bullets are best. With 125- or 150-grain projectiles, it is outstanding for deer and other medium game, offering better performance than the 30-30 Winchester in the T/C Contender pistol with less than half the felt recoil of the 30-30. In suppressed weapons, noise can be reduced to less than that of a 177-caliber spring-air rifle. Loading data and dies are available from SSK Industries, Wintersville, OH.

300 Whisper Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
125 Nosler BT	H-110	20.6	2283	1445	SSK/Maximum rifle load, AR-15
150 Nosler BT	H-110	18.0	2073	1430	SSK/Maximum rifle load
165	A-1680	10.3	1013	375	SSK/Subsonic, AR-15
125 NoslerBT	H-110	20.6	2283	1445	SSK/Maximum load, AR-15
125 Nosler BT	H-110	18.0	2014	1350	SSK/Maximum load, AR-15
165	A-2015BR	12.6	1046	400	SSK/Subsonic, AR-15
168	A-1680	20.2	1906	1355	SSK/Maximum load, rifle
200	A-2015BR	12.0	1007	450	
220	A#9	8.5	1013	500	SSK/Subsonic, AR-15
250	H-110	8.6	980	530	SSK/Subsonic, AR-15

309 JDJ



Historical Notes This cartridge was designed and developed by J.D. Jones about 1978, hence the JDJ designation. It is generally fired in barrels furnished by SSK Industries. Its purpose is to give added power and range to the T/C Contender pistol for hunting medium game. The JDJ series of cartridges are easy to make. All of the JDJ designs are proprietary rounds and SSK neither sells reamers nor allows the reamer maker to duplicate the reamers for sale. Should you desire to chamber a JDJ cartridge, contact SSK Industries of Wintersville, OH.

General Comments The 309 JDJ is based on a 444 Marlin case necked down to 30-caliber in a 308 full-length sizing die and then fire-formed to obtain the sharp shoulder. This cartridge offers about 2600 fps with a 125-grain bullet, 2450 fps with a 150-grain bullet, and 160-grainers can be driven at 2400 fps. For general use, the 165-grain bullets are an excellent choice. J.D. Jones has taken large plains game in Africa with this round. In a pinch, it would do for elk with 180-grain bullets, but in my opinion this is stretching things quite a bit. The 309 is easy to shoot and can be extremely versatile. With the proper load and bullet and sighted to shoot about 3 inches high and 100 yards, it will be dead on at about 225-250 yards. It can be very effective on moderate sized game to that range, with the right bullet and a shooter possessing adequate skills.

309 JDJ Loading Data

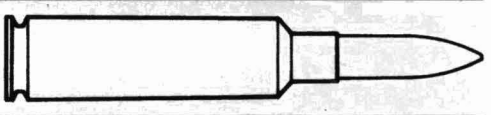
Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
150 SP	IMR 4320	41.0	2010	1360	SSK
150 SP	IMR 4350	43.0	2370	1875	SSK
165 SP	IMR 4350	49.0	2200	1775	SSK
180 SP	IMR 4350	49.0	2135	1825	SSK

30 American

Historical Notes The 30 American is not actually a cartridge. It is, in fact, a specially-annealed 30-30 Winchester case with a small primer pocket and small flash hole, made to match-grade tolerances by Federal Cartridge Company. The idea for this originated with David D. Brennan (editor of *Precision Shooting*), Bill Diefenderfers, David Tooley, et al. The purpose of the special case is to provide the basis for forming a series of wildcat cartridges that are variations of the original 22 Donaldson Wasp. There are 6mm, 25, 7mm and 30 caliber versions in the works. All this came about in 1986 and was written up in the 1988, 42nd edition of *Gun Digest* (pp. 154 through 160).

General Comments The idea behind the 30 American is to field a benchrest cartridge that will beat the 22 and 6mm PPC cartridges developed by Dr. Lou Palmisano and Ferris Pindell. Along the way it will also provide match-grade brass for making up some of the other wildcats based on the 30-30 case, such as the 30 and 357 Herrett plus a host of others. Brass is no longer available.

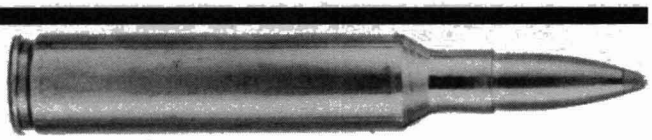
300 Phoenix



Historical Notes This is a proprietary cartridge developed by G. McMillan & Co. of Phoenix, Arizona in 1991. The cartridge is based on the 416 Rigby case necked down to 308-caliber and was available as an optional chambering for their custom-made bolt-action sporting rifles. It is no longer offered.

General Comments The 300 Phoenix was made by trimming the 416 Rigby case to 2.5 inches in length. When loaded with a 250-grain bullet, the overall length is 3.600 inches which will work through a standard-length bolt action. Hoped for ballistics were very impressive, with a 180-grain bullet delivering 3600 fps at the muzzle and a 250-grain at 3100 fps. This would have been an outstanding long-range 30-caliber round suitable for any North American big game at appropriate ranges. However, testing showed that these results were not obtainable. For example, velocities that could be gotten with the 250-grain bullet proved to be only 2800 fps, rather than the intended 3100 fps. Thus, the 300 Phoenix was not a success. It is an example of a wildcat that did not live up to its promise. Experimenters do learn from these exercises, so the 300 Phoenix deserves a place in this book as an example of this lesson.

300 Dakota



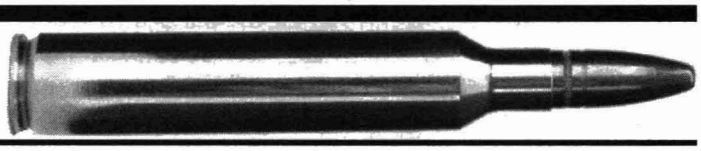
Historical Notes The 300 Dakota is based on the 404 Jeffrey case. In this application, the case is shortened to create a 30-06 length cartridge (3.35″). The 300 Dakota's rim is slightly larger than a standard belted-magnum case so rechambering must also include a slight bolt face alteration. In any given length cartridge, use of the non-belted 404 Jeffrey case provides about 15 percent more case capacity than the standard belted-magnum case. Because maximum case diameter is slightly larger (.544″ versus .532″), magazine capacity is usually reduced by one cartridge; however, minor gunsmithing alterations will remedy that situation.

General Comments The 300 Dakota functions properly through standard-length actions (3.35″). This cartridge provides a significant capacity advantage over the 300 Winchester Magnum and comes close to duplicating capacity and performance of the much longer 300 Weatherby Magnum. Rechambering to 300 Dakota is possible in most rifles originally chambered for any standard belted 300 Magnum. One thereby gains the improved feeding and accuracy advantages offered by this non-belted case. If loaded to similar pressures with appropriate powders, the 300 Dakota offers a slight velocity advantage over the 300 Winchester Magnum. With the heaviest bullets, this advantage might be significant. For those interested in an all-around 30-caliber hunting cartridge, the 300 Dakota is worth considering. The 300 Weatherby does have a slight capacity advantage but the ballistic difference is marginal and Weatherby's cartridge requires a longer action.

300 Dakota Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
165	IMR-4350	77.0	3247	3860	Dakota/Maximum load
165	H-4831	82.0	3283	3945	Dakota/Maximum load
165	RL-22	83.0	3307	4000	Dakota/Maximum load
165	IMR-7828	85.0	3277	3930	Dakota/Maximum load
180	H-4831	77.5	3114	3875	Dakota/Maximum load
180	RL-22	81.0	3249	4215	Dakota/Maximum load
180	IMR-7828	82.0	3221	4140	Dakota/Maximum load
200	H-4831	77.5	2965	3900	Dakota/Maximum load
200	RL-22	78.0	3052	4130	Dakota/Maximum load
200	IMR-7828	80.5	3026	4060	Dakota/Maximum load
200	H-1000	82.5	2986	3955	Dakota/Maximum load

300 Canadian Magnum



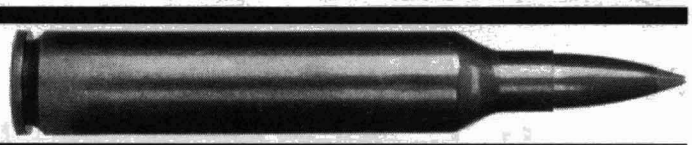
Historical Notes This cartridge was developed about 1989 by North American Shooting Systems and is somewhat similar to the 300 Imperial Magnum. This design features a slightly rebated rimless bottleneck case. The design intent was to provide the maximum powder capacity available in a standard action with minimal gunsmithing. (Without deepening the magazine well slightly, magazine capacity is usually reduced by one round.) Bolt face alteration is unnecessary. Cartridge feeding and headspacing characteristics are improved.

General Comments The Canadian Magnum series is similar to the Dakota cartridge family both in design and purpose. However, this cartridge takes advantage of the entire 3.65″ magazine length of the long-action Remington M700 and similar rifles. On the Canadian Magnums, body diameter is significantly larger than the standard belted-magnum (0.544″ versus 0.513″ at the base). Rechambering of nominal belted-magnums with the same bore diameter is generally quite simple, requiring no other rifle alterations. For any given case length, capacity is about 15 percent greater than can be achieved with the standard belted-magnum case. Body taper is minimal and the shoulder is comparatively sharp. However, neck length is sufficiently generous to provide good bullet purchase for hunting ammunition. Performance is commensurate with the generous capacity and pressures used in these loadings. Barrel life is a consideration—there are no free lunches.

300 Canadian Magnum Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
165	H-4831	86.0	3231	3820	NASS/Maximum load
165	RL-22	87.0	3434	4315	NASS/Maximum load
165	IMR-7828	89.5	3466	4395	NASS/Maximum load
180	RL-22	83.0	3354	4490	NASS/Maximum load
180	IMR-7828	87.5	3367	4525	NASS/Maximum load
180	H-1000	92.0	3163	3995	NASS/Maximum load
200	RL-22	79.0	3053	4135	NASS/Maximum load
200	IMR-7828	82.0	3093	4245	NASS/Maximum load
200	H-870	95.0	3070	4180	NASS/Maximum load
180	FL		3425	4685	NASS

300 Pegasus

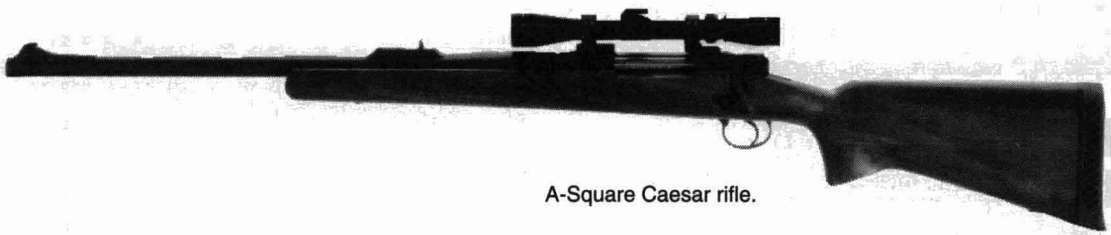


Historical Notes This 1994 chambering is based upon an entirely new case that features a 0.580″ head size. The rim is essentially identical to the 378 Weatherby case but there is no useless belt. Therefore, case capacity is substantially greater for any given cartridge length. This standard rimless bottleneck design also facilitates proper chambering with tight tolerances. Design intent was acceleration of 180-grain hunting bullets to an excess of 3500 fps without exceeding about 62,000 pse (piezo transducer pressure units)—a typical pressure for modern cartridges. The 300 Pegasus succeeded in this.

General Comments This cartridge seems a good choice for those who feel they need a flat-shooting round that can deliver substantial energy to targets at long range. Rifles originally chambered for the 378 and 460 can be rebarreled to accept this cartridge. The slowest handloader powders now available offer the best velocity potential. In a typical rifle, recoil would have to be classed as a bit heavy.

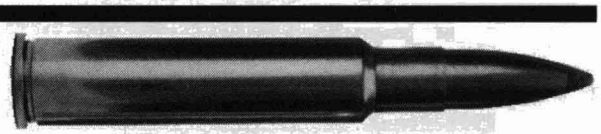
300 Pegasus Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
150 Nosler BT	IMR-7828	106.0	3642	4420	A-Square/Maximum load
150 Nosler BT	RL-22	103.0	3675	4495	A-Square/Maximum load
150 Nosler BT	A-8700	130.0	3703	4565	A-Square/Maximum load
180 Nosler BT	RL-22	103.0	3371	4540	A-Square/Maximum load
180 Nosler BT	IMR-7828	106.0	3413	4655	A-Square/Maximum load
180 Nosler BT	A-8700	125.0	3456	4775	A-Square/Maximum load
180 Nosler BT	H-870	123.0	3505	4910	A-Square/Maximum load
150 Nosler BT	FL		3780	4760	A-Square
180 Nosler BT	FL		3523	4960	A-Square



A-Square Caesar rifle.

8mm JDJ



Historical Notes Designed by J.D. Jones at SSK Industries about 1980, this chambering is the 444 Marlin case necked down to 8mm with no other changes. The design intent was a Thompson/Center chambering that would surpass 35 Remington rifle ballistics.

General Comments With the 200-grain Nosler Partition loaded to top handgun velocity (2100 fps), this chambering can deliver substantial energy within the useful range. However, the Barnes 180-grain X can deliver superior terminal performance but its use requires special handloading techniques (deeper bullet seating and a reduction in powder charge.) Effectiveness on the lightest species is improved with Hornady's 150-grain bullet at 2400 fps muzzle velocity.

8mm JDJ Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
150 Hornady	IMR-4320	47.5	2286	1740	SSK/Maximum SSK barrels only, 14″ barrel
150 Hornady	H-322	47.5	2420	1950	SSK/Maximum SSK barrels only, 14″ barrel
170 Hornady	IMR-4320	47.5	2254	1915	SSK/Maximum SSK barrels only, 14″ barrel
170 Hornady	A-2520	49.5	2373	2125	SSK/Maximum SSK barrels only, 14″ barrel
200 Speer	H-4350	52.0	2192	2130	SSK/Maximum SSK barrels only, 14″ barrel
225	H-4350	51.5	2131	2265	SSK/Maximum SSK barrels only, 14″ barrel

338 Whisper

Historical Notes Designed by J.D. Jones at SSK Industries in the early 1990s, this chambering is the 7mm BR opened up to accept .338" bullets with no other changes. JDJ's intention was the delivery of significant long-range energy from a low-noise rifle. This combination certainly succeeded in attaining that goal.

General Comments Usually this cartridge is chambered in rebarreled 308 Winchester rifles. With a quick rifling twist, 300-grain Sierra Matchkings will deliver superb accuracy past 600 yards. Long-range penetration and energy are surprising.

338 Whisper Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
200 Nosler BT	H-4227	11.5	1075	510	SSK/Subsonic, 12" barrel
200 Nosler BT	HP-38	8.8	1077	515	SSK/Subsonic, 12" barrel
250 Nosler BT	HP-38	9.6	1029	585	SSK/Subsonic, 12" barrel
250 Nosler BT	N-350	10.8	1040	600	SSK/Subsonic, 12" barrel
300 Nosler BT	N-350	12.3	1040	720	SSK/Subsonic, 12" barrel
300 Nosler BT	HP-38	10.8	1050	735	SSK/Subsonic, 12" barrel

338-06

Historical Notes Back in 1945-1946 Charles O'Neil, Elmer Keith and Don Hopkins developed a cartridge they named the 333 OKH which was based on the 30-06 case necked-up to 333-caliber. It was a very good big game cartridge, but today it suffers from the lack of good, readily available .333-inch diameter bullets. When the 338 Winchester Magnum was introduced in 1958, it was followed immediately by a variety of commercial .338-inch diameter bullets. Shortly thereafter, several individuals at different places conceived the idea of either altering their 333 OKHs or necking-up the 30-06 to accept .338-inch diameter bullets. Any difference in performance between the 333 OKH and the 338-06 is purely academic and almost invisible. The latter uses a standard commercial diameter bullet readily available through handloading supply dealers, which is a big advantage. The two cartridges are so nearly alike that one can use loading data from the 333 OKH in the 338-06 with virtually the same results.

General Comments Since .338-inch diameter bullets are available in weights varying from 200 grains up to 300 grains, this makes the 338-06 a versatile and effective big game cartridge. Its predecessor, the 333 OKH, earned a good reputation on heavy game using 275-grain bullets and the same would be true of the 338-06. Speer produces a 275-grain bullet for the 338 Winchester Magnum that should work equally well in the 338-06 for elk, moose or brown bear. The performance of the 338-06 is very similar to the 35 Whelen except that the .338-inch diameter bullets offer somewhat better sectional density—.313 for the Sierra 250-grain .338-inch Spitzer boattail, as opposed to .279 for the Speer .358-inch spitzer bullet of the same weight. Also, many of the available 35-caliber rifle bullets are flat nosed for use in lever-action or pump-action rifles with tubular magazines. This type of bullet loses velocity more rapidly than the pointed- or spitzer-type. There is no great difference in killing power between the two, but the user of 35-caliber rifles has a much larger variety of commercial bullets and bullet moulds to choose from, plus the advantage of being able to use jacketed or cast .357-inch handgun bullets for light loads or varmint shooting. In summary, the 338-06 is an excellent big game cartridge, but not as flexible or as versatile as the 35 Whelen in the matter of available bullet types. The 338-06 Ackley Improved can produce about 150 fps more muzzle velocity at the same maximum pressure and is a much better choice for other reasons: improved case life, accurate headspacing and extraction ease.

338-06 Loading Data

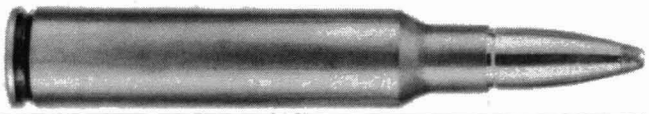
Bullet (grs.)	Powder/grs.		MV	ME
200 SP	IMR 3031	48.0	2465	2700
200 SP	IMR 4320	54.0	2610	3020
250 SP	IMR 4064	56.0	2585	3730
250 SP	IMR 3031	47.0	2370	3130
275 SP	IMR 4350	55.0	2305	3250
275 SP	IMR 4895	50.0	2275	3165

338 JDJ

Historical Notes Like several other chamberings based upon the same basic case (444 Marlin), this cartridge was designed and developed by J.D. Jones about 1978. Barrels in this chambering are furnished by SSK Industries. The purpose is to provide increased power and range for T/C Contender and other single-shot hunting handguns. Like most of the JDJ line, these cases are easily formed from the parent case. Chambering dimensions are proprietary.

General Comments Based on the 444 Marlin necked down, this chambering provides ample capacity and bullet area to produce impressive muzzle energy, especially with longer handgun-length barrels (14-16 inches). With bullets of only slightly lighter weight, the 338 JDJ offers muzzle velocities similar to the 375 Winchester when fired from a rifle. Since this cartridge uses spitzer bullets, performance at normal hunting ranges is significantly superior to the parent 444 Marlin's rifle ballistics. Conventional bullets of 180-120 grains are good choices. However, the Barnes 160-grain X can deliver superior terminal performance, reduced recoil and a flatter trajectory but requires special handloading techniques (deeper bullet seating and a reduction in powder charge). With proper hunting bullets loaded to maxmimum velocity (necessary to assure proper terminal performance) recoil can be rather stiff.

330 Dakota

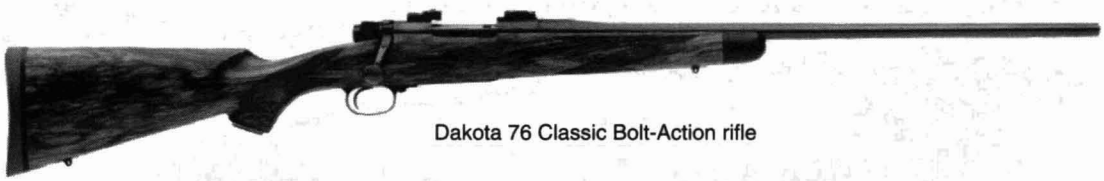


Historical Notes The 330 Dakota is based upon a shortened version of the rimless bottleneck 404 Jeffrey case. The 330 Dakota is dimensioned to function through a standard-length action (3.35″). The design intention was to offer a factory alternative to the 338 Winchester Magnum providing 340 Weatherby performance. This also offers 338 Winchester Magnum rifle owners a simple conversion to improve ballistics and cartridge feeding characteristics.

General Comments Like the 7mm and 300 Dakota cartridges, the 330 Dakota functions properly through 30-06 length (3.35″) actions. This cartridge provides a significant case capacity advantage over the 338 Winchester Magnum (about 15 percent) and comes very close to duplicating capacity and performance of the much-longer 340 Weatherby Magnum. Most rifles chambered for the 338 Winchester Magnum are easily converted to 330 Dakota. This conversion offers advantages in function, accuracy and ballistics because of the non-belted case. If loaded to similar pressures with appropriate powders the 330 Dakota should produce fully 5 percent more velocity (10 percent more energy), compared to Winchester's 338 Magnum. With the heaviest bullets the advantage is more significant. For those interested in a hunting cartridge geared to larger big game, the 330 Dakota is a serious contender. Combined with the right bullets, this flat-shooting cartridge can deliver more energy to targets a quarter-mile away than factory 270 ammunition produces at the muzzle! The 340 Weatherby does have a slight capacity advantage but the ballistic difference is marginal and Weatherby's cartridge requires use of a longer action. For those wanting maximum performance from the .338″ bore the Canadian Magnum or A-Square offerings are better choices.

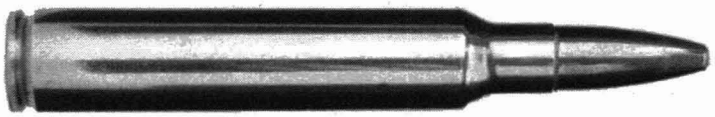
330 Dakota Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
200	IMR-4350	80.0	3082	4215	Dakota/Maximum load
200	RL-22	86.5	3146	4390	Dakota/Maximum load
200	H-4831	88.0	3200	4545	Dakota/Maximum load
200	IMR-7828	88.0	3100	4265	Dakota/Maximum load
250	IMR-4350	76.0	2853	4515	Dakota/Maximum load
250	RL-22	80.5	2849	4500	Dakota/Maximum load
250	H-4831	81.5	2878	4595	Dakota/Maximum load
250	IMR-7828	82.0	2829	4440	Dakota/Maximum load



Dakota 76 Classic Bolt-Action rifle

338 Canadian Magnum



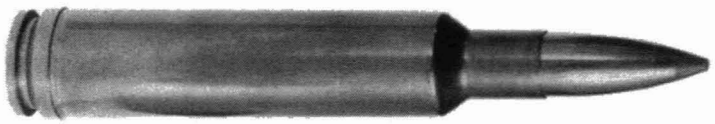
Historical Notes This cartridge was developed about 1989 by North American Shooting Systems and is somewhat similar to the 338 Imperial Magnum. This design features a slightly rebated rimless bottleneck case. The design intent was to provide the maximum powder capacity available in a standard action with minimal gunsmithing. (Without deepening the magazine well slightly, magazine capacity is usually reduced by one round.) Bolt face alteration is not necessary. Cartridge feeding and headspacing characteristics are improved.

General Comments The Canadian Magnum series is similar to the Dakota cartridge family both in design and purpose. However, this cartridge takes advantage of the entire 3.65″ magazine length of the long-action Remington M700 and similar rifles. On the Canadian Magnums, body diameter is significantly larger than the standard belted-magnum (0.544″ versus 0.513″ at the base). Rechambering of nominal belted-magnums with the same bore diameter is generally quite simple, requiring no other rifle alterations. For any given case length, capacity is about 15 percent greater than can be achieved with the standard belted-magnum case. Body taper is minimal and the case shoulder is comparatively sharp. However, neck length is sufficently generous to provide good bullet purchase for hunting ammunition. Performance is commensurate with the capacity and pressures used in these loadings.

338 Canadian Magnum Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
225	IMR-4831	88.0	3083	4745	NASS/Maximum load
225	H-4831	91.0	3047	4635	NASS/Maximum load
250	IMR-4831	88.0	2924	4740	NASS/Maximum load
250	RL-19	89.0	2977	4915	NASS/Maximum load
250	H-4831	91.0	2951	4830	NASS/Maximum load
225	FL		3110	4830	NASS

338 A-Square

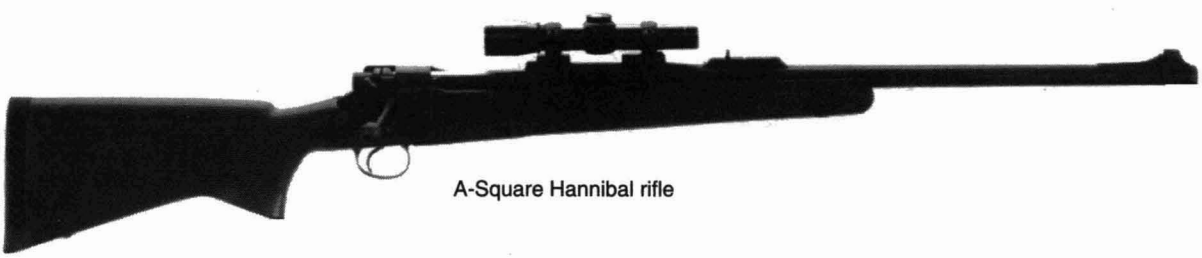


Historical Notes This 1978 design is a somewhat modified 378 Weatherby Magnum necked down to accept .338″ bullets. The intention was to provide a flat-shooting cartridge capable of delivering substantial energy to medium-sized game animals at normal hunting ranges. With minor modifications most nominal 3.65″ length bolt-action magazines will handle this cartridge.

General Comments Ballistics are very close to A-Square's 338 Excalibur but this cartridge will not feed from a magazine as smoothly as that beltless design will. The basic design incorporates a sharp shoulder, for good headspace control, but features a comparatively generous body taper. Ballistics are impressive. This cartridge can deliver massive doses of energy to long-range targets.

338 A-Square Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
200 Nosler BT	H-4831	104.0	3259	4715	A-Square/Max.
200 Nosler BT	IMR-7828	106.0	3353	4990	A-Square/Max.
200 Nosler BT	RL-22	104.0	3355	4995	A-Square/Max.
250 Sierra SBT	IMR-7828	95.0	2879	4600	A-Square/Max.
250 Sierra SBT	RL-22	95.0	2965	4880	A-Square/Max.
250 Sierra SBT	H-870	118.0	3094	5310	A-Square/Max.
250 Sierra SBT	A8700	120.0	3100	5330	A-Square/Max.
200 Nosler BT	FL		3500	5435	A-Square
250 Sierra SBT	FL		3120	5400	A-Square
250 Triad	FL		3120	5400	A-Square



A-Square Hannibal rifle

338 Excalibur

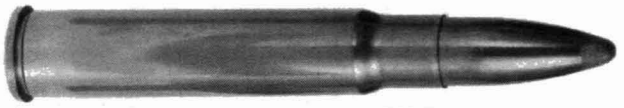
Historical Notes This 1994 chambering is based upon an entirely new case that features a 0.580″ head size. The rim is essentially identical to the 378 Weatherby case but there is no useless belt. Therefore, case capacity is substantially greater for any given cartridge length. This standard rimless bottleneck design also facilitates proper chambering with tight tolerances. Design intent was acceleration of a 200-grain hunting bullet to an excess of 3500 fps without exceeding about 62,000 psi (piezo transducer pressure units)—a typical pressure for modern cartridges. The 338 Excalibur seems to have succeeded in this.

General Comments This cartridge is a superior choice for those who feel they need a flat-shooting cartridge that can deliver substantial energy to medium-sized game targets at long-range. Rifles originally chambered for the 378 and 460 can be rebarreled to accept this cartridge. The slowest handloader powders now available offer the best velocity potential. In a typical rifle, recoil would have to be classed as heavy, especially when shooting heavier bullets. As is normal with .338″ chamberings, trajectories are essentially indistinguishable from the similar 30-caliber counterpart but with the delivery of a heavier bullet carrying more energy.

338 Excalibur Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
200 Nosler BT	RL-22	113.0	3434	5240	A-Square/Maximum load
200 Nosler BT	H-870	138.0	3480	5380	A-Square/Maximum load
200 Nosler BT	A-8700	140.0	3493	5415	A-Square/Maximum load
200 Nosler BT	IMR-7828	116.0	3497	5430	A-Square/Maximum load
250 Sierra SBT	IMR-7827	105.0	2966	4885	A-Square/Maximum load
250 Sierra SBT	H-5010	128.0	3109	5365	A-Square/Maximum load
250 Sierra SBT	RL-22	110.0	3192	5655	A-Square/Maximum load
250 Sierra SBT	H-870	128.0	3200	5685	A-Square/Maximum load
250 Sierra SBT	A-8700	130.0	3202	5690	A-Square/Maximum load

358 JDJ



Historical Notes This is another cartridge designed and developed by J.D. Jones. J.D. began development of his cartridges around 1978 to give added range and power to the Thompson/Center Contender pistol. Some of J.D.'s cartridges have also proved to be excellent metallic silhouette numbers. The JDJ cartridges are relatively easy to make. All of the JDJ cartridges are proprietary and SSK neither sells reamers nor has permitted the reamer maker to duplicate any of the reamers for the series. Should you desire a JDJ cartridge, contact SSK Industries, 421 Woodvue Lane, Wintersville, OH 43952.

General Comments Based on the 444 Marlin necked down, this chambering provides ample capacity and bullet area to produce impressive muzzle energy, especially with longer handgun-length barrels (14-16 inches). Any 357 Magnum, 35 Remington or 35 Herrett Thompson/Center Contender barrel is easily rechambered to use this cartridge. The 358 JDJ offers muzzle velocities similar to the 375 Winchester (rifle loads) with bullets of equal weight. Since this chambering uses spitzer bullets, delivered energy at normal hunting range is significantly higher than the parent 444 Marlin can deliver, even when the latter is fired from a rifle. Bullets of 180-225 grains are good choices and the Barnes 180-grain X provides excellent terminal performance. However, the use of the Barnes X requires special handloading techniques (deeper bullet seating and a reduction in powder charge). Top loads in this chambering generate significant recoil. An effective muzzlebrake (which increases the already signficant muzzle blast effect) is essential. Recoil of top loads compares to top 44 Magnum revolver loads, a recoil level many shooters cannot learn to tolerate. When bullets of proper hunting weight are driven at full velocity (necessary to assure proper terminal performance) even the seasoned handgunner would describe the recoil generated as "rather brisk."

358 JDJ Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
180 JSP	RL-7	49.0	2295	2105	SSK
200 SP	RL-7	48.0	2275	2295	SSK
225 SP	RL-15	52.5	2145	2300	SSK
250 SP	AAC2520	50.0	2100	2205	SSK

358 Shooting Times Alaskan (358 STA)

Historical Notes This wildcat chambering was originated in 1990 by Layne Simpson, a gun writer for *Shooting Times* magazine. The original version was simply the 8mm Remington Magnum necked up with no other changes. In 1994, a somewhat modified version featuring reduced body taper and a sharper shoulder was adopted for chambering in A-Square rifles. This cartridge takes advantage of the 3.65″ magazine length of the long-action Remington Model 700.

General Comments The 358 STA has impressive velocity potential and can deliver good ballistics with a variety of bullets and powders. Currently there is a paucity of data available but A-Square provides ammunition and data for a few of the more popular bullet weights and types. It is likely that some of the slower handloader powders would show improved performance in this chambering.

358 STA Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
125 Sierra JSP	H-4831	91.0	3046	2575	A-Square (Practice Load)
225 Sierra SBT	IMR-7828	93.0	3003	4505	A-Square/Maximum load
225 Sierra SBT	RL-22	93.0	3041	4620	A-Square/Maximum load
225 Sierra SBT	H-4831	93.0	3056	4665	A-Square/Maximum load
275 A-Square Lion	RL-22	90.0	2835	4905	A-Square/Maximum load
275 A-Square Lion	IMR-7828	92.0	2850	4960	A-Square/Maximum load
275 A-Square Lion	H-4831	90.0	2857	4980	A-Square/Maximum load
275 TRIAD	FL		2850	4955	A-Square (3 A-Square bullet types)

9.3mm JDJ

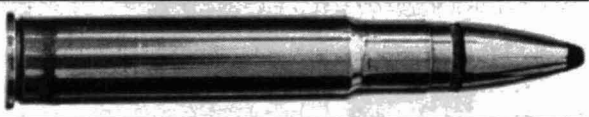
Historical Notes Designed by J.D. Jones at SSK Industries, this chambering is the 444 Marlin case necked down to 9.3mm with no other changes. The design intent was a Thompson/Center chambering that would surpass 35 Remington rifle ballistics and use the newly available U.S. manufactured 9.3mm bullets.

General Comments Any ballistic difference between this chambering and the 358 JDJ would be very hard to demonstrate. This chambering is reported to deliver impressive preformance against deer and black bear-sized game when heavy bullets are used. The primary market is European, where the 9.3mm bore is quite popular. Bluntly, this chambering generates significant recoil. An effective muzzlebrake (which increases the already significant muzzle blast effect) is essential. Recoil of top loads compares to top 44 Magnum revolver loads, a recoil level many shooters cannot learn to tolerate. When bullets of proper hunting weight are driven at full velocity (necessary to assure proper terminal performance) even the seasoned handgunner would describe the recoil as "very brisk."

9.3mm JDJ Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
270 Speer	H-322	44.0	1906	2175	SSK/Maximum load, SSK barrel only, 14″ barrel
270 Speer	H-414	57.3	1924	2240	SSK/Maximum load, SSK barrel only, 14″ barrel
270 Speer	IMR-4064	52.0	1974	2335	SSK/Maximum load, SSK barrel only, 14″ barrel
270 Norma	RL-15	53.0	2027	2465	SSK/Maximum load, SSK barrel only, 14″ barrel
270 Speer	RL-15	54.0	2077	2585	SSK/Maximum load, SSK barrel only, 14″ barrel

375 JDJ



Historical Notes This is another cartridge designed and developed by J.D. Jones, hence the JDJ designation. J.D. began development of his cartridges around 1978 and they are generally fired in barrels furnished by his company SSK Industries. The purpose of these cartridges is to give added range and power to the Thompson/Center Contender pistol for hunting. Some of J.D.'s cartridges have also proved to be excellent metallic silhouette numbers. The JDJ cartridges are relatively easy to make. All of the JDJ cartridges are proprietary and SSK neither sells reamers nor has permitted the reamer maker to duplicate any of the reamers for the series. Should you desire a JDJ cartridge, contact SSK Industries, 421 Woodvue Lane, Wintersville, OH 43952.

General Comments Based on the 444 Marlin necked down,this chambering provides ample capacity and bullet area to produce muzzle energy similar to what 30-06 chambered rifles deliver, especially with longer handgun-length barrels (14-16 inches). The 375 JDJ loaded to top velocity with 250-grain bullets is fully capable of taking elk-sized game with proper shot placement. However, the Barnes 210-grain X can deliver superior terminal performance, reduced recoil and a flatter trajectory but does require special handloading techniques (deeper bullet seating and a reduction in powder charge). With heavier bullets of proper construction this chambering is adequate for species to the one-ton class. J.D. Jones himself has repeatedly proven this fact. There is an excellent selection of good bullets that work well when loaded to top 375 JDJ velocity. Bluntly, this chambering generates signficant recoil. An effective muzzlebrake (which increases the already significant muzzle blast effect) is essential. Top loads generally produce more recoil than top 44 Magnum revolver loads, a recoil level many shooters cannot learn to tolerate. When bullets of proper hunting weight are driven at full velocity (necessary to assure proper terminal performance) even the seasoned handgunner would describe the recoil as "very brisk."

375 JDJ Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
220 SP	H-4895	51.0	2200	2365	SSK
270 SP	IMR 4064	48.0	1900	2165	SSK
270 SP	IMR 4064	49.2	2000	2400	SSK
300 SP	W-748	50.8	1900	2405	SSK

375 JRS Magnum

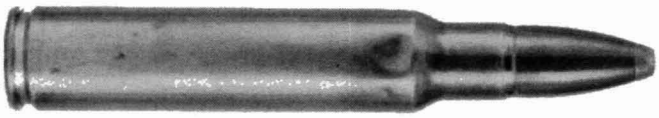
General Comments The 375 JRS was designed by noted gunwriter Jon R. Sundra. It is based on the 8mm Remington Magnum case necked up to .375 with no other changes. It can be made by fireforming 375 H&H factory ammunition, or by necking up the 8mm Rem. Mag. using tapered expanders of .358- then .375-inch, or by fireforming using blank loads in 8mm Rem. Mag. brass. Of these options, Sundra recommends the latter because only the neck is worked; this procedure requires a load of 35.0 grains of DuPont SR 4756, a small overpowder wad of tissue, and then filling the remainder of the case to the base of the neck with Cream of Wheat. Seal off the case mouth with a plug of soap by pushing the case neck into a bar of soap. The resultant blank will expand the neck perfectly in a 375 JRS chamber. As of August, 1990, the above procedures are no longer necessary because A-Square Co. now offers 375 JRS unprimed brass as well as loaded ammo with their headstamp. They also build rifles as well as rebarrel actions and rechamber. As of 1992, U.S. Repeating Arms is chambering the Winchester Model 70 Super Grade (the pre-'64 action with controlled round feeding) for the 375 JRS.

General Comments Case capacity of the 375 JRS is about 8 percent greater than that of 375 H&H. The best powder for 270- to 330-grain bullets is IMR 4350. Velocity in 24-inch barrels for a 300-grain bullet will average between 2700 and 2750 fps. Any max load listed for the 375 H&H can be used for a starting load in the 375 JRS. E.R. Shaw and H-S Precision also chamber for the 375 JRS; Hornady and RCBS make reloading dies.

375 JRS Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	
270 SP	IMR 4350	85.0	2750	4535	Jon Sundra
300 SP	IMR 4350	83.0	2700	4855	Jon Sundra

375 Dakota



Historical Notes The 375 Dakota is a shortened and necked-down version of the basic rebated-rimless 404 Jeffrey case, but the rim is enlarged slightly to eliminate the rebated feature. The design purpose was to create a cartridge that would duplicate 375 H&H performance from a 30-06 length action (3.35″). The case features a rim that is slightly larger than the standard belted-magnum cases—standard belted-magnum bolt faces require slight alteration for use with this cartridge. Despite its similar capacity, maximum case diameter of this much shorter case is only slightly larger than the 375 H&H Magnum. Typically, magazine capacity is reduced by one cartridge. This is perhaps, a significant consideration for a dangerous-game rifle but a minor magazine alteration will remedy the problem.

General Comments The 375 Dakota, just like the 7mm, 300 and 330 Dakota cartridges, functions properly through standard-length (3.35″) actions. Usable case capacity is nearly identical to the 375 H&H Magnum and, if loaded to equal pressures, ballistics are the same. This cartridge provides superior feeding and a potential accuracy advantage over the 375 H&H. Geared toward larger species, this should be a good choice for those who feel lesser calibers are not adequate to the task at hand. Combined with some of the superior bullets now availabe, this cartridge can rival the long-range trajectory of the best 270 Winchester loads. When loaded with proper dangerous-game bullets, and in the hands of an expert, this cartridge would suffice for any game worldwide.

375 Dakota Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
270	RL-15	75.0	2829	4795	Dakota/Maximum load
270	IMR-4350	85.0	2895	5020	Dakota/Maximum load
270	H-4350	85.0	2883	4980	Dakota/Maximum load
300	IMR-4350	78.0	2660	4710	Dakota/Maximum load
300	H-4350	78.0	2648	4670	Dakota/Maximum load
300	IMR-4831	79.0	2641	4640	Dakota/Maximum load
300	RL-19	83.5	2662	4720	Dakota/Maximum load

375 Canadian Magnum

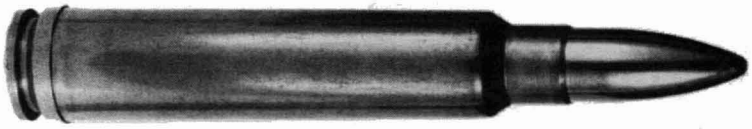
Historical Notes This cartridge was developed about 1994 by North American Shooting Systems and is simply a 375-caliber version of the 338 Canadian Magnum. This design features a slightly rebated rimless bottleneck case. Design intent was to provide the maximum feasible powder capacity in a standard action with minimal gunsmithing. (Without deepening the magazine well slightly, magazine capacity is usually reduced by one round.) Bolt face alteration is not necessary. Cartridge feeding and headspacing characteristics are improved.

General Comments The Canadian Magnum series is similar to Dakota's cartridge family both in design and purpose. However, this cartridge (like the entire Canadian line) takes advantage of the full 3.65″ magazine length of the long-action Remington M700 and similar rifles. On the Canadian Magnums, body diameter is significantly larger than the standard belted-magnum (0.544″ versus 0.513″ at the base). Rechambering of nominal belted-magnums with the same bore diameter is generally quite simple, requiring no other alterations to the gun. For any given case length, case capacity is about 15 percent greater than can be achieved with the belted version. Body taper is minimal and the shoulder is comparatively sharp. However, neck length is sufficiently generous to provide good bullet purchase for hunting ammunition. Performance is commensurate with the capacity and pressures used in these loadings. Actual performance of this number is *very* close to the vaunted 378 Weatherby Magnum.

375 Canadian Magnum Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
270	H-4831	103.0	3010	5430	NASS/Maximum load
270	FL		3000	5395	NASS

375 A-Square



Historical Notes This is a somewhat modified 378 Weatherby Magnum designed in 1975. Ths changes are intended to allow duplication of 378 Weatherby Magnum performance in a 375 H&H magazine length (3.65″).

General Comments Ballistics duplicate the parent 378 Weatherby Magnum and chambering is easily achieved in any of the many 375 H&H chambered magazine rifles. Cases are easily converted from 378 Weatherby Magnum brass. This chambering is a viable choice for a light rifle in Africa. The heavier solids offered are certainly capable for use against the heaviest of game, with proper shot placement—but then, when does shot placement *not* count? Recoil is distinctly less than any of the 40 caliber and larger dangerous-game chamberings—rightly it could be said that recoil is an entirely different class!

375 A-Square Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
250 Sierra SBT	IMR-4831	106.0	3184	5625	A-Square/Maximum load
250 Sierra SBT	H-4831	114.5	3186	5630	A-Square/Maximum load
250 Sierra SBT	RL-22	113.0	3217	5740	A-Square/Maximum load
300 Monolithic Solid	RL-22	105.0	2839	5370	A-Square/Maximum load
300 Monolithic Solid	IMR-4831	101.0	2911	5640	A-Square/Maximum load
300 Monolithic Solid	H-4831	110.0	2974	5890	A-Square/Maximum load
300 Sierra & TRIAD	FL		2920	5675	A-Square (3 A-Square bullet types)

411 JDJ

Historical Notes Based upon the 444 Marlin case, this cartridge is designed to take advantage of the plentiful 41-caliber pistol and revolver bullets now on the market. With cast rifle bullets sized properly it provides more versatility than the .416″ bore. JDJ designed this at SSK Industries.

General Comments Various pistol and revolver bullets can be loaded to achieve as high as 2400 fps from a 14″ Contender barrel. Special cast bullets in the 400-grain range are easily loaded to achieve 1800 fps in the same guns. This is equivalent to top 45-70 modern rifle ballistics. Even with the best Pachmayr Decelerator grips and the most effective muzzlebrake possible, this combination will generate massive recoil. Many otherwise competent shooters simply cannot learn to master such a chambering in a handgun. The Barnes 300-grain X offers reduced recoil with potentially superior terminal performance and a flatter trajectory but requires special handloading techniques (deeper bullet seating and a reduction in powder charge). With the proper bullets, those who can handle the recoil will find this a serious handgun chambering for use against any species in the world.

411 JDJ Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
210 Sierra	H-4198	45.0	1878	1640	SSK/Maximum load, SSK barrels only, 14″
210 Sierra	IMR-4227	44.0	2344	2560	SSK/Maximum load, SSK barrels only, 14″
275 Harrison	H-4227	38.0	1990	2415	SSK/Maximum load, SSK barrels only, 14″
295 Cast	H-322	45.0	1683	1855	SSK/Maximum load, SSK barrels only, 14″
330 Harrison	RL-7	46.0	2000	2930	SSK/Maximum load, SSK barrels only, 14″
385 Cast	RL-7	46.0	1711	2500	SSK/Maximum load, SSK barrels only, 14″

416 JDJ

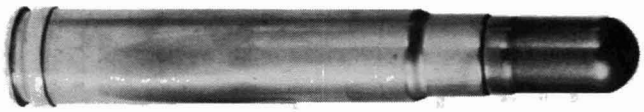
Historical Notes Based upon the 444 Marlin case, this cartridge is designed to take advantage of the plentiful 416-caliber rifle bullets now on the market. With cast rifle bullets sized properly, it provides some versatility but is only intended for big game hunting. JDJ designed this at SSK Industries after the advent of 416 handloader bullets.

General Comments Rifle bullets in the 400-grain range are easily loaded to achieve 1800 fps from a 14″ Contender barrel. This is equivalent to top 45-70 ballistics from a modern rifle. Even with the best Pachmayr Decelerator grops and the most effective muzzlebrake possible, this combination will generate massive recoil. Many otherwise competent shooters simply cannot learn to master such a chambering in a handgun. The Barnes 300-grain X offers reduced recoil with potentially superior terminal performance and a flatter trajectory but requires specal handloading techniques (deeper bullet seating and a reduction in powder charge.) With the proper bullets, those who can handle the recoil will find this a serious handgun chambering for use against any species in the world.

416 JDJ Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
300 Hawk	RL-7	51.0	2016	2705	SSK/Maximum load, SSK barrels only, 14″
350 CB	A-2230	56.0	1908	2830	SSK/Maximum load, SSK barrels only, 14″
400 Hornady	RL-15	53.5	1727	2650	SSK/Maximum load, SSK barrels only, 14″
400 Hawk	RL-15	56.5	1810	2910	SSK/Maximum load, SSK barrels only, 14″

416 Taylor



Historical Notes The 416 Taylor was developed by Robert Chatfield-Taylor in 1972. It is based on the 458 Winchester Magnum case necked-down to 416-caliber. However, it can also be made by necking-up 338 Winchester Magnum brass. The late Robert Chatfield-Taylor was a writer and hunter of note, and he used the cartridge in Africa and reported very favorably on it. It was also checked out on Cape buffalo, elephant and lion by several others with success, including John Wootters. At one time, there were rumors that the cartridge would be commercialized by Remington or Winchester, but this never happened. The 416 Taylor is ballistically similar to the 416 Rigby and is adequate for the same range of game, including the tough, dangerous African varieties. It is over powered for most North American big game, but would be good backup against the big brown bears.

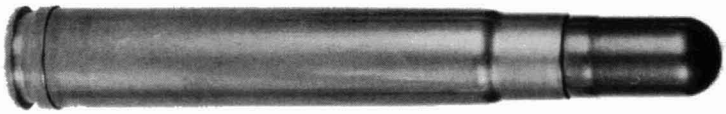
General Comments The 416 Taylor came about in part because 416 Rigby cartridges and cases were difficult to obtain and partly because the 416-caliber represents a gap in the American commercial cartridge lineup. The 416 Taylor can also be used in a standard-length action. This gap has now been filled by Remington with their 416 Remington Magnum based on the 8mm Remington Magnum case, and also by Weatherby with their new 416. In 1988, Federal introduced ammunition in 416 Rigby caliber, thus ending the shortage of this caliber ammunition.

The 416 Taylor can be considered something of a forerunner to the Remington 416 because it proved the feasibility and effectiveness of a new 416-caliber to replace the venerable 416 Rigby. The cases are easy to make and RCBS can furnish loading dies. Originally the problem was the availability of good .416-inch bullets. However, that deficiency has been eliminated by Barnes and Hornady. A-Square currently furnishes rifles, cases, bullets and loaded ammunition in 416 Taylor, so it has become a proprietary cartridge.

416 Taylor Loading Data

Bullet (grs.)	Powder/grs.		MV	ME
400 SP	IMR 4320	70.0	2270	4595
400 SP	IMR 4320	71.0	2305	4700

416 Hoffman



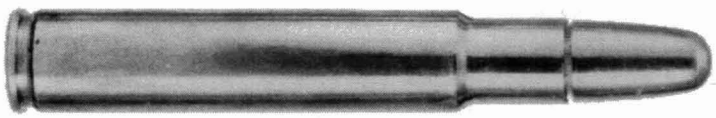
Historical Notes The 416 Hoffman is another of the wildcat cartridges adopted by A-Square Co. In other words, brass cases, bullets, and loaded ammunition in this caliber are currently available from A-Square. It originated with George L. Hoffman, of Sonora, Texas, in the late 1970s and is based on the necked-up and Improved 375 H&H Magnum case. Ballistically, it duplicates the 416 Rigby and the 416 Taylor except that the case is about $^{3}/_{10}$-inch longer than the Taylor and holds a little more powder. The cartridge case is of smaller base diameter than the Rigby, which allows an extra round to be carried in a magazine of equal size. A-Square can also furnish rifles of this caliber.

General Comments The 416 Hoffman is the most practical of the 416 wildcats because as a proprietary cartridge one can obtain all of the components without the necessity of reworking 375 H&H brass. With its 400-grain bullet at 2400 fps, it is relatively flat-shooting out to 200 yards and is extremely accurate. It would be a good candidate for a one-gun cartridge to take on whatever Africa has to offer. Although over powered for most North American big game, it would nevertheless do very well on moose or grizzly bear and could be loaded down for use on some of the smaller species. It is a very good cartridge for those who need or favor the 416 bore. However, the new 416 Remington will probably dominate the field because as a commercial number it will be easier to find and less expensive.

416 Hoffman Loading Data

Bullet (grs.)	Powder/grs.		MV	ME
400 SP	IMR 4064	77.0	2400	5125
400 SP	IMR 4895	74.0	2350	4910
400 SP	IMR 4895	77.0	2425	5230
400 SP	IMR 4320	77.0	2400	5125
400 SP	IMR 4350	88.0	2375	5040

416 Dakota



Historical Notes The 416 Dakota uses a modified full-length 404 Jeffrey case, which features a rim that is only slightly larger than the standard belted-magnum rim. In any given length cartridge, use of the non-belted 404 Jeffrey case offers about 15 percent more case capacity than the standard belted-magnum. Because maximum case diameter is only slightly larger, one can retain full magazine capacity through minor magazine well modifications. Dakota designed their 416 to offer maximum 416 bore ballistics in a standard size action.

General Comments With about 15 percent more usable capacity, the 416 Dakota offers ballistic performance substantially superior to the 416 Remington Magnum. Lacking the belt, this cartridge also feeds better from the magazine and offers potentially superior accuracy. This cartridge requires use of a so-called magnum-length action (3.65″). Gunsmiths can easily rechamber most 416 Remington Magnum rifles to 416 Dakota. Restrictive laws often prohibit taking of dangerous game with cartridges of lesser caliber (although typically there is no restriction on bullet weight, type or velocity!) so the various 416s present themselves as a minimum-caliber alternative. Many find the reduction in recoil, compared to larger bores shooting heavier bullets, a worthwhile advantage. To its credit, when loaded with proper spitzer bullets, the 416 Dakota offers a trajectory similar to the 270 Winchester and can deliver energy levels at extended ranges that rival muzzle energies of cartridges most shooters consider as true magnums. Of course, there are no free lunches; in this chambering, even with an effective muzzlebrake, recoil becomes a bit stiff in typical rifles.

416 Dakota Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
400	IMR-4350	90.0	2489	5500	Dakota/Maximum load
400	IMR-4831	95.0	2527	5670	Dakota/Maximum load
400	RL-19	100.0	2558	5810	Dakota/Maximum load
400	H-4831	100.0	2556	5800	Dakota/Maximum load

425 Express

Historical Notes The 425 Express was developed as a joint effort between Cameron Hopkins and Whit Collins with John French building the original prototype rifle. The entire story was published in the May 1988 issue of *Guns Magazine*. The cartridge is based on the 300 Winchester Magnum case shortened from 2.620 inches to 2.550 inches to allow for case stretching, then fireformed in the 425 chamber. Loading dies are available from Redding Reloading Equipment. The prototype rifle was built on a Ruger Model 77 action.

General Comments The 425 Express fills a gap in the medium-bore cartridge lineup between the 375 Holland & Holland Magnum and the 458 Winchester Magnum. The cartridge fits standard-length bolt actions such as the Winchester Model 70, 1917 Enfield, Mauser 98 or other similar length actions. The cartridge uses either a 350-grain or a 400-grain bullet and has proven very effective on heavy African game. It is overpowered for most North American hunting, but would provide a margin of safety if going after the big brown bears in the far North. Col. Charles Askins used the 425 Express very successfully on buffalo in Australia.

425 Express Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
350 SP	IMR 4064	79.0	2535	5000	Cameron Hopkins
350 SP	H-4895	77.0	2490	4825	Cameron Hopkins
350 SP	W-760	77.0	2210	3795	Cameron Hopkins
400 SP	H-4895	73.0	2420	5210	Cameron Hopkins
400 SP	IMR 4064	76.0	2370	4995	Cameron Hopkins
400 SP	W-760	76.0	2155	4120	Cameron Hopkins

458 Whisper

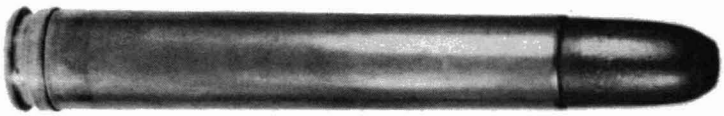
Historical Notes Designed by J.D. Jones in 1993 at SSK Industries, this chambering uses a shortened 458 Winchester Magnum case. With custom 600-grain very low drag (VLD) bullets this cartridge will function through standard-length magazines. The design intent was to create a hard-hitting subsonic round with superior penetration potential.

General Comments This is a rather esoteric chambering. For proper use it requires very expensive custom bullets. Nevertheless, ballistic consistency and accuracy are impressive. When launched at subsonic velocities (1040 fps is typical for the 458 Whisper), this long and heavy VLD bullet loses velocity so slowly that crosswinds have little effect. It also retains the greater measure of its muzzle energy beyond one mile!

458 Whisper Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
500 H.T.	W-231	15.6	1021	1155	SSK/Subsonic
500 H.T.	Blue Dot	18.0	1025	1165	SSK/Subsonic
560 H.T.	Blue Dot	18.0	1101	1505	SSK/Subsonic
560 H.T.	H-4198	25.5	1049	1365	SSK/Subsonic
600 H.T.	A-2015BR	27.0	1044	1450	SSK/Subsonic
600 H.T.	H-4198	25.5	1082	1555	SSK/Subsonic
600 H.T.	Blue Dot	18.0	1107	1630	SSK/Subsonic

458 Lott



Historical Notes The 458 Lott was originated by Jack Lott in 1971. It is based on the blown out and shortened 375 H&H Magnum case. It is $^{3}/_{10}$-inch longer than the 458 Winchester Magnum case. The purpose of the slightly longer case was to improve on the performance of the 458 Winchester with the 500-grain bullet for use in Africa against dangerous game. Information was published in the 10th Edition of *Handloader's Digest*, p. 119.

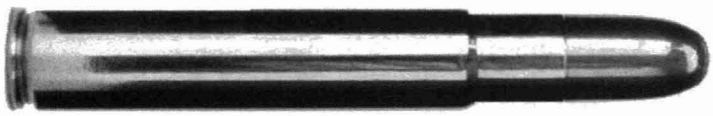
General Comments The 458 Winchester is advertised as developing 2040 fps with the 500-grain bullet when fired from a 24-inch barrel. In reality, it doesn't actually do much better than 1900 fps. The 458 Lott will do an honest 2300+ fps from a 22-inch barrel. It has been field-tested in Africa and has chalked up an impressive number of one-shot kills on elephant and buffalo. It is similar to the 450 Watts which is also based on the full-length 375 H&H case expanded to 458-caliber, but is shorter. Rifles chambered for the 458 Lott will also safely shoot 458 Winchester ammo. The 458 Lott has been adopted by A-Square as a proprietary cartridge. They furnish brass, bullets, ammunition and rifles of this caliber.

458 Lott Loading Data*

Bullet (grs.)	Powder/grs.		MV	ME
500 SP	IMR 4320	85.0	2330	6020
500 SP	IMR 4064	79.0	2230	5520

*From the *Handloader's Digest*, 10th ed., p. 119.

458 Canadian Magnum

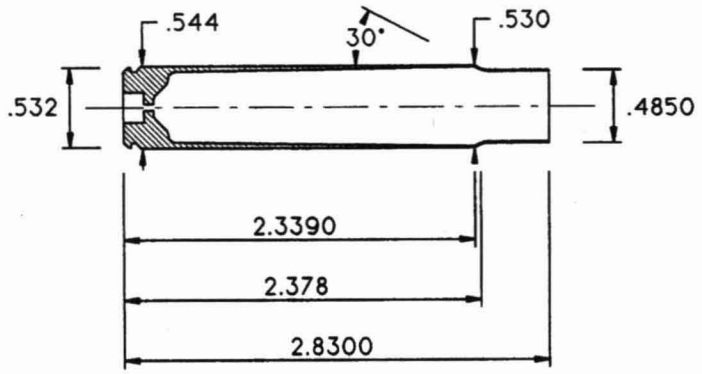


Historical Notes North American Shooting Systems (NASS) developed this cartridge in about 1994. This cartridge features a slightly rebated rimless bottleneck case. Design intent was provision of maximum powder capacity in a standard action with minimal gunsmithing. (Without deepening the magazine well slightly, use of this cartridge usually reduces magazine capacity by one round.) Bolt face alteration is not necessary. Cartridge feeding and headspacing characteristics are improved. This particular cartridge is factory loaded to modest pressures to provide assurance of proper functioning in the hottest climes—a worthwhile consideration.

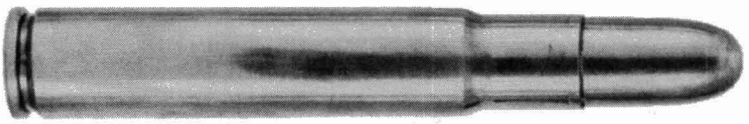
General Comments This cartridge takes advantage of the entire 3.65″ magazine length of the long-action Remington M700 and similar rifles. This represents the maximum feasible bullet size for use in this beltless case—headspace control, while adequate, is marginal with such a narrow case shoulder (one would be well advised to avoid "Magnum-Strength" striker springs). Body diameter is significantly larger than the standard belted-magnum (0.544″ veruse 0.513″ at the base). Rechambering of nominal belted-magnums with the same bore diameter is generally quite simple, requiring no other rifle alterations. For any given case length, capacity is about 15 percent greater than can be achieved with the belted version. Body taper is minimal and the case shoulder is comparatively sharp. However, neck length is sufficiently generous to provide good bullet purchase for hunting ammunition.

458 Canadian Magnum Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
350	FL		2575	5150	NASS
500	IMR-4064	89.0	2360	6180	NASS/Maximum



450 Dakota



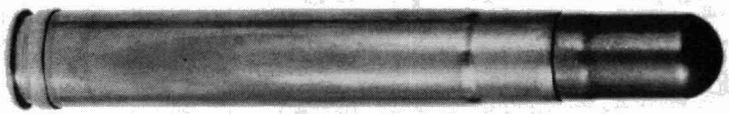
Historical Notes Formerly, Dakota had based their entire cartridge line on the 404 Jeffrey case. However, with the introduction of the 450 Dakota, that changed. Dakota's latest addition to their line, the 450 Dakota, uses an improved 416 Rigby case. Design purpose was to provide a cartridge capable of driving a 500-grain bullet at about 2400 fps with moderate chamber pressures.

General Comments Since the 450 Dakota uses an improved full-length 416 Rigby case, capacity is substantially identical to the 460 Weatherby Magnum. Obviously, if loaded to similar pressures, these two will produce similar ballistics. However, Dakota does not advocate loading this cartridge to full Weatherby pressures. The logic: By slightly reducing peak pressure, one can ease the effort of extracting a fired case. This approach also helps to minimize pressure excursions related to use under extreme tropical heat. Since that is what this cartridge was designed for, such an approach seems reasonable. When loaded to similar peak pressures, the 450 Dakota can propel a 500-grain bullet about 350 fps faster than the 458 Winchester Magnum. The nominal 450 Dakota loading gives up only about 150 fps to full-power 460 Weatherby loads. If one follows Dakota's advice, one ends up with a load propelling a 500-grain bullet at about 2450 fps. Most dangerious game experts agree that 2450 fps is nearly the perfect muzzle velocity for maximizing terminal performance with solid bullets. Because of its non-belted design this cartridge offers superior functioning from a box magazine and can deliver superior accuracy. However, most would agree that recoil as a bit heavy for a day of shooting holes in paper targets.

450 Dakota Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
400	RL-15	105.0	2732	6625	Dakota/Maximum load
400	IMR-4064	105.0	2763	6775	Dakota/Maximum load
400	IMR-4350	115.0	2650	6235	Dakota/Maximum load
500	H-4350	110.0	2460	6715	Dakota/Maximum load
500	IMR-4350	110.0	2470	6770	Dakota/Maximum load
500	IMR-4831	112.0	2444	6630	Dakota/Maximum load

450 Ackley Magnum



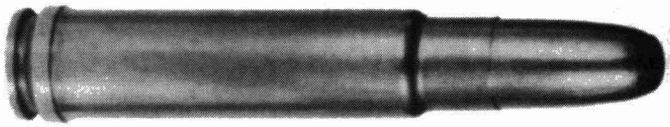
Historical Notes The 450 Ackley Magnum was originated by P.O. Ackley, the well-known gunsmith, ballistics experimenter and author. It dates back to 1960 and is described on page 502 of Mr. Ackley's excellent book, *Handbook for Shooters and Reloaders*. It developed a modest following during the 1960s among big game hunters, but gradually lost out to the 458 Winchester Magnum. Cases are made by necking 375 Magnum brass up to 450 and then fireforming. Recently, A-Square of Bedford, Kentucky, has revived the 450 Ackley and can furnish brass cases, loaded ammunition and custom rifles so chambered. Original loadings used 300-, 400-, 500- and 600-grain Barnes bullets. However, the new A-Square ammunition uses only the 500-grain weight in various types.

General Comments The 450 Ackley Magnum actually uses bullets of .458-inch diameter of which there is a good variety of both jacketed and cast types. The cartridge gained a good reputation on elephant and dangerous game in Africa, but is overpowered for North American big game It can be loaded down with 300- or 350-grain bullets and used in a variety of situations. Unlike the similar 450 Watts Magnum, this chambering because of its bottleneck design, will not safely shoot 458 Winchester Magnum loads and proper headspacing is a potential problem.

450 Ackley Magnum Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
300	IMR 4198	90.0	3035	6010	P.O. Ackley
400	IMR 3031	100.0	2800	7000	P.O. Ackley
500	IMR 3031	90.0	2470	7005	P.O. Ackley
600	IMR 4320	87.0	2200	6047	P.O. Ackley

460 A-Square Short

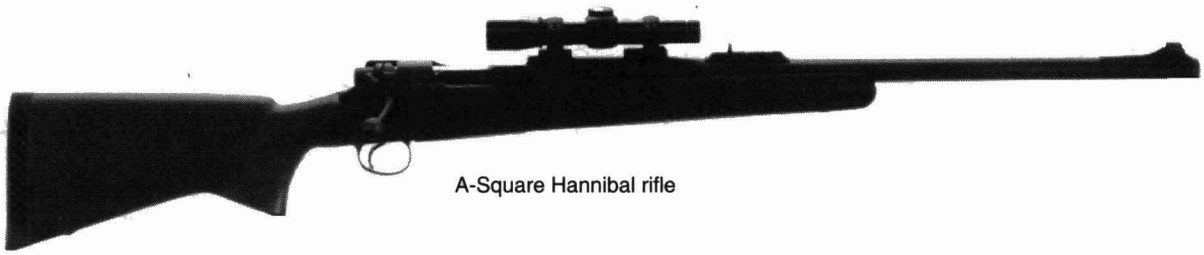


Historical Notes The A-Square series of cartridges was designed in 1974 by Col. Arthur Alphin as a result of a hunting incident on Cape buffalo with the 458 Winchester Magnum. Colonel Alphin first designed the 500 A-Square with the purpose in mind of providing maximum stoppping power. By 1977, requirements had been identified for cartridges in ten other bullet diameters. In order to gain more powder capacity and more power, all A-Square cartridges were originally based on the 460 Weatherby case. The A-Square Company of Bedford, Kentucky, offers brass and loaded ammunition for each of the A-Square cartridges.

General Comments The 460 A-Square Short provides better ballistics than the 458 Winchester, but with the same length cartridge. It would be an excellent choice for rechambering a 458 Winchester. Aside from rechambering, this would require work on the magazine well and feed ramp as well as opening up the bolt face. This cartridge can easily push a 500-grain bullet at velocities of 2400 fps or more. The 460 Short is an efficient cartridge, as well as being a very accurate one. Groups of under 1-inch at 100 yards have been reported on numerous occasions.

460 A-Square Short Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
500 SP	IMR 4064	88.0	2385	6315	A-Square
500 SP	IMR 4895	91.0	2450	6670	A-Square
500 SP	IMR 4320	91.0	2435	6580	A-Square



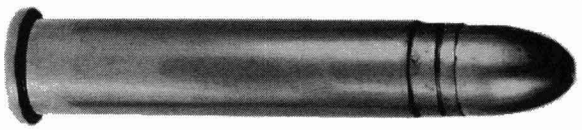
A-Square Hannibal rifle

470 Capstick

Historical Notes This cartridge was designed by Col. Arthur B. Alphin and is named after the famous author and African big game hunter, Peter Capstick. It delivers the maximum possible power from the 375 H&H Magnum case size while retaining the greater magazine capacity of the H&H over the Weatherby or Rigby cartridges. The .475-inch diameter bullets deliver distinctively more shock than the 458-caliber cartridges. The 470 Capstick is designed for heavy game out to 200 yards and dangerous game at close ranges. Trajectory is flat enough to allow taking medium size game at ranges up to 250 yards.

General Comments The 470 Capstick was designed to deliver 500-grain bullets at a muzzle velocity of approximately 2400 fps. It offers a muzzle energy of 6394 fpe and still retains well over 5200 fpe at 100 yards. The 470 Capstick is nearly identical in dimensions to the 475 Ackley Magnum designed quite a few years prior. Probably the most notable difference is the use of a 500-grain bullet in the 470 Capstick as opposed to a 600-grain bullet in order to obtain a flatter trajectory. Peter Capstick was a legend in his own time and did much to promote African hunting. He certainly deserves to have a cartridge with his name on it. If the choice were his, the author probably would have renamed the 500 A-Square in his honor.

475 JDJ



Historical Notes This cartridge was designed and developed by J.D. Jones, hence the JDJ designation on the cartridge. J.D. began development of his series of cartridges in 1978 and they are generally fired in barrels furnished by his company known as SSK Industries. The purpose of these cartridges is to give added range and power to the Thompson/Center Contender pistol for the primary purpose of hunting. Some of J.D.'s cartridges have proved to be excellent metallic silhouette cartridges. The JDJ series cartridges are relatively simple and easy to make. All of the JDJ cartridges are proprietary and SSK neither sells reamers or has permitted the reamer maker to duplicate any of the reamers for the JDJ series. If you desire a JDJ cartridge, contact SSK Industries, Wintersville, OH.

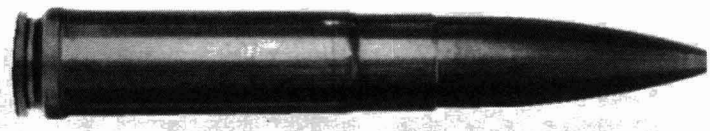
General Comments The 475 JDJ is the first 475 handgun cartridge. It is made by straightening out the tapered 45-70 Government case to a straight wall configuration. This is easily done by expanding the neck and firing a .475-inch bullet. Cast bullets work very well in this caliber and there are a lot of good ones available. Standard .475-inch rifle bullets will not expand reliably. However a .475-inch diameter 500-grain bullet pushed at 1650 fps does expand. Big animals fall down quickly. J.D. Jones has taken several buffalo with the 475. When properly loaded, it is very impressive on animals in the 2000-pound category. It is noticeably more effective than the 45-70 Government when loaded correctly.

475 JDJ Loading Data

Bullet (grs.)	Powder/grs.		MV	ME
485 Cast	IMR 3031	45.5	1292	1798
485 Cast	IMR 3031	48.5	1403	2120
500 Barnes	IMR 3031	48.5	1551	2672

Loading data from SSK Industries, Inc.

500 Whisper



Historical Notes Designed by J.D. Jones in 1993 at SSK Industries, this chambering is based upon a shortened 460 Weatherby Magnum case. At this writing, experimenting continues. Case length and nominal bullet weight are not yet established. Custom very low drag (VLD) bullets up to 900 grains have been tested. The design intent was to create a very hard-hitting subsonic round with superior penetration potential for use against lightly armored vehicles.

General Comments This is a very esoteric chambering. For proper use, it requires very expensive cutom bullets. Nevertheless, ballistic consistency and accuracy are impressive. When launched at subsonic velocities (1040 fps is typical for the 500 Whisper). Typical heavy VLD bullets lose velocity so slowly that crosswinds have little effect and retained energy exceeds one-half of muzzle energy well beyond one mile—and yes, they will travel that far with exceedingly good accuracy!

495 A-Square

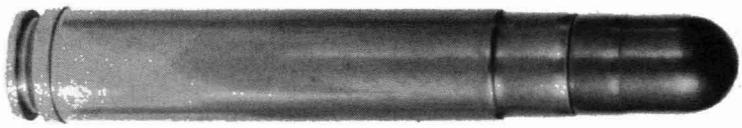
Historical Notes The A-Square series of cartridges was designed in 1974 by Col. Arthur Alphin as a result of a hunting incident with Cape buffalo using the 458 Winchester Magnum. Colonel Alphin first designed the 500 A-Square for the purpose of providing maximum stopping power. By 1977, requirements had been identified for cartridges in ten other bullet diameters. In order to gain more power capacity and more power, all A-Square cartridges are based on the 460 Weatherby case. The A-Square company of Bedford, Kentucky, offers brass and loaded ammunition for each of the A-Square cartridges.

General Comments The 495 A-Square was designed to push 600 grain .510-inch bullets from a cartridge which could be used in 375 Magnum length actions. Though the 495 A-Square may not have as much energy as the 460 Weatherby, it does have the advantage of a larger diameter bullet. For a 50-caliber cartridge, recoil is reported as relatively low. It has also been reported that this cartridge does well with cast bullets.

495 A-Square Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
600 SP	IMR 4895	100.0	2275	6890	A-Square
600 SP	IMR 4320	103.0	2280	6925	A-Square

500 A-Square



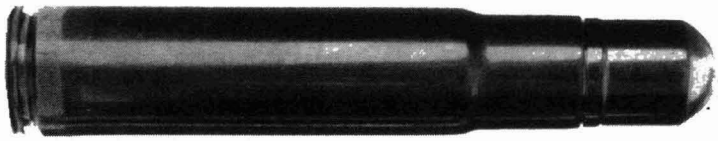
Historical Notes The A-Square series of cartridges was designed in 1974 by Col. Arthur Alphin after a hunting incident with Cape buffalo using the 458 Winchester Magnum. Colonel Alphin first designed the 500 A-Square for the purpose of providing maximum stopping power. By 1977, requirements have been identified for cartridges in ten other bullet diameters. In order to gain more powder capacity and more power, all A-Square cartridges are based on the 460 Weatherby case. A-Square Company of Bedford, Kentucky, offers brass and loaded ammunition for each of the A-Square cartridges.

General Comments The 500 A-Square requires a long magazine (3.77 inches, same as a 416 Rigby and 460 Weatherby). This cartridge delivers high energy and stopping power from a bolt-action rifle . This was Colonel Alphin's first design in 1974 and is based on the 460 Weatherby cartridge necked-up and blown out. Colonel Alphin reports that this cartridge is the backbone and main reason for the formation of the A-Square company in 1979. In addition to custom rifles made for this caliber, A-Square makes its own rifles chambered for this caliber. The 500 A-Square is an excellent choice for a backup rifle and has stopping power approximately equivalent to the 577 Nitro Express. Naturally, recoil from this cartridge can be extremely heavy. This is, without a doubt, a heavy or dangerous game cartridge.

500 A-Square Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
600 SP	IMR 4064	104.0	2280	6925	A-Square
600 SP	IMR 4895	114.5	2460	8060	A-Square
600 SP	IMR 4320	116.5	2475	8155	A-Square
600 SP	IMR 4350	124.0	2450	8015	A-Square

577 Tyrannosaur



Historical Notes This entirely new cartridge was designed in 1993 in response to the demands of two professional African hunting guides who had had bad experiences with lesser calibers as backup guns with clients hunting dangerous species. There is no secret to the design: This is the longest and largest diameter case that will properly function through a standard size bolt-action rifle; bullet diamter is limited by the necessity of a sufficent case shoulder to control headspace; design pressure assures proper functioning, even in the hottest climes.

General Comments When loaded to 30-30 Winchester pressure levels, this cartridge can develop 10,000 foot pounds of muzzle energy. When chambered in a 13# class rifle featuring a properly designed stock and three mercury recoil suppressers, recoil of the 577 Tyrannosaur is claimed to be less punishing than Weatherby's Mark V chambered for the much less powerful 460 WM. Nevertheless, by no means should one call this a mildly recoiling combination. However, for those who are looking for the ultimate in affordable repeating rifle firepower the 577 is the factory option of choice. Case capcity is on par with the 600 N.E. H-4831 provides startling consistency and performance. For those who can handle the recoil generated, this likely is the best factory option for dangerous game hunting. Price is also a consideration. Compared to purchasing a typical big-bore British double rifle, one could buy several 577 Tyrrannosaurs, a lifetime supply of 577 ammunition and a new 4x4 pickup to haul the lot around in...and with leftover change!

577 Tyrannosaur Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source/Comments
750 Monolithic Solid	H-4831	180.0	2395	9550	A-Square/Maximum load
750 Monolithic Solid	RL-19	177.5	2473	10,180	A-Square/Maximum load
750 Monolithic Solid	IMR-4350	170.0	2480	10,240	A-Square/Maximum load
750 Monolithic Solid	FL		2400	9590	A-Square

Proprietary Cartridges Rifle and Handgun

Dimensional Data

Cartridge	Case Type	Bullet dia.	Neck dia.	Shoulder dia.	Base dia.	Rim dia.	Case length	Ctge. length	Twist	Primer
226 JDJ	A	.224	.256	.410	.419	.467	1.93	—	9	LR
6mm JDJ	A	.243	.272	.415	.421	.470	1.905	2.65	V	LR
257 JDJ	A	.257	.288	.415	.421	.473	1.905	2.81	V	LR
6.5mm Whisper	C	.264	.286	.357	.372	.375	1.36	—	V	SR
6.5mm JDJ	A	.264	.293	.410	.419	.467	1.93	—	8-9	LR
6.5mm JDJx30	A	.264	.285	.409	.419	.497	2.03	—	9	LR
6.5mm JDJ #2	A	.264	.292	.450	.466?	.502	2.00	—	9	LR
270 JDJ	A	.277	.305	.415	.419	.467	1.905	2.875	10	LR
7mm Whisper	C	.284	.306	.357	.372	.375	1.36	—	V	SR
7mm JDJ	A	.284	.312	.415	.421	.473	1.905	—	9	LR
7mm-30 JDJ	A	.284	.306	.409	.419	.497	2.03	—	9	LR
7mm JDJ #2	A	.284	.313	.450	.466	.502	2.00	—	9	LR
7mm JRS	C	.284	.312	.454	.470	?	2.525	3.455	10	L
7mm Dakota	C	.284	.314	.531	.544	.544	2.50	3.33	10	LR
7mm STW	E	.284	.316	.487	.513	.532	2.85	3.65	9-9.5	LR
7mm Canadian Magnum	I	.284	.3224	.530	.544	.532	2.83	3.60	9-12	LR
7.62 Micro-Whisper	C	.308	.328	.382	.389	.392	.846	—	V	SP/SR
7.63 Mini-Whisper	C	.308	.329	.375	.381	.385	.985	—	V	SP/SR
300 Whisper	C	.308	.330	.369	.375	.375	1.50	2.575	V	SR
309 JDJ	A	.308	.335	.453	.470	.514	2.20	3.16	?	LR
30 American	A	.308	.328	.402	.422	.502	2.03	2.53	?	S
300 Phoenix	C	.308	?	?	.589	.586	2.50	3.60	?	LR
300 Dakota	C	.308	.338	.531	.544	.544	2.55	3.33	10	LR
300 Canadian Magnum	I	.308	.3417	.530	.544	.532	2.83	3.60	10	LR
300 Pegasus	C	.308	.339	.566	.580	.580	2.99	3.75	10	LR
8mm JDJ	A	.323	.356	.455	.465	.506	2.22	—	?	LR
338 Whisper	C	.338	.360	.457	.463	.466	1.47	—	V	SR
338-06	C	.338	.369	.441	.471	.473	2.494	3.34	10	LR
338 JDJ	A	.338	.365	.453	.470	.514	2.20	—	?	LR
330 Dakota	C	.338	.371	.530	.544	.544	2.57	3.32	10	LR
338 Canadian Magnum	I	.338	.369	.530	.544	.532	2.83	3.60	10-12	LR
338 A-Sqaure	E	.338	.367	.553	.582	.579	2.85	3.67	10	LR
338 Excalibur	C	.338	.371	.566	.580	.580	2.99	3.75	10	LR
358 JDJ	A	.358	.362	.453	.470	.514	.220	3.065	?	LR
358 STA	E	.358	.386	.502	.513	.532	2.85	3.65	12	LR
9.3mm JDJ	A	.366	.389	.455	.465	.506	2.22	—	?	LR
375 JDJ	A	.375	.396	.453	.470	.514	2.20	3.13	?	LR
375 JRS	E	.375	.498	.485	.535	?	2.84	3.69	12	L
375 Dakota	C	.375	.402	.529	.544	.544	2.57	3.32	10	LR
375 Canadian Magnum	I	.375	.402	.530	.544	.532	2.83	3.60	10	LR
375 A-Square	E	.375	.405	.551	.582	.579	2.85	3.65	10	LR
411 JDJ	A	.411	.425	.455	.465	.506	2.235	—	?	LR
416 JDJ	A	.416	.430	.455	.465	.506	2.22	—	?	LR
416 Taylor	E	.416	.447	.491	.513	.532	2.50	3.34	10	LR
416 Hoffman	E	.416	.447	.491	.513	.532	2.85	3.60	10	LR
416 Dakota	C	.416	.441	.527	.544	.544	2.85	3.645	10	LR
425 Express	E	.423	.429	.490	.513	.532	2.552	3.34	10	LR
458 Whisper	F	.458	.485	—	.506	.525	1.75	—	V	LR
458 Lott	F	.458	.481	—	.513	.532	2.80	3.60	10	LR
458 Canadian Magnum	I	.458	.485	.530	.544	.532	2.83	3.60	10	LR
450 Dakota	C	.458	.485	.560	.582	.580	2.90	3.74	10	LR
450 Ackley Magnum	E	.458	.486	.503	.513	.532	2.885	3.665	10	LR
460 A-Square	K	.458	.484	.560	.582	.579	2.50	3.50	10	LR
470 Capstick	F	.475	.499	—	.513	.532	2.85	3.65	10	LR
475 JDJ	B	.475	.497	—	.502	.604	2.10	—	14	LR
495 A-Square	L	.510	.542	—	.582	.579	2.80	3.60	10	LR
500 Whisper	F	.510	.549	.563	.580	.575	V	—	V	LR
500 A-Square	K	.510	.536	.568	.582	.579	2.90	3.74	10	LR
577 Tyrannosaur	C	.585	.614	.673	.688	.688	2.99	3.71	12	LR

A—Rimmed bottleneck B—Rimmed straight C—Rimless Necked D—Rimless Straight E—Belted Bottleneck F—Belted straight G—Semi-rimmed bottleneck I—Rebated Bottleneck J—Rebated straight
Nominal Primer Type: SP Small Pistol (.175″), LP Large Pistol (.210″), SR Small Rifle (.175″), LR Large Rifle (.210″),** CCI-35
Other codes: V—Rifling twist varies, depending upon applications; —OAL depends upon bullet used.

Chapter 6

HANDGUN CARTRIDGES OF THE WORLD

(Current and Obsolete—Blackpowder and Smokeless)

IT CAN BE stated unequivocally that the United States is the only country where the handgun has developed fully as a sporting arm and is used for hunting as well as various kinds of match and silhouette shooting.

This has had a profound effect on the development of handguns and handgun cartridges in America. Shortly after WWII, for instance, there was renewed interest in the single-action revolver. This resulted in the introduction of new single-action models by Sturm, Ruger & Co. In turn, it became profitable for Colt to reintroduce their single-action revolver which had been considered obsolete. Now Ruger and several other manufacturers and importers continue the single-action tradition. Handgun hunting was responsible for new cartridges designed primarily for field use, such as the 22 Remington Jet, 221 Remington Fire Ball, 44 Magnum, and 454 Casull. The increasing popularity of silhouette pistol competition has given rise to specialized types of handguns designed particularly for this sport, as represented by the Thompson/Center Contender, Wichita Silhouette Pistol, Merrill Sportsman (now the RPM) and a number of custom handguns based on the Remington XP-100 action and the 7mm BR Remington cartridge. Some of these silhouette pistols chamber cartridges that are suitable for varmint and big game hunting.

The sporting handgun is a uniquely American innovation. Using a handgun for hunting reduces the effective range to about 100 yards, depending on the skill of the shooter. However, it offers the advantages of light weight and easy portability, decided advantages in rough terrain or heavy brush.

Handguns are divided into several types, depending on intended use. Military and police handguns are designed for defensive use at short range. Caliber commonly varies from 9mm to 45. The semi-automatic pistol is preferred by the world's military establishments, although the revolver is still used by some military police agencies. In recent years, police organizations in the U.S. have switched to the 9mm or 40 Auto, and in a some cases, the 45 automatic. Military and police handguns are usually of medium weight and have barrels of 3 to 5 inches in length. Caliber is mostly 9mm, 40 and 45, as represented by the 9mm Luger, 40 S&W and 45 ACP. Off-duty or special assignment police arms are usually lighter and have shorter barrels than standard arms.

Pocket-type self-defense handguns have generally been small, lightweight and of reduced caliber, varying from 22 to 38. Some are well made and of good manufacture; others are inexpensive and of lesser quality. Today, the trend is toward pocket-type handguns chambered in the more substancial calibers. These high-end models are often of superior quality and capable of surprising accuracy and dependability.

Well-made "pocket" or self-defense handguns can be good small game and plinking guns. Handloading with hunting-type bullets will also help adapt these to field use. However, if one is buying a handgun primarily for hunting, it is better to choose one made for that purpose. Target pistols are characterized by adjustable target sights and usually a barrel of 6 inches or so in length. Match pistols often are so specialized they are of little use for anything else.

Hunting handguns also tend to be specialized, due to the long barrel and heavy frame. Because most also have adjustable sights, they can be used for target shooting too. Any handgun can be used for hunting small game at short ranges provided its user can hit with it. Serious hunting handguns vary in caliber from 22 to 50, depending on the game to be hunted. Magnum calibers are preferred for big game. Some single shot pistols such as the Thompson/Center Contender are chambered for rifle calibers like the 30-30 and the 223 Remington.

Because handgun cartridges are limited in velocity, an important consideration is the type of bullet used. The semi-wadcutter, as designed by the late Elmer Keith, is probably the best type if cast lead bullets are used. Some of the modern jacketed handgun bullets with a large area of exposed lead at the nose have also proven highly effective on lighter species. Of the standard commercial cartridges, only the 41 Magnum, 44 Magnum, 454 Casull, 50

Action Express and 45 Winchester Magnum can be considered adequate for big game. In competent and practiced hands, the 357 Magnum has given a good account of itself on deer-size animals and, in some cases, even larger quarry. One must realize that handgun cartridges used for big game deliver marginal ballistics for that purpose compared to high-powered rifle cartridges. Therefore shooter skill is particularly critical.

Some handgun cartridges have also become popular as rifle cartridges. This includes the 357 and 44 Magnums as well as the venerable 44-40 Winchester and 45 Colt. These make a good combination for owners of handguns in these calibers because standard factory ammunition can then be used interchangeably in rifles and pistols. However, most rifles can withstand much higher pressure levels than most handguns, and handloads that are safe in a rifle may wreck a handgun of the same caliber. Use caution and common sense when reloading.

Handgun cartridges are divided into three major types—those intended for automatic pistols, those to be used in revolvers and those for single-shot pistols. Those designed for automatic pistols are either rimless or semi-rimmed to facilitate feeding through the clip or magazine. Revolver cartridges are, in general, of rimmed construction, although some revolvers have been made to handle semi-rimmed or rimless cartridges such as the 32 ACP, 30 Carbine, 9mm Luger, 380 ACP and the 45 ACP. Single shot pistol cartridges are often bottleneck rimmed or rimless. At one time, bullets intended for revolver cartridges were of lead and those for auto-pistol cartridges were jacketed to facilitate feeding. At present, it is common practice to use jacketed bullets in revolvers, particularly for hunting, although match shooters prefer light loads and lead bullets. Lead bullets are also used for target loads in automatic pistols. Jacketed bullets were used in some military revolvers since before WWI because of international agreements.

Owing to limitations in design strength of typical revolvers and pistols, smokeless powder didn't improve the performance of handgun cartridges to the extent that it did rifle cartridges. Consequently, blackpowder cartridges of medium to large caliber are almost as effective as modern non-magnum handgun cartridges. In fact, many "modern" handgun cartridges originated as blackpowder numbers and their performance with smokeless powder is about the same as it was with the original blackpowder loading.

When selecting a handgun or handgun cartridge, give careful consideration to what the gun is to be used for. Most individuals have a tendency to overdo it regarding caliber, the idea being that bigger is better. While a few experts can achieve long-range hits, most handgun hunting is for small game or varmints at ranges of 50 yards or less. It takes a great deal of practice before one can hit a target with any consistency at 100 yards and beyond. Power won't compensate for poor marksmanship, so it is best to start with something you can handle and move up to a larger caliber after proficiency has improved. Remember, the average person must expend hundreds of rounds to develop proficiency with a 22 rimfire pistol, and it takes even more practice with larger calibers.

The 22 Long Rifle rimfire is probably the most popular handgun caliber, followed by the 38 Special and 9mm Luger among the centerfires. The 22 rimfire is adequate for small game at close ranges and can serve as a house gun for home protection. The 38 Special has the advantage of being reloadable, and by choosing loads it is possible to regulate the power to cover shooting situations from very light target loads to full-power self-defense or field loads. For serious self-defense, the 38 Special and the 380 ACP are considered minimum. The 38 Special and the 357 Magnum are probably the most widely-used revolver calibers with the 9mm, 40 S&W and 45 ACP the most popular pistol calibers. For match competition, the 22 rimfire, 38 Special and 45 ACP lead the pack.

For silhouette shooting, a whole new generation of handgun cartridges has evolved and most of these are wildcats or proprietary cartridges. They are fired in unconventional handguns with long barrels of 10 to 16 inches, single shot actions mounted with scope sights. Most silhouette pistols no longer fit the usual handgun image. It has been interesting following developments in the silhouette field to see where all this will lead. Some of the wildcat cartridges designed for this sport have become standardized commercial items. Remington introduced a version of their XP-100 designed for silhouette shooting and chambered for a 7mm cartridge based on the 308x1½-inch case necked down. Originally, Remington produced only the cases and the pistols. However, the 7mm BR Remington cartridge has emerged as standard loaded ammunition.

2.7mm Kolibri Auto

Historical Notes The 2.7mm Kolibri Auto is the smallest commercially manufactured centerfire pistol cartridge. It was used in the equally-small Kolibri semi-auto pistol introduced about 1914. There was also a single shot parlor-type pistol chambered for the round. The Kolibri automatic is of conventional blowback design. The cartridge has been obsolete for many years and is a collector's item.

General Comments Small pistols and miniature cartridges may have some value for indoor target practice, but have no other practical use. The tiny 2.7mm Kolibri jacketed bullet is of .105-inch to .108-inch diameter and weighs about 3 grains. Actual ballistics are unknown, but muzzle velocity is estimated to be 650 to 700 fps. This would develop an energy of only 3 foot pounds. When you consider that the 25 ACP develops 73 fps at the muzzle, you can see what a pipsqueak this cartridge is. However, it is by no means a toy. It is claimed that the bullet will penetrate 1½ inches of pine, which is sufficient to inflict a serious wound at close range. It should be treated with the same respect accorded any firearm. The 2.7mm Kolibri could not be considered a humane caliber for hunting anything. However, it might do to dispatch a trapped mouse or eliminate an overly-aggressive cockroach. It is not practical to reload these small cartridges.

2.7mm Kolibri Auto Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
3 FMJ	FL	650-700	2.8-3.25	Vel. approx. only

3mm Kolibri

General Comments There is some confusion surrounding the 3mm Kolibri. Some say it is the same as the 2.7mm Kolibri, but physical measurements disprove this. The bullet and case are larger in diameter than the 2.7mm round. In addition, 3mm rounds have lead bullets, while 2.7mm cartridges use a jacketed projectile. Power and general characteristics would be about the same as the 2.7, which is listed above.

4.25mm Liliput Auto

Historical Notes Another of the miniature European auto-pistol cartridges, this 4.25mm (17-caliber) cartridge was used in the German Liliput pistol introduced in 1920 and this name stuck to it. However, this cartridge actually originated in Austria about 1913-14 for the Erika auto pistol. Thus it is sometimes referred to as the 4.25mm Erika. Both gun and cartridge have been obsolete for many years.

General Comments The 4.25mm round is of greater power than the 2.7 or 3mm Kolibri, but that still doesn't mean it is much of a cartridge. With a 12- to 15-grain bullet and a muzzle velocity of around 800 fps it develops only 17 foot pounds muzzle energy, still way below the 25 ACP's 73 fps. It could not be considered effective for serious self-defense or any kind of hunting. However, it would kill rats or mice at short range. As with all these miniature cartridges, it is potentially dangerous and could inflict a serious wound at short range. Its principal use would be for indoor target practice. Ammunition is scarce and too expensive to shoot in quantity anyway. It is not reloadable.

4.25mm Liliput Auto Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
12-15	FL	800	17-21.3	Vel. approx. only

5mm Clement Auto

Historical Notes The 5mm Clement cartridge originated in Spain during 1897 for the obscure Charola-Anitua auto pistol. In 1903, the Belgian-made Clement auto pistol was adapted to the round and this resulted in the change of name. The cartridge is listed in the 1904 and 1934 DWM catalog (No. 484) and was loaded in Germany until about 1938. It was replaced by the more effective 25 ACP.

General Comments The Clement auto pistol was well made and fairly popular in Europe. The 5mm cartridge is of bottlenecked type and the 36-grain bullet has a muzzle velocity of 1030 fps. Because of the high velocity, it develops slightly greater energy than the 25 ACP. However, it is not a more effective cartridge. Like the 25 ACP, it is not entirely satisfactory for self-defense and unsuitable for hunting anything but rats, mice, sparrows or similar pests. It is now a collectors' item and ammunition is far too expensive to shoot.

5mm Clement Auto Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
36 FMJ	FL	1030	78	DWM factory load

5mm Bergmann

Historical Notes Cartridge for the obsolete Bergmann No. 2 auto pistol introduced in 1894 and produced commercially from 1896 until about 1900. The cartridge is listed in the 1904 DWM catalog (No. 416A), but not in the 1934 issue. It has been obsolete since around 1930, being replaced by the 6.35mm Browning (25 ACP).

General Comments The 5mm Bergmann has a straight, tapered, rimless case. It is of .20- to .21-inch diameter and was available with a 37-grain lead or 34-grain full-metal cased or soft-point bullet. According to White and Munhall, muzzle velocity is just a little under 600 fps. Muzzle energy would be about 30 foot pounds or less than half that of the 25 ACP. Obviously not a very potent round. The cartridge has little practical value except for indoor target practice. As originally manufactured, the cartridge had no rim or extractor groove, but after a short time the extractor groove was added. This is another collector's cartridge, much too expensive to shoot.

5mm Bergmann Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME
34 FMJ	FL	600	27
37 Lead	FL	600	30

5.45x18mm Soviet

Historical Notes This modern pistol cartridge was developed in the Soviet Union in the 1970s for the PSM compact semi-automatic pistol. Its design follows Soviet tradition in that the case is bottlenecked and the bullet caliber is the same as the service rifle (the 5.45mm AK-74). The case length and overall loaded length are similar to the 9mm Makarov cartridge, however, the base and rim diameter of the 5.45x18mm Soviet is smaller. Thus far, Russia is the only country to have adopted this caliber and the PSM pistol for it.

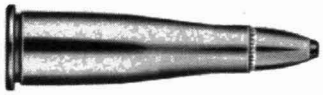
General Comments The concept behind this cartridge is unknown. By Western standards this cartridge is a very poor choice for self-defense. Muzzle energy is about the same as the 22 Long Rifle. However, a key to its purpose may be bullet construction which consists of a gilding metal jacket around a two-piece core consisting of a steel front half and a lead rear half. If penetration is the purpose, then this bullet should prove effective against body armor. Beyond this, it seems to have little use.

It is one of the few new calibers to enter production in Russia for many years. Manufactured only in the Commonwealth of Independent States, cases are normally lacquered steel with a Berdan primer. Bullet diameter is about .210-inch.

5.45x18mm Soviet Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
40 FMJ	FL	1034	95	Factory load

22 Remington Jet



Historical Notes The 22 Remington Jet, also known as the 22 Center Fire Magnum, was introduced jointly by Remington and Smith & Wesson. The former developed the cartridge, the latter the revolver. The first news of this cartridge "leaked" out in 1959, but production revolvers and ammunition were not available until 1961. The S&W Model 53 revolver is the only revolver ever to chamber this cartridge, and it was discontinued in 1971. The 22 Jet grew out of popular wildcat handgun cartridges such as the Harvey 22 Kay-Chuk and others based on the altered 22 Hornet case. However, the 22 Jet is actually based on a necked down 357 Magnum case. Marlin once offered the Model 62 lever-action rifle for the 22 Jet and the H&R Topper and Thompson/Center Contender also offered it for a time.

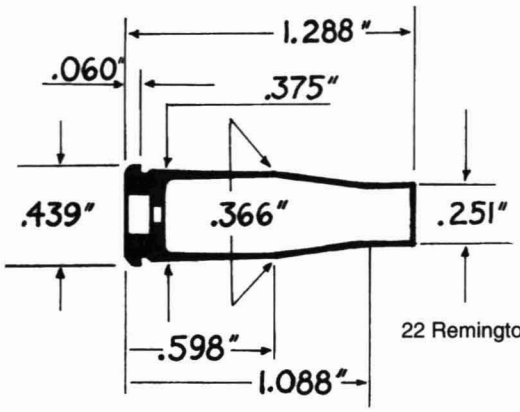
General Comments The 22 Jet is strictly a hunting number intended to provide high velocity and flat trajectory in the field. The M53 revolver will also fire regular 22 Long Rifle ammunition by use of supplemental steel cartridge chamber inserts and an adjustable firing pin. This cartridge has ample performance for small game at ranges out to 100 yards, for those who can shoot a revolver that well.

When first announced, most gun writers praised the fantastic performance. A muzzle velocity of 2460 fps was supposed to be developed in an 8½-inch barrel. Chronographed tests by various individuals, including this author, indicated an actual velocity of only around 2000 fps in this length barrel. Quite a come down, but it is still a good cartridge. The S&W Model 53 in 22 Jet was discontinued due to problems with the cylinder locking up when firing full-powered loads. The 22 Jet is no longer manufactured by Remington or other commercial manufacturers.

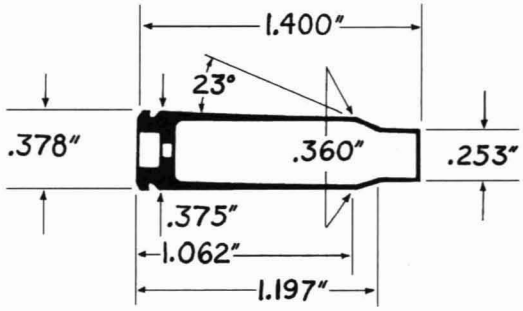
22 Remington Jet Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
40 HP	2400	10.5	1800	288	Hornady, Sierra
45 SP	2400	12.8	1700	288	Hornady, Sierra
40 HP	FL		2460	535	Factory load

Cartridges and cylinder must be free of grease or oil to prevent setback of case when fired.



22 Remington Jet



221 Remington Fireball

221 Remington Fireball

Historical Notes This cartridge was introduced early in 1963 for the Remington XP-100 bolt action, a single shot pistol based on a shortened, lightened 700 series rifle action. The pistol had a streamlined nylon-plastic stock, ventilated barrel rib and adjustable sights. This is the first handgun made by Remington since their pocket automatics were discontinued back in 1935. The Thompson/Center Contender was also available in 221 Remington but has since been dropped. Remington was the only source for 221 Fireball ammunition. It is still available from that source.

General Comments The 221 Fireball follows the modern design in 22-caliber high-velocity pistol cartridges for small game and varmint hunting at long range. The rimless case is a shortened version of the 222 Remington. The cartridge is well adapted to rifles as well as pistols. The bullet is designed for quick expansion on small animals and is very deadly at all practical ranges. The XP-100 pistol has a 10-inch barrel and is intended for scope use. It is capable of 100-yard groups as small as an inch or less when fitted with a scope and fired from a rest. It is much more powerful than the older 22 Remington Jet used in the S&W 22 WMR revolver. Muzzle energy of the 221 Fireball is greater than the 357 Magnum. Despite caliber designation, .224-inch is proper bullet diameter.

221 Remington Fire Ball Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
50 SP	1 MR 4198	17	2610	755	Speer, Hornady, Sierra, Nosler
50 SP	1 MR 4227	15.5	2600	750	Speer, Hornady, Sierra, Nosler
55 SP	1 MR 4198	16	2400	704	Speer, Hornady, Nosler
50 SP	FL		2650	780	Remington factory load

5.5mm Velo Dog Revolver*

Historical Notes Introduced in 1894 for the "Velo Dog" revolver, manufactured by Galand of Paris. It derives its name from the French word "velocycle" meaning roughly "bicycle." Later, a number of Belgian and German revolvers also chambered the round. The cartridge was loaded in the U.S. by Peters, Remington and Winchester up until about 1940. However, no American company made a gun for it. Fiocchi of Italy still loads this caliber.

General Comments The 5.5mm Velo Dog is a centerfire 22 of slightly less power than the 22 Long Rifle rimfire. It bears some resemblance to the obsolete 22 Extra Long Maynard centerfire rifle cartridge. However, it is easy to distinguish them by the head markings and because the 5.5mm has a metal cased bullet. The Velo Dog revolver was designed for cyclists to shoot pursuing dogs. This was a unique period in history. Can you imagine what would happen today if some cyclist shot a dog! The cartridge became obsolete because it is ballistically inferior to the popular 22 Long Rifle.

*There is some uncertainty as to the proper designation for this cartridge. There is also a loading called the 5.75 Velo Dog which may be the correct name for this cartridge.

5.5mm Velo Dog Revolver Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
45 FMJ	FL	750	55	Fiocchi factory load

25 (6.35mm) Automatic (25 ACP)

Historical Notes This cartridge was introduced in the United States in 1908 with the Browning-designed, Colt-manufactured, 25 Vest Pocket Automatic pistol. It was introduced in Europe a few years earlier in the F.N. Baby Browning, which is practically identical to the Colt. The design of these two pistols has been copied by manufacturers all over the world. Literally dozens of different pistols have used this cartridge. The original Browning is still made (for European consumption), but Colt did not resume manufacture of their Vest Pocket model after WWII. American Arms, Beretta, Iver Johnson, Jennings, Lorcin, Phoenix Arms, Sundance, Taurus, Ortgies, Astra, Star and Walther have all made pistols in this caliber.

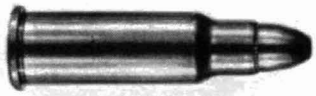
General Comments The 25 Automatic has fairly high velocity for such a small cartridge. However, the energy it delivers at any range is quite low. This, combined with the full-metal jacketed bullet, adds up to very poor stopping or killing power on anything. The 25 Auto is not powerful enough for hunting anything but pests, nor is it adequate for serious self-defense. However, the 25 auto caliber pistols are popular because of their small size and low cost. Their principal usefulness is as a threat, because no one wants to get shot if it can be avoided, even with the little 25. Recently Winchester introduced a hollowpoint load in an effort to improve terminal ballistics. (*Editor's Note: One important fact not often considered or conveyed is that the 25 ACP does provide superior functioning in typical concealable pistols, compared to any rimfire chambering. Also in spite of being very underpowered, it does beat throwing rocks and can disable or kill.*)

25 (6.35mm) Automatic (25 ACP) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
50 FMJ	Bullseye	1.2	810	73	Hornady, Sierra
45 JHP	FL		815	66	New Winchester load
50 FMJ	FL		760	64	

Colt Vest Pocket Model 1908

256 Winchester Magnum



Historical Notes The 256 Winchester Magnum handgun cartridge was announced in 1960. However, no arms were available until late in 1962 and most of these were not on the market in quantity before 1963. The Marlin Model 62 lever-action rifle was the first rifle officially announced for the cartridge. This was followed by a new Ruger single shot pistol named the "Hawkeye," which made the scene ahead of the Marlin. The Ruger "Hawkeye" was discontinued in 1966 and the Marlin 62 was dropped a few years later. The 256 Magnum is based on the 357 Magnum case necked-down to accept .257-inch diameter bullets. I understand some difficulty developed trying to design a revolver for this cartridge due to the cylinder gap and high pressure. The Ruger "Hawkeye" has a completely enclosed breech. Thompson/Center single shot pistols were also available in this caliber.

General Comments Fired in the Ruger "Hawkeye" with its enclosed breech and 8½-inch barrel, the 256 Magnum develops an average muzzle velocity of about 2360 fps. From a 24-inch rifle barrel muzzle velocity is over 2800 fps—this, with the 60-grain SP bullet originally loaded by Winchester. When first announced, the velocity was listed as 2200 fps, as the factory used a test barrel shorter than 8½ inches. Although similar to the old 25-20 cartridge, the 256 has greater powder capacity, is loaded to higher pressures and therefore gives superior performance. When used in a rifle, many shooters prefer a 75- or 85-grain bullet. The 256 Magnum should be an excellent varmint and small game round at close ranges. In a rifle, it would be effective out to 200 or 225 yards, or so. See the 18th Edition of *Gun Digest* for an excellent report on the 256—the shooting of it, etc., by Yard and Helbig. Winchester was the only source of ammunition in this caliber. Though Winchester ceased production of this caliber in the early 1990s, cases are easily formed from 357 Magnums so the handloader has no problem.

256 Winchester Magnum Handgun Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
60 SP	2400	14.6	2300	705	Hornady
60 SP	H-4227	16	2300	705	Hornady
75 SP	2400	13	2000	668	Hornady
60 SP	FL		2200	650	Winchester factory load

6.5mm Bergmann

Historical Notes Another in the series of cartridges developed by Bergmann in the 1894-96 period, the 6.5mm round is listed in the 1904 DWM catalog (#413A), but by 1934 had been dropped. Theodor Bergmann designed a number of special cartridges for his auto pistols. They ranged from 5 to 11mm in diameter and practically all of them were obsolete by about 1930. The original version of the 6.5mm was both rimless and grooveless, but because of the problem of extracting an unfired or dud cartridge, was soon altered to standard rimless design. The more popular Bergmann cartridges were loaded in England as well as on the continent.

General Comments The 6.5mm Bergmann cartridge is a necked, rimless-type that looks very powerful, but really isn't. It is actually less powerful than the 32 ACP. While not an entirely adequate self-defense round, it could be used for shooting small pests or birds. It is more powerful than the 25 ACP. However, ammunition is scarce and expensive, so no one is likely to do much shooting with it anyway. The 6.5mm Bergmann is one of the few pistol cartridges in 6.5mm caliber.

6.5mm Bergmann Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
65-88 FMJ	FL	780	94	Factory ballistics

7mm Nambu

Historical Notes This unusual pistol cartridge was manufactured only in Japan for the Japanese "Baby" Nambu semi-auto pistol, which was introduced about 1920. It was not an official Japanese military cartridge, but was specially made for high-ranking officers required to purchase their own sidearms. The 7mm Nambu pistol is a scaled-down version of the original model Nambu, which was developed about 1904. The 7mm Nambu pistol was something of a mystery until after WWII, when quantities were brought back by returning GIs. The 7mm Nambu cartridge is a collector's item and the pistols are scarce.

General Comments By Western standards, the 7mm Nambu would not be considered an adequate self-defense cartridge. For sporting use, it would be effective only on small game or birds. The pistol has a seven-shot magazine, 3¼-inch barrel, weighs only 16 ounces, and is extremely well made and of good material and finish. The 1963 (17th) edition of *Gun Digest* includes an article by Roy D. Strengholt that covers the 7mm Nambu pistol and cartridge in considerable detail. The 7mm Nambu is unusual in that it is one of the very few pistol cartridges to use a 7mm (.283-inch) diameter bullet.

7mm Nambu Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
56 FMJ	FL	1250*	196*	Factory ballistics

*Approximate

7mm Bench Rest Remington

Historical Notes Originally not a cartridge, but a chambering for the Remington Model XP-100 Silhouette target pistol, the 7mm BR has graduated to a full-fledged commercial cartridge. It has also become a rifle as well as a pistol round. It is based on the 308x1½-inch Barnes case necked-down to 7mm caliber. Originally the cartridge was made by shortening and necking-down the Remington BR case, a special 308 Winchester case with a Small Rifle primer pocket made especially for this purpose. Mike Walker of Remington was instrumental in developing the 7mm BR.

The idea is not new because the British had developed a similar, although slightly longer, cartridge as an experimental military round as early as 1945. Also, more than one person has necked the 308x1½-inch case down to 7mm. Elgin Gates worked with a similar cartridge in 1952. The Remington BR line of cartridges originated, according to company literature, in 1978. There is also a 22 BR and a 6mm BR covered elsewhere in this book. This cartridge was designed to provide an out-of-the-box silhouette cartridge with ballistics calculated to strike the best balance for accuracy, velocity and bullet weight to hit and knock down the metal targets.

General Comments External dimensions of the Remington 308 BR case are identical to the 308 Winchester. However, the walls are thinner and are annealed to facilitate reforming, and the primer pocket is sized for the Small Rifle primer. The ballistics of the factory cartridge are a 140-grain bullet at a muzzle velocity of 2215 fps and 1525 fpe. This was registered from a 15-inch barrel. It would probably do better in a longer barrel. These short 1½-inch cartridges develop their maximum velocity in a relatively short barrel, usually about 16 to 18 inches.

The 7mm BR would be a good medium-range varmint and short-range deer cartridge. It can not be improved to any extent by handloading since the standard factory load is about tops for the 140-grain bullet. Remington currently is the only source for this caliber.

7mm Bench Rest Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
100	W-748	34	2400	1279	Sierra, Hornady
120	748	32	2300	1410	Sierra, Hornady
130	H-322	27	2100	1277	Sierra, Speer, Nosler
140	748	30	2150	1450	Sierra, Hornady, Speer
150	H-335	28	2000	1333	Sierra, Speer, Nosler
160	748	28	2000	1421	Sierra, Hornady, Speer
140	FL		2215	1525	Remington factory load

7.62mm Russian Nagant Revolver

Historical Notes The military revolver cartridge adopted by Russia in 1895 and used in the Nagant and Pieper revolvers, which were both seven-shot designs as opposed to the usual six. The Nagant design is unique in that when the hammer is cocked, the cylinder moves forward over the barrel shank to form a gas seal. The gain in velocity from this arrangement is significant. However, no other revolver has ever used this ingenious, though complicated, system.
General Comments Russian Nagant revolvers have been sold in moderate quantities in the U.S., but are more a collector's item than a practical weapon. Ammunition in shooting quantities is difficult to find, but can be made from 32-20 Winchester cases, which are very similar. Power and effectiveness are about the same as the 32 S&W Long. Most versions of the cartridge have the bullet seated completely inside the case. Velocity of the 108-grain FMJ flat-nose bullet in the Nagant revolver is about 1100 fps, but the conventional Pieper revolver delivers only 725 fps. Bullet diameter is .295-inch. Both guns and ammunition are still in production in Russia. Fiocchi manufactures this cartridge.

7.62 Russian Nagant Revolver Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
98 FMJ	FL		750	122	Fiocchi factory load
108 FMJ	FL		725	125	Factory load—Pieper revolver
108 FMJ	FL		1100	290	Factory load—Nagant revolver
115 Cast	Bullseye	3.0	800	165	Lyman#31144166

Nagant Model 1895

7.65mm Roth-Sauer

Historical Notes The 7.65mm Roth-Sauer originated in 1901 as one of the calibers for the Frommer pocket-type auto pistol. About 1905, the Roth-Sauer pistol was adapted to a reduced loading of the Frommer cartridge. Due to the popularity of the Roth-Sauer pistol, the name became attached to the cartridge. Winchester loaded the round during the 1920s, but it has been obsolete since 1930.
General Comments The eight-shot Roth-Sauer pistol was a compact pocket, or self-defense, type. Despite the low power of the cartridge, the pistol had a complicated long-recoil locked breech. The 7.65mm Roth-Sauer cartridge looks like the 32 ACP, but has a shorter case and a bullet of slightly smaller diameter, (.301-inch). The 70- to 74-grain bullet has a muzzle velocity of 1070 fps, which means it develops a bit more energy than the 32 ACP. Regardless, both are in the same class and there isn't much difference to get excited about. It is possible to make 7.65mm R-S ammo from 32 ACP cases by turning down the rim, shortening and reforming.

7.65mm Roth-Sauer Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
70-74 FMJ	FL	1070	184	Factory load

7.62x25mm Russian Tokarev

Historical Notes The 7.62x25mm Tokarev was the official Soviet pistol cartridge adopted in 1930 for the Tokarev Model TT-30 and modified Model TT-33 automatic pistols. The pistols are a basic Browning-type design similar to the Colt 45 auto pistol. However, they incorporate many original features to simplify manufacturing processes and must be considered an advance over the original Browning patent. These pistols often have a crude finish, but are well made and of excellent design. They have a 4½-inch barrel and a magazine capacity of eight rounds. Large quantities have been sold as military surplus. Some were made in Communist China and Hungary, as well as in Russia. The Hungarian-made Tokarev, in a modified form called the Tokagypt, is chambered for the 9mm Parabellum cartridge. The Chinese began exporting both pistols and ammunition to the U.S. in 1987 at very reasonable prices.

General Comments The cartridge is very similar in dimension to the 7.63mm (30) Mauser and most brands of Mauser ammunition can be fired in the Tokarev pistol. The 7.62mm Tokarev is a fair field cartridge for small game with good velocity and flat trajectory, but needs softpoint bullets for maximum effectiveness. Loading data for the 7.63 Mauser can be used. The Speer 30-caliber plinker bullet of 100 grains makes a good hunting bullet, but because it is slightly heavier than the standard weight, it must be loaded to lower velocity.

Chinese or Russian ammunition is steel cased and Berdan primed with corrosive primers. Such ammunition is not reloadable. Recently, Hansen Cartridge has imported quantities of 7.62x25mm ammunition with a reloadable case and non-corrosive Boxer primers.

7.62x25 Russian Tokarev Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
86	Bullseye	5.0	1390	365	Duplicate Factory Ball
87 FMJ	FL		1390	365	Factory load

30 (7.65mm) Borchardt

Historical Notes Also known as the 7.65mm Borchardt, this is the cartridge for the Model 1893 Borchardt auto pistol. The cartridge and pistol were designed by American Hugo Borchardt, but were manufactured by Loewe in Berlin. The 30 Borchardt is listed in the 1905 and 1918-19 Remington catalogs and was loaded here for a number of years.

General Comments The 30 Borchardt is the predecessor of the 7.63 (30) Mauser, 7.65mm Mannlicher and 7.62x25mm Russian Tokarev. They all have similar physical measurements, but the modern rounds are loaded to higher pressures and velocity than the original Borchardt cartridge. The 30 Borchardt fired an 85-grain bullet at 1280 fps, whereas the 30 Mauser fires an 86-grain bullet at from 1410 to 1450 fps. Modern ammunition should not he used in the Borchardt or Mannlicher pistols. Borchardt cartridges are now scarce collectors items and should not be fired.

30 (7.65mm) Borchardt Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
85 FMJ	FL	1280	312	Factory load

7.63mm (7.65) Mannlicher

Historical Notes This straight-walled rimless cartridge was used in the Model 1900, 1901 and 1905 Mannlicher military automatic pistols. They were manufactured by Steyr in Austria and were also made in Spain. Austrian guns are well made and finished, but the Spanish types are sometimes of doubtful quality. These pistols were common military surplus items in the 1950s. Some dealers also had ammunition.

General Comments The 1900 and slightly-modified 1901 and 1905 Mannlicher pistols operate on the delayed blowback system. The non-detachable magazine is in the grip and holds eight (1905, 10) rounds. They are loaded from the top by means of a special charger, after retracting the slide. The 7.63 cartridge is only slightly more powerful than the 32 ACP, and its use in the field would have to be confined to small game. There is also a locked-breech Model 1903 Mannlicher auto pistol that fires a cartridge similar to the bottlenecked 7.63 Mauser, only not so heavily loaded. The standard Mauser cartridge must not be fired in these Model 1903 pistols, as that will quickly damage the action.

7.63 (7.65) Mannlicher Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
86	Unique	3.2	1000	193	Mauser bullet
85 FMJ	FL		1025	201	Factory load

30 (7.65x21mm) Luger

Historical Notes Introduced in 1900 by Deutsche Waffen u. Munitions Fabriken in Germany, the 7.65mm was designed by Georg Luger for the Luger automatic pistol. The cartridge is still used chiefly in the Luger pistol, although some SIG, Beretta M951 Browning Hi-Power, Ruger P89 and Walther P.38 pistols are chambered for this round. It was adopted as standard issue by the Swiss, Brazilian, Bulgarian and Portugese armies, but none of them currently issue it for front line service.

General Comments This is another rimless, bottlenecked cartridge, similar to the 30 Mauser, but shorter and not quite as powerful. It is not noted for great stopping power because of the small-diameter, lightweight, full-jacketed bullet. It is used occasionally for small game hunting and will do a fair job on rabbits and the like, provided the bullets are properly placed. The only manufacturer still offering this cartridge is Winchester. Bullet diameter is .308-inch.

30 (7.65x21mm, 7.65mm) Luger Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
93	Unique	5	1115	257	Lyman Dup. fact. ball.
100	Unique	4.8	1210	325	Speer plinker
93 FMJ	FL		1220	305	Factory load

30 (7.63x25mm) Mauser

Historical Notes The 30 Mauser cartridge was developed by American gun designer Hugo Borchardt for the first successful commercial, automatic pistol of the same name. The Borchardt pistol was made by Ludwig Loewe & Co. (later DWM) of Berlin, Germany. Both pistol and cartridge were introduced in 1893. The Borchardt automatic pistol was later redesigned and emerged as the well-known Luger pistol. This cartridge was adopted by Paul Mauser for his famous Model 1896 pistol with increased power for his more rugged design. It has been used mainly in the Mauser M1896 military automatic pistol and various imitations or copies manufactured in Spain and China.

General Comments Until the 357 Magnum cartridge came along, the 30 Mauser was the high-velocity champion of the pistol world. It has a flat trajectory that makes long-range hits possible, but lacks stopping power because of the light, full-jacketed bullet. However, it has been used successfully for hunting small game and varmints at moderate ranges. If handloaded with soft-point or hollowpoint hunting bullets, its performance can be improved a good deal. At one time, both Remington and Winchester loaded this caliber, but it has been dropped. Fresh supplies of this caliber are being imported from Portugal by Century International Arms.

30 (7.63x25mm) Mauser Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
86 FMJ	Bullseye	4.5	1160	257	Lyman
86 FMJ	Unique	6.0	1230	289	Lyman
86 FMJ	FL		1410	375	Factory load

35 Smith & Wesson Auto/35 Automatic

Historical Notes Smith & Wesson introduced this cartridge and a new auto pistol in 1913. The S&W pistol is the only one that ever chambered this cartridge. It was discontinued (in 35 S&W caliber) in 1921. The pistol was based on designs of the Belgian, C. P. Clement. Commercial ammunition was loaded until about 1940.

General Comments The 35 S&W Auto is actually a 32-caliber cartridge and is similar to the 32 ACP. In fact, it is possible to fire 32 ACP ammo in some 35 semi-auto pistols. The caliber designation was probably to prevent confusion with the 32 ACP. However, it has created more confusion than it prevented. The 32 ACP is a better cartridge and Smith & Wesson eventually chambered their pistol for this more popular round.

35 Smith & Wesson Auto Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
76 FMJ	Bullseye	1.6	809	110	Duplicate factory load
76 FMJ	FL		809	110	Factory load

32 (7.65mm) Automatic/32 ACP

Historical Notes Designed by John Browning for his first successful automatic pistol, this cartridge was first manufactured by FN in Belgium, and introduced in 1899. It was marketed in the U.S. when Colt turned out a pocket automatic on another Browning patent in 1903. The 32 Automatic is one of the more popular pistol cartridges ever developed. Colt, Remington, Harrington & Richardson, S&W, and Savage made pistols for this cartridge in the U.S. In Europe, every company that made automatic pistols chambered the 32 ACP (Automatic Colt Pistol). It was also used in the German Pickert revolver. In Europe, it is known as the 7.65mm Browning, while in the U.S. it is designated 32 Auto or 32 ACP.

General Comments This caliber uses a semi-rimmed cartridge case and a .308-inch diameter bullet. The 32 ACP is the minimum caliber that can be seriously considered for self-defense. In the United States, it is used exclusively for small pocket-type guns and is not considered adequate for police or military use. However, in Europe it is often used in police pistols and as an alternate but unofficial caliber for military sidearms. As a hunting cartridge, it is not powerful enough for anything larger than small game.

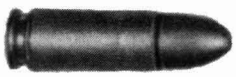
Loading tables generally give the bullet diameter of the 32 ACP as .312-inch or .314-inch. It is actually closer to .308-inch, and this is important if you handload. Effective small game loads can be made by using 100-grain 30-caliber rifle bullets intended for light loads and plinking, such as the Speer 30-caliber "Plinker." All major ammunition makers offer this caliber. Winchester recently introduced a load with a jacketed hollowpoint bullet.

32 (7.65mm) Automatic/32 ACP Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
71 FMJ	Bullseye	2.2	800	100	Sierra, Hornady
71 FMJ	700X	2.0	850	114	Sierra, Hornady
60 JHP	FL		970	125	Winchester factory load
71 FMJ	FL		905	129	Factory load
74 FMJ/JSP	FL				Early Factory Load

Colt Model 1903
Pocket Hammerless

7.65mm MAS (French)



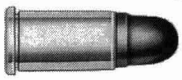
Historical Notes A military cartridge used in the French Model 1935A and 35-S auto pistols and Model 1938 submachine gun. It was replaced in 1950 by the 9mm Parabellum (Luger) cartridge. However, it is still used to a limited extent by French police. Quite a few of these pistols have been sold on the surplus market in the U.S. They are of Colt-Browning-type design, but do not have the grip safety.

General Comments The 7.65mm French MAS pistol cartridge must not be confused with the 7.65mm Luger or 7.65mm Browning Long cartridges. The 7.65mm MAS has an elongated, 19.8mm straight case. It is slightly more powerful than the 32 ACP, but not sufficiently so to make it anything but a small game number for field use. For self-defense, it would be a little better than the 32 ACP. For handloading, any 30-caliber bullet of up to 100 grains can be used. This caliber was manufactured only in French and Vietnamese arsenals. It will be found with both steel and brass cases. It is no longer in regular production, although small lots of newly made ammunition will be encountered.

7.65mm MAS (French) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
77	Unique	3.6	1100	206	Lyman#311252
85 FMJ	FL		1120	240	Factory load

32 Smith & Wesson



Historical Notes Designed for the Smith & Wesson Model 1½, hinged-frame, single-action revolver introduced in 1878, the 32 S&W is an old and very popular cartridge, widely used in the United States and in Europe for low-priced, pocket-type revolvers. Originally a blackpowder cartridge, it has been loaded with smokeless powder exclusively since 1940. In the U.S., Colt, Harrington & Richardson, Hopkins & Allen, Iver Johnson, Smith & Wesson and others have made revolvers for this cartridge. In England, Webley & Scott made revolvers for it and in Europe the Bayard and Pickert revolvers chambered it. The original loading used 9 grains of blackpowder.

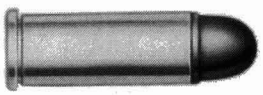
General Comments The 32 Smith & Wesson probably ranks along with the 32 ACP in general popularity, and for the same reason. It is low powered and adaptable to small, light, cheap, pocket-type handguns. Ballistically it is not quite as good as the 32 ACP. It is very similar to the 32 Short Colt, but the two are not interchangeable due to a difference in bullet and case diameter. Like the 32 ACP, the 32 S&W is about the minimum caliber for self-defense. It is considered inadequate for police work. It is used occasionally for hunting small game at very short ranges, but is too underpowered for consideration as a sporting cartridge. This caliber is still loaded by Remington and Winchester.

32 Smith & Wesson Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
85 Lead	Fg	9	680	90	Factory load (Black)
85 Lead	Bullseye	1.1	705	93	
98 Lead	FL		705	115	Factory load (Smokeless)

Webly Mark III Police Model

32 Smith & Wesson Long
32 Colt New Police
32-44 Target

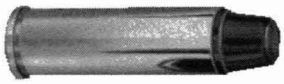


Historical Notes This cartridge was developed for the Smith & Wesson, First Model, solid-frame, hand-ejector revolver introduced in 1903. The same cartridge with a flat nose bullet is the 32 Colt New Police. Colt, Harrington & Richardson, Iver Johnson and Smith & Wesson were the principal companies making revolvers of this caliber in the United States. Many Spanish and other European revolvers such as the Bayard and Pickert chambered the round. In Europe, it had not been as widely used as the shorter 32 S&W until some ISU centerfire target shooters discovered the 32 S&W Long, and now there are several high-class European target autoloaders for the wadcutter loading of this caliber.
General Comments The 32 S&W Long is the smallest revolver cartridge deemed adequate for police use in the United States, and it has been fairly popular with detectives or plain clothesmen. It has always been available in a variety of short, light, small-frame revolvers, some of them very well made. It has a reputation for excellent accuracy and has been used for target and match shooting in the past as well as in ISU shooting. It is as accurate as the 38 S&W Special, but not as versatile. It is the minimum size for sporting use and with handloaded, hunting-type bullets is quite effective on small game. It is not as popular or widely used for defense as it once was because of the development of compact 38-caliber revolvers. Its range and effectiveness can be increased by handloading. Original load was 13 grains of blackpowder and a 98-grain bullet.

32 Smith & Wesson Long Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
90 Lead	700X	1.8	700	98	Hornady
98 Lead	Unique	1.8	665	96	Speer
98 Lead	Fg	13	780	132	Factory load (Black)
98 Wadcutter	FL		705	115	Factory load (Smokeless)

32 H&R Magnum



Historical Notes The 32 H&R Magnum was the result of a joint project between Harrington & Richardson and Federal Cartridge company. It was introduced in 1984 for the five-shot H&R Model 504, 532 and 586 revolvers. This was followed later in the same year by Charter Arms with their six-shot 32 H&R Magnum Police Undercover revolver and in 1985 by the Ruger New Model 32 Magnum Single-Six and SP101 revolvers. The 32 H&R Magnum is simply the older 32 Smith & Wesson Long case lengthened by .155-inch. Therefore, any 32 Magnum revolver will also accept and fire both the 32 S&W and the 32 S&W Long. This makes for a convenient situation because the shooter has a choice of three different cartridges that will work in one handgun. Two loadings of the cartridge are available—either a lead semi-wadcutter bullet of 95 grains or an 85-grain jacketed hollowpoint.

General Comments According to factory ballistics, the 32 Magnum delivers double the energy of the 32 S&W Long and 13 percent more energy than the standard 38 Special load. However, chronograph tests demonstrated that actual velocity at the muzzle ranges 60 to 100 fps below factory-advertised figures. Nevertheless, the cartridge performance level is well above that of any other 32-caliber handgun cartridge currently available. The 32-20 can be handloaded to equal the 32 Magnum in a revolver, but new 32-20 revolvers have not been available since before WWII.

Why didn't H&R simply chamber their revolvers for the 32-20? To do so would have required extensive design changes in their revolvers because the 32-20 is too long for the cylinder of most revolvers. In fact, its case length alone is nearly the same as the overall cartridge length of the 32 Magnum.

By the late 1980s, both H&R and Charter Arms had gone out of business, leaving Ruger as the sole supplier of revolvers in this caliber. Federal was the only ammunition maker to undertake production.

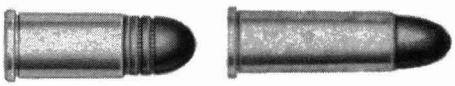
32 H&R Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
85 JHP	Unique	4.0	900	153	Hornady
90 Lead	Unique	3.4	815	145	Hornady
98 Lead	Unique	3.0	815	145	Speer
85 JHP	FL		1100	230	Factory load
95 SWC Lead	FL		1030	225	Factory load

32-20 (32 Winchester)

General Comments Although designed as a rifle cartridge, the 32-20 became popular as a revolver cartridge. Historical notes and comments will be found in Chapter 2: Current American Rifle Cartridges.

32 Short Colt—32 Long Colt 32 S&W Gallery



Historical Notes Introduced by Colt in 1875 along with the New Line model revolvers, this was originally a blackpowder cartridge using a 90-grain outside-lubricated bullet. There is also a 32 Short Colt which is identical except for a shorter case length. In England and Europe, this is known as the 320-caliber revolver. The 32 Short and Long Colt cartridges are actually obsolete, having been displaced by the 32 S&W and 32 S&W Long. Colt is the only company that used this cartridge in the United States. It was more popular in Europe, where a number of blackpowder 320 revolvers were made.

General Comments The 32 Colt cartridge was originally of the outside-lubricated type which used a bullet of .313-inch diameter. Later this was changed to an inside-lubricated type which necessitated a bullet of .299-inch diameter so the lubricating grooves would fit inside the case. Bullet weight was reduced from 90 to 80 or 82 grains in the inside-lubricated type and this also shortened the overall length a little. In power and usefulness, the Colt cartridges are nearly the same as the 32 S&W Short and Long, but not nearly as accurate. Winchester still loads the 32 Short Colt cartridge.

32 Short Colt—32 Long Colt Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
55 Lead	Black	4.5			Wadcutter lead in 32 S.C.
80 Lead	Bullseye	1.8	732	94	Approx. Factory eq. 32 S.C.
80 Lead	FL		745	100	Factory Load-Short Colt
82 Lead	FL		755	104	Factory Load-Long Colt

32 Colt

Historical Notes This cartridge was Colt's attempt at solving the problems associated with outside lubricated cartridges. The 32 Colt utilized a longer case to fully cover the lubricated portion of the bullet and carried a hollow based bullet to help obturation in the bore. This was necessary because the bullets had to be undersized to fit in the case. Reports were that the effort wasn't very successful. Loading was an 82-grain lead buillet with 12 grains of blackpowder.

320 Revolver

Historical Notes The 320 Revolver cartridge originated in England about 1870. It was the first used in the Webley revolver, but later a number of other British and European pocket-type weapons chambered it. The 320 served as the inspiration for the 32 Short Colt. It is no longer loaded by European ammunition manufacturers. At one time, it was also manufactured in the U.S., but was discontinued in the late 1920s.

General Comments The 320 Revolver is nearly identical to the 32 Short Colt in ballistic performance. The 320 is a short-range small game number only. Use the same loading data as given for the 32 Short Colt. Recently 320 Revolver ammunition has become available from Fiocchi.

320 Revolver Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
80 Lead	FL	550	54	Factory load

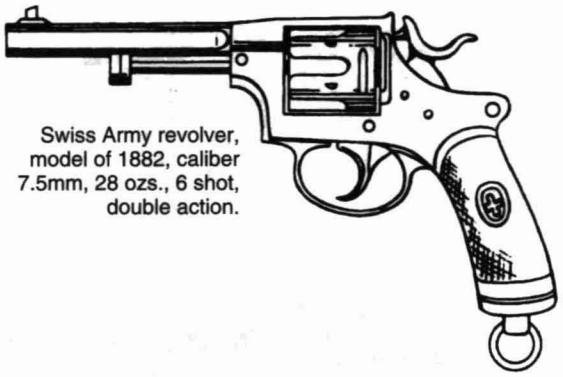
7.5mm Swiss Army Revolver

Historical Notes This cartridge was adopted by the Swiss army in 1882 and officially used until 1903. The Swiss army revolver is based on a modified Nagant system. In the early 1960s, quantities of these revolvers were sold in the American market by surplus dealers. They are quite well made and finished. Both blackpowder and smokeless powder ammunition is encountered.

General Comments The 7.5mm Swiss revolver cartridge is identical to and fully interchangeable with the 7.5mm Swedish and Norwegian rounds. Modern smokeless ammunition was loaded by Norma for the Swedish Nagant, and this can also be used in the Swiss revolver. The two cartridges differ only in bullet type. Most Swedish cartridges use an outside-lubricated bullet, whereas the Swiss also used an inside-lubricated type. Ballistics are about the same as the 32 S&W Long. For additional information, see the 7.5mm Swedish Nagant Revolver.

7.5mm Swiss Army Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
102-110 Lead	FL	700	115	Military loading



Swiss Army revolver, model of 1882, caliber 7.5mm, 28 ozs., 6 shot, double action.

8mm Rast-Gasser

Historical Notes The 8mm Rast-Gasser military cartridge was introduced in 1898 for the solid-frame Rast-Gasser military revolver patented in 1873. A number of different revolvers manufactured in Belgium and Germany also chambered the round. Although popular in Europe, the 8mm Rast-Gasser was never manufactured in the U.S. The round is obsolete and ammunition difficult to obtain.

General Comments The Gasser solid-frame revolver design is noted for the simplicity of disassembly. It also has a rebounding hammer and a spring-mounted, separate firing pin. They are usually well made and rather sturdy. Quantities have been sold at various times in surplus stores.

The cartridge resembles the 8mm French Lebel Revolver round quite closely. Bullet diameter is .320-inch. Rim and body diameter are nearly identical to the 32 S&W Long. The 32 S&W case is shorter, but both cartridges are of approximately the same power. Lyman cast bullet #313445 (95 grains) can be adapted for handloading. Loading data for the 32 S&W can be used as a guide in working up loads. This ammunition was recently loaded by Fiocchi.

8mm Rast-Gasser Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
115-126 Lead	FL	750-785		Factory load
125	FL	787	170	1914-1918 Factory load
126 Lead	FL	770	166	Fiocchi factory load

8mm Nambu

Historical Notes The official Japanese military pistol cartridge introduced in 1904 for the Nambu auto pistol, it was also used in the modified 1925 model and the odd-looking 1934 model. This was the official Japanese pistol cartridge in WWII, although other pistols and cartridges were used. It was used only by Japan.

General Comments Quite a few 8mm Nambu pistols were brought back from the Pacific battle areas by returning GIs at war's end. Ammunition has been a problem because most captured stores were destroyed. Externally, the cartridge resembles the 7.65mm Luger, but uses a larger diameter bullet and a semi-rimmed case. In power, it is slightly superior to the 32 ACP. Most Nambu cartridges are collector's items. Bullet diameter is .320-inch. Cast 32 revolver bullets sized as close to this as possible would undoubtedly work in weights of from 83 to 100 grains. Use only light charges of powder. In the 1980s, Brass Extrusion Laboratories, Ltd. of Bensenville, Illinois, manufactured 8mm Nambu brass for Midway Arms, Inc. of Columbia, Missouri. Midway no longer sells this ammunition. This caliber is no longer commercially loaded.

8mm Nambu Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
83 Lead	Unique 3.0	950	165	Estimated velocity
102 FMJ	FL	960	202	Military load

Nambu Type 14 (1925)

8mm Lebel Revolver

Historical Notes This cartridge is for the French 1892 Ordnance Revolver, commonly called the Lebel. This is a six-shot, solid-frame, double-action gun. Bayard and Pieper also made revolvers of this caliber. Small lots have shown up in surplus stores, but they are of interest mostly to military collectors.

General Comments The 8mm Lebel revolver cartridge closely resembles the 32-20 WCF and ammunition can be made by sizing 32-20 brass. It is not a common item, but surplus stores have had ammunition of this caliber available at times. The 32 Smith & Wesson Long can be fired in these revolvers, but the cases bulge badly and accuracy is poor. When cooking up your own loads, stick to moderate charges and velocity as the Lebel revolver is not designed for high pressures. For field use, this is another 32 S&W Long class cartridge suitable only for small game. Bullet diameter is .330-inch and one can use the Lyman #32359 cast bullet.

8mm Lebel Revolver Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
115 Lead	Bullseye	2.8	700	126	Lyman#32359
102 Lead	FL		625	104	Military load

7.5mm Swedish Nagant Revolver

Historical Notes The cartridge listed here is the 7.5mm Swedish for the 1887 Swedish Nagant military revolver manufactured by Husqvarna. Large numbers of these revolvers have been sold as surplus in the U.S. since the end of WWII. This has a short, rimmed case with an outside-lubricated bullet and is usually loaded with blackpowder. The revolver is long obsolete, but Norma of Sweden loaded this cartridge with Berdan-primed cases and smokeless propellants.

General Comments The 7.5mm Swedish Nagant revolver cartridge was practically unknown in the U.S. prior to 1948. It is listed here because of the large number of these revolvers imported. Many Nagant revolvers were altered to use the 22 Long Rifle by lining the barrel and bushing the cylinder. The 32 Short or Long Colt can be fired in these revolvers, but it fits loosely and accuracy is terrible. Cartridge cases can be made from empty 32-20 brass trimmed back to .895-inch in length. The Australian 310 Martini cartridge will also work if cut to the proper length. The Swedish Nagant revolver was intended for blackpowder, and only low pressure smokeless loads are safe. Ballistically, the 7.5mm cartridge is in the same class as the 32 S&W Long. The caliber is still commercially manufactured by Fiocchi.

7.5mm Swedish Nagant Revolver Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
105 Lead	Bullseye	2.0	720	120	Duplicate factory load
105 Lead	FFFg	11.5	725	121	Duplicate factory load
104 Lead	FL		725	121	Factory load
107 Lead	FL		710	108	Fiocchi factory load

8mm Roth-Steyr

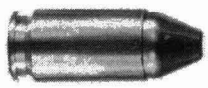
Historical Notes The 8mm Roth-Steyr cartridge and auto pistol were adopted by the Austro-Hungarian cavalry in 1907. No other country or gun employed this cartridge. It was a popular post-WWII surplus item, all but unknown on the American market prior to the war. It is a recoil-operated pistol of rather odd appearance, resembling some modern air pistols.

General Comments The 8mm Roth-Steyr cartridge is similar to the 32 ACP, but longer and more powerful. It would make a fair field cartridge for small game if loaded with hunting-type bullets. The Roth-Steyr pistol has a non-detachable magazine in the grip that holds 10 shots. As with most Austrian-designed auto pistols of the period, it is loaded by retracting the slide (bolt) and inserting a special charger from the top. It can be loaded without the charger, but this is rather slow and hard on the fingers. Fiocchi still manufactures this cartridge.

8mm Roth-Steyr Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
116 Lead	Unique	3.3	1050	283	Lyman#313226
113 FMJ	FL		1070	287	Fiocchi factory load
116 FMJ	FL		1090	309	Military load

9mm Ultra



Historical Notes This cartridge was designed for the Walther PP Super semi-auto pistol introduced in 1972-73. This seven-shot autoloader was designed particularly for the West German police. The pistol was not available to the civilian market until 1975 and then only in small numbers. Quite a few guns in this caliber have shown up in the U.S. as the West German police discontinued this caliber. In recent years, the Sig-Sauer P-230 and the Benelli B76 auto pistols have also been chambered for the 9mm Ultra. The cartridge was actually developed in 1936 for the German airforce, but was never officially adopted.

The 9mm Ultra is 1mm longer than the 380 Auto and 1mm shorter than the 9mm Luger with the same general case dimensions. In terms of inches, the 380 case length is .680-inch, the 9mm Ultra is .720-inch and the 9mm Luger is .760-inch.

The original loading of the 9mm Ultra by Hirtenberger of Austria was a 100-grain full-jacketed bullet at a muzzle velocity of 1060 fps. GECO (Dynamit-Nobel) loads a 94-grain full-jacketed bullet at an initial velocity of 1054 fps. Both bullets are of truncated cone shape. The ammunition is hard to find in the U.S., and American companies do not load it. The case has a slightly rebated rim .020-inch smaller than the base.

General Comments European police have traditionally carried small 32 ACP and 380 ACP pistols. However, with the increase in crime and attacks by terrorist groups, they found themselves outgunned by those on the other side of the law. There was some reluctance to adopt the full-powered 9mm military auto pistol, which is heavier and bulkier than the more convenient 32 and 380 autos. The 9mm Ultra was an effort to provide greater stopping power while retaining the small, handy pistols police were used to carrying. It was not successful and most German police now carry 9mm Luger-caliber pistols.

The best that can be said about the 9mm Ultra is that it is as good as and probably more effective than the 380 ACP. Handloaded with 9mm jacketed hollowpoint bullets, it would certainly be satisfactory for small game hunting. Hirtenberger, Fiocchi and Dynamit Nobel still offer this cartridge. It is sometimes called the 9mm Police.

9mm Glisenti Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
100	W231	3.6	1010	225	
123 FMJ	FL		1070	350	Fiocchi factory load
124 FMJ	FL		1050	308	Military load

Sig Sauer P230

9mm Browning Long

Historical Notes This Browning-designed pistol cartridge was popular in Europe, but never adopted by American manufacturers. It was introduced with the FN Browning 1903 Model pistol. Sweden used the pistol and cartridge as an official military sidearm starting in 1907 and sold most of these pistols as surplus after WWII. Most were altered to use the standard 380 ACP for the American market. In addition to the Browning, LeFrancais and Webley & Scott pistols used this cartridge.

General Comments The 9mm Browning Long has been used only to a very limited extent in the U.S. In size it is a shortened 38 ACP, and in power is between the 380 and 38 Colt ACP. For field use it would be strictly a small game number. Bullet diameter is the same as the 9mm Luger. These bullets for reloading are easy to obtain. Like all auto pistol cartridges, killing power can be improved with softpoint or half-jacketed hunting bullets. In Europe, this cartridge is nearly obsolete.

9mm Browning Long Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
75 Lead	Unique	5.0	1078	192	Lyman#358101
95 FMJ	Unique	5.0	1050	230	Estimated Velocity
116 FMJ	Unique	4.8	1000	255	Estimated Velocity
110 FMJ	FL		1100	300	Factory load

9mm Glisenti

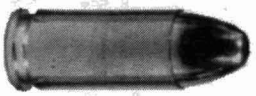
Historical Notes Adopted for the Italian military Model 1910 Glisenti auto pistol, the 9mm Glisenti was also used in other pistols and submachine guns. It was the official Italian pistol cartridge in WWI and II. It is similar in physical measurement to the 9mm Luger (Parabellum), but is not loaded as heavily. Regular 9mm Luger ammunition should not be fired in pistols intended for the Glisenti cartridge or loading.

General Comments The 9mm Glisenti is in about the same class as the 38 ACP and is not quite as powerful as the standard 9mm Luger. Quite a few Glisenti pistols have been sold on the American market through military surplus dealers. Ammunition can be made by loading 9mm Luger cases down to the proper velocity-pressure level. Bullet diameter is .355-inch, so standard 9mm Luger bullets can be used. This cartridge is now obsolete, but Fiocchi still manufactures it.

9mm Glisenti Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
116 FMJ	Bullseye	4.0	1070	294	
123 FMJ		FL	1070	350	Fiocchi factory load
124 FMJ		FL	1050	308	Military load

9x21mm



Historical Notes In many countries such as Italy, Mexico and France, it is illegal for private citizens to own semi-automatic pistols in military calibers such as 9x19mm Parabellum (9mm Luger). Faced with a strong demand for a powerful, semi-automatic pistol in a non-military caliber, the 9x21mm cartridge was developed in the mid-1980s. Basically, it is a 9x19mm Parabellum case lengthened by 2mm. However, a blunt, truncated cone bullet seated deeply in the case mouth is used. Overall loaded length is, therefore, the same as the 9mm Luger cartridge. Thus, magazines, breech faces and feed ramps which are suitable for one cartridge work fine with the other with little or no modification.

Ballistically, the 9x21mm offers the same performance as the 9mm Luger, so those barrels and recoil springs can be used. Firearms manufacturers find it an easy to transition from 9mm to 9x21to produce this caliber as needed for specialized markets.

General Comments For self-defense, the 9x21mm is fully the ballistic equal of the 9mm Luger. It is suitable for small game hunting with expanding bullets. For handloading, 9mm Luger data may be used. Despite their similarity, these two cartridges are *not* interchangeable.

With the Western European Union consolidating firearms laws, the prohibition against private ownership of pistols in military calibers will be ended. The purpose for which the 9x21mm was developed will no longer exist. Therefore, the 9x21mm will probably become history. The only commercial maker has been Fiocchi.

9x21mm Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
90 JHTP	Bluedot	10.2	1482	437	Lyman
124 FMJ	AA#7	9.8	1335	490	Lyman
147 Lead	AA#7	8.0	1089	385	Lyman#356637
123 FMJ	FL		1181	380	Patronen (Hungarian)
124 FMJ	FL		1110	340	Fiocchi factory load

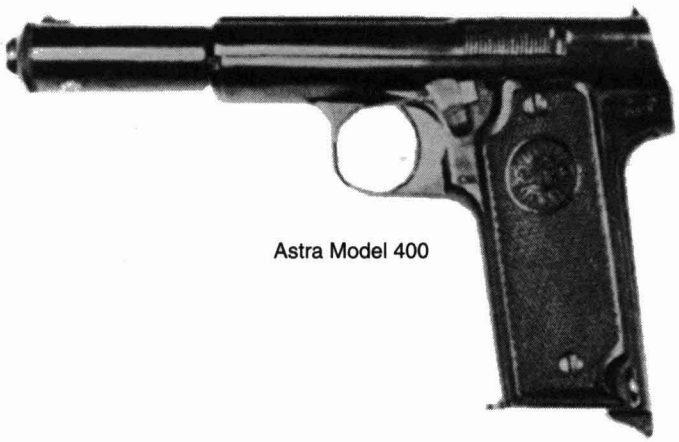
9mm Bayard Long

Historical Notes This cartridge is for the 1910 Model Bergmann-Bayard automatic pistol that was for many years the official Danish military sidearm. The Spanish also used both pistol and cartridge and consequently many Spanish-made pistols were made for this round. The Astra and various Colt-Browning copies or modifications are found in 9mm Bayard caliber.

General Comments The 9mm Bayard has never been manufactured in the U.S. Pistols of this caliber are mostly military surplus, imported and sold since the end of WWII. The cartridge is quite similar to the 38 ACP, but longer. The Astra Model 400 is designed for the 9mm Bayard and will handle the 38 ACP without any adjustment, but most other pistols won't. It is a fairly potent round and makes a good field cartridge if loaded with hunting-type bullets. The bullet diameter is .355-inch and any 9mm Luger bullet can be used, cast or jacketed. Standard loads for the 9mm Luger or the 38 Colt ACP will work fine in these pistols.

9mm Bergmann-Bayard Long Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
116 JSP	Unique	7.0	1280	420	
125 FMJ	FL		1120	352	Factory load



Astra Model 400

9mm Steyr

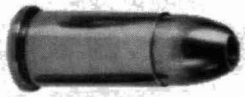
Historical Notes The standard Austrian military pistol cartridge for the Steyr Model 1912 auto pistol, the case is approximately 23mm long, as compared to the 19mm 9mm Luger. Apparently the only other country besides Austria to use this as a military round was Romania, who adopted both the Steyr pistol and cartridge in 1912. The cartridge is very similar to the 9mm Bergmann-Bayard and the two are often confused. However, 9mm Steyr ammunition is usually found with a nickel, jacketed bullet. The 9mm Bayard case is slightly longer. Quantities of 9mm Steyr pistols have appeared on the U.S. surplus military market and for a time ammunition was readily available.

General Comments The 9mm Steyr is quite similar to the 9mm Bayard. The Astra Model 400 will sometimes handle both, but other pistols won't. The 9mm Steyr is a pretty good field cartridge, similar to the 38 Colt ACP in performance. Bullet diameter is the same as the 9mm Luger and one can use Luger bullets for reloading. Any standard load for the 9mm Luger or 38 ACP will work in the Steyr pistol. This caliber is still offered by Hirtenberger AG of Austria and Fiocchi of Italy.

9mm Steyr Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
119 Lead	Unique	6.5	1200	379	Lyman#356402
115 FMJ	FL		1200	360	Factory load
116 FMJ	FL		1200	370	Military load

9mm Federal



Historical Notes The 9mm Federal was developed by Federal Cartridge Co. and first appeared in their 1989 ammunition catalog. It is a rimmed version of the 9mm Luger, intended for use in revolvers. The first handgun specifically chambered for it was the Charter Arms Pit Bull revolver, also introduced in 1989. This was a five-shot double-action revolver with a 2½-inch barrel similar to the older Police Bulldog model. The use of any rimless cartridge in double-action revolvers has never been entirely satisfactory because of extraction difficulties. The 9mm Federal was designed to eliminate this problem in the same way that the 45 Auto Rim removed the need for the half-moon clips in 45 ACP revolvers. However, the 9mm Federal lacks the very thick rim characteristic of the 45 Auto Rim. Shortly after its introduction, Charter Arms went out of business. No other manufacturer chambered this caliber. In 1992, Federal ceased manufacture.

General Comments Initial loading of the 9mm Federal was a 115-grain jacketed hollowpoint bullet at 1280 fps muzzle velocity from a 4-inch test barrel. Ballistically this equals or exceeds most +P 38 Special loads and is pushing close to 357 Magnum performance. The principal advantage of the 9mm Federal was the short case length which would allow shortening the length of the cylinder and frame of revolvers designed for it, thus reducing weight and bulk. However, no gun manufacturer ever did this; Charter Arms merely rechambered a 38 Special. As a self-defense or field cartridge it would be equal to the 9mm Luger. Unfortunately, the 9mm Federal will chamber in most 38 S&W revolvers, but should never be fired in these, particularly the old top-break type, as this would almost certainly result in damage to the revolver and injury to the shooter. Also some lots or makes of 38 S&W ammunition will fit the 9mm Federal chamber, but it is probably not safe practice to fire these in 9mm Federal guns because of the grossly oversize bullet. Last, but not least, 9mm Luger cartridges will chamber and fire in 9mm Federal revolvers, but this can create extraction and other mechanical problems. In all cases, stick to the ammunition that a gun is chambered for. Reloading data for the 9mm Luger can be used as a guide in working up reloads.

9mm Federal Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
115	HS6	7.7	1270	410	
115 JHP	FL		1280	420	Factory load

9mm Luger (9x19mm Parabellum/ 9mm Luger +P)

Historical Notes The 9mm Luger, or 9mm Parabellum, was introduced in 1902 with the Luger automatic pistol. It was adopted first by the German navy in 1904 and then by the German army in 1908. Since that time, it has been adopted by the military of practically every non-Communist power. It has become the world's most popular and widely-used military handgun and submachine gun cartridge. In the United States, Colt, Smith & Wesson, Ruger and many others chamber the 9mm, and there are many foreign-made pistols also available in it. In 1985, the 9mm Luger was adopted as the official military cartridge by U.S. Armed Forces along with the Beretta Model 92-F (M-9) 15-shot semi-auto pistol.

General Comments Although the 9mm Luger delivers good performance for police, military or sporting use, it was not popular in the U.S. until fairly recently. The principal reason was that no American-made arms were chambered for it early on. In 1954, Smith & Wesson brought out their new Model 39 semi-automatic in this caliber and Colt chambered their lightweight Commander for the 9mm Luger in 1951. This, plus the influx of surplus 9mm military automatics, greatly increased its popularity and acceptance in this country. At the present time, it is the most widely used cartridge in the U.S. A principal complaint has always been that the 9mm Luger lacks stopping power as a defensive cartridge. However, the only automatic pistol cartridge with proven stopping power is the 45 ACP. For hunting use, the 9mm Luger is adequate for most small game if hollowpoint bullets are used. The 9mm Luger cartridge is loaded by all major U.S. ammunition makers in wide variety.

9mm Luger (9x19mm Parabellum, 9mm Luger +P) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
100	Unique	5.1	1150	294	Hornady
115	Herco	6.0	1200	368	Speer
115	Bullseye	4.8	1250	399	Speer, Hornady, Sierra
115	231	5.2	1150	338	Speer, Hornady, Sierra
124/125	Unique	5.5	1150	364	Speer, Sierra
124/125	700X	4.3	1150	364	Speer, Sierra
88 JHP	FL		1500	440	Factory load
115 FMJ	FL		1160	345	Factory load
115 JHP	FL		1250	399	Factory load
124 FMJ	FL		1299	465	U.S. military load
124 FMJ	FL		1120	345	Factory load
147 JHP	FL		975	310	Factory load

9mm Mauser

Historical Notes Introduced in 1908, this cartridge was developed for the "Export Model" Mauser auto pistol. Both cartridge and pistol had a relatively short life and were discontinued in 1914 with the outbreak of WWI. Production was not resumed after the war. The 9mm Mauser was designed as a more powerful round than the 7.63mm Mauser in an effort to capture sales in Africa and South America. It failed in this effort and never became popular, although it's potentially a good field cartridge. The 9mm Mauser was revived in 1933-34 when the Swiss-designed Neuhausen submachine gun and later the Austrian Steyr-Solothurn were chambered for the round. Manufacture of the cartridge then resumed in several European countries. Today, the 9mm Mauser (DWM No. 487) is a collector's item.

General Comments The 9mm Mauser is more powerful than the 9mm Luger and also has an edge on the 38 Colt Super Automatic. It develops 534 fpe at the muzzle compared to 465 and 430 for top factory loadings of the 9mm Luger and 38 Colt Super, respectively. According to the DWM catalog, the 9mm Mauser is loaded with a 123- or 128-grain full-jacketed bullet at an initial velocity of 1362 fps. With modern bullets, it would make a good small to medium game hunting cartridge. The case is approximately .23-inch longer than the 9mm Luger, is rimless and Berdan-primed. Empty cases could be reloaded with any standard 9mm (.355-inch) bullets of 100 to 130 grains in weight.

9mm Mauser Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
125	Blue Dot	10.6	1300	467	Estimated Velocity
128 FMJ	FL		1362	534	Factory load

9mm Winchester Magnum

Historical Notes Reports on the 9mm Winchester Magnum were circulating as early as 1977, but 11 years later, in late 1988, it was still not exactly an over-the-counter item, although a few individuals were using it in Thompson/Center pistols. The cartridge is listed in the 1988 Winchester-Western Sporting Arms and Ammunition Catalog. In any event, the 9mm Magnum is one of two cartridges developed by Winchester for the stainless steel Wildey gas-operated semi-automatic pistol. This is another rather large handgun weighing over 3 pounds, unloaded, and holding 14 of the 9mm Magnum rounds. It was advertised as available in 5-, 6-, 7-, 8- or 10-inch barrel lengths and has a ventilated, raised rib over the barrel and an adjustable target-type rear sight. The pistol and cartridge are intended primarily for silhouette competition, but have an obvious field application for hunting small to medium game, or big game in the hands of an expert.

General Comments The 9mm Winchester Magnum bears some resemblance to the older 9mm Mauser cartridge and develops roughly comparable ballistics. The Mauser 9mm fires a 128-grain bullet at 1362 fps whereas the Winchester version has a 115-grain bullet that starts out at 1475 fps. The energies developed are 534 and 556 foot pounds respectively, so they are not really very far apart. A 115-grain bullet with a muzzle velocity of 1475 fps (5-inch barrel) is impressive, but no more so than some handloads in the 357 Magnum which can develop over 1550 fps with a 125-grain bullet. The 9mm Magnum is certainly more powerful than either the 9mm Luger or the 38 Colt Super and, if loaded with hunting-type bullets, should prove to be very effective for a broad range of hunting situations.

9mm Winchester Magnum Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
115 FMJ	FL	1475	556	Factory load

380 Automatic (9mm Kurz/9x17mm/380 ACP)

Historical Notes Designed by John Browning and introduced in Europe by FN of Belgium in 1912 as the 9mm Browning Short, and was added to the Colt Pocket Automatic line in 1908. It has been adopted as the official military pistol cartridge by several governments, including Czechoslovakia, Italy and Sweden and is much used by European police. Colt, High Standard, Remington and Savage have made pistols in this caliber in the U.S. In Europe, Browning, Beretta, Bayard, CZ, Frommer, Astra, Star, Llama, Walther and others made or make automatic pistols in 380-caliber. This caliber is also called 9x17mm.

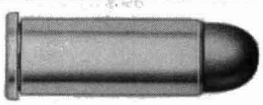
General Comments This is another cartridge that has been very popular because of the light, handy pistols that are chambered for it. The 380 Auto has more stopping power and is a far better cartridge for almost any purpose than the 32 Auto. It is about the minimum automatic pistol caliber considered adequate for police or military use. For self-defense it is not as powerful as the 9mm Luger, 38 Auto or a few others, but this is offset to a certain extent by the reduced size and weight of the arms it is used in. For hunting or field use, it will do a pretty good job on rabbits, birds or other small game. It has a fairly high velocity as compared to most light handguns, and this is an advantage for field use. With cast or swaged half-jacketed bullets of hunting type it will do a good job on small game, but not many shooters want to bother reloading it.

380 Automatic (9mm Kurz/9x17mm/380 ACP) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
90 JHP	Bullseye	3.0	900	162	Sierra, Hornady, Speer
95 FMJ	Bullseye	3.2	900	171	Speer, Sierra
95 FMJ	Unique	3.7	900	171	Speer, Sierra
85 JHP	FL		1000	189	Factory load
88 JHP	FL		990	191	Factory load
90 JHP	FL		1000	200	Factory load
95 FMJ	FL		955	192	Factory load

Astra Model 4000 Falcon

38 Short & Long Colt



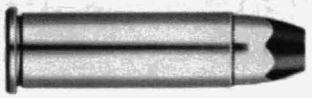
Historical Notes Obsolete for many years, the 38 Long Colt was once the official United States Army revolver cartridge, from 1892 to 1911. However, 38 Short Colt ammunition is commercially available and can be used in 38 Long Colt revolvers. It was used mainly in the Colt Army & Navy Model revolver with swing-out cylinder developed in 1887. The 38 Long Colt was actually introduced in 1875 as one of several calibers for the Colt New Line, New Police and New House revolvers. There is also a short version that is identical except for case length (.762-inch) and the fact that it used a 130-grain, outside-lubricated bullet at the same 770 fps muzzle velocity.

General Comments Since this was once a military cartridge, a number of Colt and S&W revolvers are still around in this caliber. The 38 Long Colt cartridge can be fired in a 38 Special revolver, but not vice versa. During the Spanish-American War and the Philippine insurrection, the Army found that the 38 Long Colt had insufficient stopping power for combat use. The cartridge was therefore dropped, in 1911, in favor of the 45 ACP. It is this same experience that made the U.S. Army reluctant to adopt the 9mm Luger which they eventually did anyway, in 1985, largely as a NATO-inspired political decision. Advocates of a smaller caliber admit the superior stopping power of the 45, but point out that extra weight, reduced magazine capacity, and the fact that few men can shoot well with the 45 ACP are detrimental factors that should be considered. The 38 Long Colt is in about the same class as the standard 38 Special load, but not nearly as accurate or as versatile. Some of the old 38 Long Colt revolvers will accept 38 Special or 357 Magnum ammunition but never fire these in the old 38s. Firing the 357 Magnum would be particularly dangerous, probably wrecking the gun and possibly injuring the shooter or bystanders. Remington still manufactures 38 Short Colt ammunition, but 38 Long Colt is now obsolete.

38 Short & Long Colt Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
150 Lead	FL	770	195	Factory load

38 Special (38 Special +P/ 38-44 Target/38-44 High Velocity/ 38 Smith & Wesson Special)



Historical Notes Also known as the 38 Colt Special and, more generally, as simply the 38 Special, it was developed by S&W and introduced with their Military & Police Model revolver in 1902. It was originally a military cartridge to replace the unsatisfactory 38 Long Colt then in use by the Army. Colt brought out their version in 1909, which differs from the original only in the shape of the bullet, a flat-point style. Colt, Smith & Wesson, and others make revolvers specifically for this cartridge. Several Belgian, Brazilian, German and Spanish firms also make 38 Special revolvers. The S&W 52 Target Auto available until 1993 was made for the mid-range wadcutter load. A number of good-quality, lever-action Winchester clones (1866, 1873, 1892) are chambered for the 38 Special.

General Comments The 38 Special is considered one of the best-balanced, all-round handgun cartridges ever designed. It is also one of the most accurate and is very widely used for match shooting. Any 357 Magnum revolver will also shoot the 38 Special. At one time it was the standard police cartridge here, and to a large extent in Mexico and Canada. It is also usable in lightweight pocket revolvers. Several companies make over/under, two-shot, derringer-type pistols in this caliber that are compact and relatively powerful for close-in self-defense. The 38 Special is also a very popular sporting cartridge for hunting small to medium game and varmint-type animals. With modern hunting bullets it is effective for this purpose. Because of its moderate recoil, the average person can learn to shoot well with it in a fairly short time, something not true of the 357 or 44 Magnums. The 38 Special is loaded by all major commercial ammunition manufacturers. Bullet weights from 95 to 200 grains have been available.

38 Smith & Wesson Special Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
110 JHP	Bullseye	4.7	1000	244	Hornady, Speer, Sierra
125 JHP	231	5.5	1000	278	Sierra, Speer, Nosler
140 JHP	2400	10.4	950	281	Speer, Sierra
158 JHP	Herco	5.0	900	284	Speer, Nosler, Sierra
148 WC	Bullseye	3.1	800	210	Speer, Hornady
95 JHP	FL		1175	291	Factory load
110 JHP	FL		995	242	Factory load
125 JHP	FL		945	248	Factory load
130 FMS	FL		950	260	Military load
148 WC	FL		710	132	Factory load
150 LRN	FL		890	270	Factory load
158 JHP	FL		755	200	Factory load
200 LRN	FL		730	236	Factory load

357 Magnum

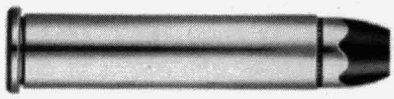
Historical Notes Introduced in 1935 by Smith & Wesson for their heavy-frame revolver. The ammunition was developed by Winchester in cooperation with Smith & Wesson. Major Douglas B. Wesson (of S&W) and Philip B. Sharpe are also credited with much of the final development work. The 357 Magnum is based on the 38 Special case lengthened about $^1/_{10}$-inch, so it will not chamber in standard 38 Special revolvers. This was the most powerful handgun cartridge in the world until the 44 Magnum was introduced in 1955. Colt, Ruger and Smith & Wesson manufacture revolvers of various types for this cartridge. There has also been a proliferation of imported single- and double-action revolvers and several single shot pistols chamber it. There is even a semi-auto pistol in this caliber. American 357 Magnum revolvers are used in Canada, Mexico and other countries.

General Comments Probably the most popular high-velocity handgun cartridge in the United States for police, hunting or target work. It provides about double the velocity and more than three times the energy of the standard 38 Special load. It is noted for its flat trajectory, deep penetration and great knockdown power. It has been used successfully on deer, black bear, elk and even grizzly bear. However, it is not really adequate for these larger animals unless used by a good handgun shot. It is also used in repeating and single shot rifles as matched arms to go along with the revolver. In a 20- to 24-inch rifle barrel, the standard factory load will develop about 1650 fps muzzle velocity and special handloads will develop over 2000. It is considered the best all-round handgun hunting cartridge for small and medium game and, under proper conditions, for deer at short range. During the Korean conflict it was found to be very effective against the body armor used by the Communist forces. Nearly every major commercial ammunition manufacturer offers this caliber.

357 Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
110 JHP	2400	19	1500	550	Sierra, Speer
125 JHP	2400	16	1200	400	Nosler, Speer, Hornady
140 JHP	296	16	1200	448	Speer, Hornady, Sierra
158 JHP	2400	13.5	1200	505	Hornady, Speer, Sierra, Nosler
110 JHP	FL		1295	410	Factory load
125 JHP	FL		1450	583	Factory load
140 JHP	FL		1360	575	Factory load
158 JHP, Lead	FL		1235	535	Factory load
180 JHP	FL		1090	475	Factory load

357 Remington Maximum



Historical Notes The 357 Maximum was announced as a joint venture between Remington Arms Co. and Sturm, Ruger, Inc. The cartridge is basically a 3/10-inch elongation of the 357 Magnum case. The first handgun to chamber the round was the Ruger Blackhawk 357 Maximum single-action revolver introduced in 1983. This was followed in 1984 by the Dan Wesson double-action, stainless steel revolver, the Seville single-action stainless steel revolver and the Thompson/Center Contender single shot pistol. During the same year Harrington & Richardson chambered their Model 258 single shot rifle for the round as did Savage in their Model 24V and Model 24VS Camper over/under rifle shotgun combination guns. Although Remington developed the commercial 357 Maximum, a similar wildcat cartridge was actually developed earlier by Elgin Gates.

Unfortunately, the 357 Maximum revolvers all developed excessive gas-cutting just forward of the cylinder within 1000 rounds or so when fired with full factory loads. Ruger withdrew their Blackhawk 357 Maximum revolver from production pending additional research and possible engineering changes. Dan Wesson approached the problem by offering a second barrel with each gun sold and a discount on a third barrel if needed. Since Dan Wesson revolvers have easily interchangeable barrels, this was a viable solution. There did not appear to be any danger involved, but it was something manufacturers did not like. There is, of course, no such problem with the Thompson/Center Contender or the rifles chambering the 357 Maximum. As this is written, the erosion problem with 357 Maximum revolvers has not been solved, ammunition is no longer available. The cartridge gained some success as a silhouette round in single shot pistols and in the Wesson revolvers.

General Comments Efforts to develop ultra high-velocity revolvers have not been crowned with unbridled success. The 22 Remington Jet and the Model 53 Smith & Wesson revolver is another example of a combination that was discontinued because of mechanical troubles. In the case of the 357 Maximum, the cartridge differs from the standard 357 Magnum only in case length, so one can drop back to shooting the 357 Magnum in any Maximum revolver or simply handload to lower velocity levels using the Maximum case. Factory ballistics were taken in a 10½-inch vented test barrel and actual muzzle velocity from a revolver with the same length barrel is about 200 fps lower than the advertised figure.

The 357 Maximum was conceived primarily as an ultra-velocity, flat-trajectory silhouette cartridge. That it would also make a good field cartridge for hunting small and medium game is pretty obvious. Many would consider it a good deer cartridge, but when used in a handgun, it would be rather marginal for that purpose. Of course, a good deal depends on the skill of the person using it and as noted, elsewhere, the older, less powerful 357 Magnum has killed its share of big game. Certainly, it will be used as a big game handgun cartridge, but the measure of success will depend as much on the man behind the gun as on the cartridge. It is difficult to predict the eventual popularity of this round or even its long-term survival.

357 Remington Maximum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
125 JHP	296	25	1800	900	Hornady, Speer
140 JHP	296	23.5	1700	899	Hornady, Speer
158 JHP	296	21	1550	843	Hornady, Speer
180 FMJ	H-4227	18.4	1300	676	Sierra, Nosler, Speer, Hornady
158 JHP	FL		1825	1168	Factory load
180 JHP	FL		1550	960	Factory load

357 Sig

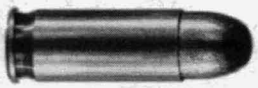
Historical Comments: This cartridge is based upon the 40 S&W case simply necked down with a short neck and a sharp shoulder. The design purpose was to achieve 357 Magnum revolver ballistics from typical semi-automatic pistols. This cartridge design offers several potential advantages. First, its compact nature allows use of a smaller (shorter) grip frame in pistols so chambered. For shooters with smaller hands this is significant; many find guns chambered for the 45 Automatic and 10mm cartridges entirely too big for proper handling and accurate shooting. Second, compared to the parent cartridge, the 357 Sig can effectively launch lighter bullets at greater velocity to achieve similar muzzle energy with less recoil. All of these considerations figured in the development of this cartridge.

General Comments: The 357 Sig is loaded to a comparatively high pressure level, the same as top factory 357 Magnum loads and fully 14 percent higher than the 40 S&W or the 9mm Luger. The combination of high pressure, reasonable case capacity and no barrel venting (as seen in 357 Magnum revolvers) allows this petite cartridge to generate significant ballistics—fully the equal of the 40 S&W in terms of muzzle energy. However, in the typical short pistol barrels used there is a price to pay for this level of performance—muzzle blast is significant. Compared to the 40 S&W, which can be chambered in the same pistols, the 357 Sig has only one advantage, a slight reduction in recoil. Time will tell if that will prove sufficient cause to popularize this cartridge.

357 Sig Factory Loads and Handloading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
88 JHP	AA #5	11.1	1616	510	Accurate/1.13″ OAL
95 FMJ	AA #5	11.0	1572	520	Accurate/1.135″ OAL
115 XTP	AA #9	13.5	1434	525	Accurate/1.14″ OAL
124 XTP	AA #9	13.0	1387	530	Accurate/1.14″ OAL
147 XTP	N350	6.9	1170	445	Vihtavuori/1.135″ OAL
95 FMJ	AA #5	11.0	1572	520	Accurate/1.135″ OAL
125 JHP	FL		1350	505	Speer/Federal

38 Automatic (38 ACP)



Historical Notes Another cartridge designed by John Browning and introduced by Colt in 1900 for their 38 Automatic. In its original form, this pistol was designed as a military gun. From this evolved the seven-shot sporting and eight-shot military models of 1902. This cartridge was stepped up in power in 1929, and the improved round called the 38 Super Auto. In the U.S., only Colt used it; in England, Webley & Scott chambered it in one version of their military automatic and in Spain a number of automatics have been made for it.

General Comments Although developed for military and self-defense use, the 38 Colt Auto achieved a degree of popularity for sporting use through its relatively high velocity. The military turned it down because of previous poor results with the 38 Long Colt. No guns designed for this cartridge have been made since 1928, but plenty of the older model Colt pistols are still used. In power it is about the same as the 9mm Luger, but it has a longer semi-rimmed case. This caliber is now obsolete. It is no longer loaded by any major ammunition maker.

38 Automatic (38 Colt Automatic/38 ACP) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
115 FMJ	Bullseye	5.0	1150	338	Hornady
125 JHP	Bullseye	4.7	1100	336	Hornady
130 FMJ	FL		1040	312	Factory load

38 Super Automatic
38 Super Automatic +P

Historical Notes Introduced by Colt in 1929 as an improved version of the older 38 Auto. The Super Auto is identical to the original cartridge except it uses a more powerful loading. It's a fine high-speed sporting cartridge for the improved Government Model automatic pistol, but it should not be used in the older Colt pocket models. In the U.S. only Colt uses it, although the Thompson submachine gun was once available in a 38 Super caliber. In Spain, Llama makes pistols for it. It is not popular in Europe, but is very popular in Canada, Mexico and South America where pistols in military calibers are prohibited.

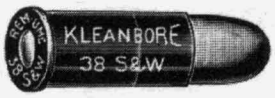
General Comments This was for many years the most powerful automatic pistol cartridge made in the United States from the standpoint of velocity and energy. It makes a good sporting cartridge for hunting small to medium game because the flat trajectory permits accurate long-range shots. However, the metal case bullet used does not bring out the full potential of this round. With a good expanding-type bullet, it is one of our better hunting cartridges. It is more powerful than the 9mm Luger, but both are adequate for about the same range of game. It will give greater penetration than the 45 ACP, but is inferior in stopping power for defense use. For handloading, any 9mm bullet can be used. However, unless proper round-nosed or conical shapes are used, it will be necessary to single load most rounds. Both Remington and Winchester still offer this caliber.

38 Super Automatic +P Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
115 FMJ	Bullseye	5.0	1200	368	Hornady, Sierra, Speer
125 JHP	231	5.4	1150	500	Sierra, Hornady, Speer
115 JHP	FL		1300	431	Factory load
125 JHP	FL		1240	427	Factory load
130 FMJ	FL		1215	426	Factory load

Colt Gov't. Model pistol in 38 Super Automatic.

38 Smith & Wesson
38 Colt New Police

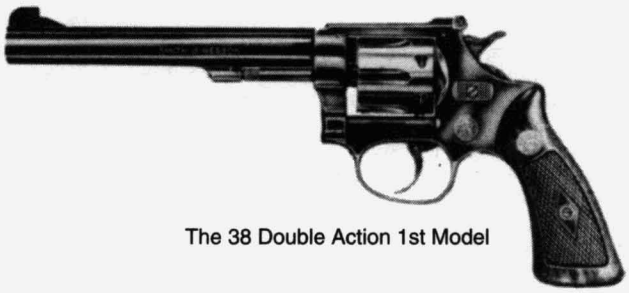


Historical Notes Designed by Smith & Wesson for their hinged-frame revolvers introduced about 1877, the 38 S&W is one of the more widely adopted American revolver cartridges; it has been used all over the world. England began using it as an official service cartridge prior to WWII, and it is rather well-distributed through the British Commonwealth. Large numbers of Spanish-made revolvers in this caliber are used in Mexico and South America, but it has never been very popular in Europe. It is also known as the 38 Colt New Police, and with a 200-grain bullet as the 38 Super Police. Colt, H&R, Hopkins & Allen, Iver Johnson, Ruger and S&W have made revolvers in this caliber in the U.S. Webley & Scott made many of the British service arms. The British service load is called the 380/200.

General Comments The 38 S&W is another cartridge that owes most of its popularity to the fact that it is well-suited to lightweight pocket guns. It is also a good short-range cartridge for defense use and has better stopping power than any of the 32s and even some of the larger automatic pistol cartridges. The British military figured out that the shocking power of this cartridge with a 200-grain bullet was about the same as their older 455 military cartridge. In actual combat this proved correct, thus permitted the use of lighter weapons. The 38 S&W is not a particularly satisfactory hunting cartridge because the curved trajectory limits its use to short ranges. However, it can be improved for hunting by handloading. Both Remington and Winchester still offer this cartridge with a 145-146-grain bullet.

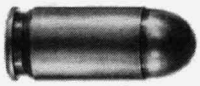
38 Smith & Wesson Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
148 Lead	Bullseye	2.5	700	161	Speer
158 Lead	Unique	3.0	700	172	Speer
145 Lead	FL		685	150	Factory load
200 Lead	FL		630	176	British military load



The 38 Double Action 1st Model

9mm Russian Makarov



Historical Notes Current Russian military cartridge used in the Makarov and Stechkin auto pistols. It was adopted shortly after the end of WWII, and its design may have been inspired by an experimental German cartridge called the 9mm Ultra. Other countries from the former Warsaw Pact also use the round. Chinese-made Makarov pistols have recently appeared on the surplus along with 9mm Makarov ammunition.

General Comments The Soviet 9mm pistol cartridge is intermediate in size and power between the 380 ACP and the 9mm Luger. Technically, it can be described as a 9x18mm, although it differs dimensionally from the 9x18 Ultra and is not interchangeable with that caliber. It is a well-designed cartridge for its purpose, although a little underpowered by Western standards. It would be satisfactory for small game if loaded with hunting-type bullets. Loading data for the 380 ACP stepped up about 10 percent would probably work in pistols of this caliber. The Makarov pistol is of medium size and is similar to the German Walther. The Stechkin is a selective-fire type that can be used with the holster stock as a submachine gun. Both pistols are well made. Speer and Sierra offer bullets in this caliber for reloading.

9mm Russian Makarov Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
90 JHP	Unique	4.3	966	185	Lyman
95 FMJ	AA#5	5.0	909	173	Lyman
95 Lead	Unique	4.0	1016	215	Lyman#364653
100 JHP	Unique	4.1	887	173	Lyman
95 FMJ	FL		1060	237	Military load

380 Short & Long Revolver

Historical Notes The 380 Revolver cartridge is a British innovation for the Webley revolver and originated about 1868-70. It was loaded in the U.S. until shortly after WWI. The 38 Short Colt was copied from it, and most 380 revolvers will accept the Colt version. It has been largely replaced by the inside-lubricated 38 S&W.

General Comments The 380 is in the same class as the 38 Short Colt or 38 S&W, which see for additional information. Use the same loading data. This ammunition has recently been available from Fiocchi.

380 Revolver Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
124 Lead	FL	625	110	Factory load

9.8mm Automatic Colt (9.65 Browning Automatic Colt)

Historical Notes This cartridge is also known as the 9.8 Colt Auto Pistol and was developed by Colt in about 1912, probably for the Model 1911 pistol. It was my understanding that this was part of an effort to secure a contract with the Romanian government whose military didn't like the 45 ACP. In any event, the Romanians opted for the 9mm Steyr Model 1912 automatic pistol produced in Austria. Only a very few Colt pistols in the 9.8mm caliber were ever made, and the cartridge was not introduced in this country. However, an identical cartridge appears to have been produced in Belgium, listed as the 9.65mm Browning Automatic Pistol. American cartridges are headstamped WRA and were manufactured by Winchester; the Belgian are marked F.N.

General Comments The 9.8mm Colt is a true 38-caliber with a bullet diameter that varies from .378- to .381-inch and weighs 130 grains. Actual ballistics are not available at this time, but the muzzle velocity must have been in excess of 1000 fps which would put it into the same class as the 38 Automatic. It would have made a fairly good military or self-defense cartridge. With all the new handgun cartridges that have appeared in the last few years, I wonder why someone hasn't latched onto this design? Increase the bullet weight to 140 grains and start it out at 1250 fps and you would have a great self-defense and field cartridge. It is long obsolete and 9.8mm cartridges are collector's items.

9.8mm Automatic Colt (9.65 Browning Automatic Colt) Factory Ballistics

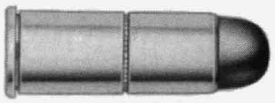
Bullet (grs.)	Powder/grs.	MV	ME	Source
130 FMJ	FL	1000	289	Estimated factory load

41 Short Colt

Historical Notes The 41 (Short) Colt uses a heel-base bullet of about 0.401-inch maximum diameter. One of an entire line of cartridges designed for application in various revolvers with cylindrical chambers, this was never a very successful cartridge. The chief complaints involved limited case support on the bullet and the problems associated with the necessary external grease grooves which tended to attract dirt. It was said that this type of cartridge was among the deadliest on the frontier, not because of its ballistic effect but because the dirt and grime it carried into even a minor wound was almost certain to lead to a fatal infection. The historical reason for the invention of heel-based cartridges stemmed from the era of the conversion cap and ball revolver. It was a simple matter to bore a hole of cylinder mouth diameter full-length through the cylinder. The heel-base bulleted cartridge was invented for use in guns so converted. The original loading used a 160-grain lead bullet and 14 grains of blackpowder.

General Comments The 41 Short Colt was never a popular chambering and offered limited ballistics. It was also very difficult to handload properly. Lyman once offered moulds that cast hollow-base bullets of inside case diameter. These were easier to load and removed the problem of the external lube groove but were not sufficiently accurate to engender any following.

41 Long Colt



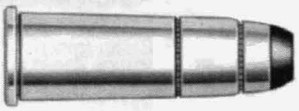
Historical Notes Introduced by Colt with their double-action or Lightning Model revolver in 1877, it was later used in the New Army, New Navy, Army Special, Single Action Army and the Bisley. No revolvers have chambered this cartridge since about the early 1930s. There is also a 41 Short Colt that is identical except for case length (.65-inch) and the 160-grain bullet used. Both were originally blackpowder cartridges using outside-lubricated bullets with a diameter of .410-inch. Smokeless, inside-lubricated cartridges have hollow-base bullets of .387-inch diameter.

General Comments Although obsolete for a long time, the 41 Long Colt was for some years fairly popular. It is largely a short-range number with its slow, heavy bullet, but it has good stopping power. Its performance can be duplicated by using the 200-grain bullet in the 38 Special. It actually isn't any more powerful than the 38 Special and, in addition, is not as accurate nor as versatile. It was never popular for hunting although it would certainly be adequate for small to medium game. Cartridges in this caliber are now collector's items as there has been no commercial manufacture for many years.

41 Long Colt Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
200 Lead	FL		730	235	Factory load
200 Lead	Bullseye	3.4	730	235	Duplicate factory load

38-40 (38 Winchester)



Historical Notes Designed primarily as a rifle cartridge, the 38-40 became a popular handgun chambering. Historical notes and comments will be found in Chapter 2, Current American Rifle Cartridges.

40 Smith & Wesson

Historical Notes This cartridge was developed as an in-house joint venture between Winchester and Smith & Wesson within a matter of six months from the time it was first discussed in June of 1989. Mr. Bersett at Winchester and Mr. Melvin at S&W were primarily responsible for this cartridge's development and standardization.

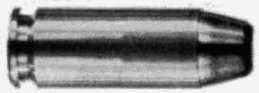
At the time the FBI had been working with the 10mm Automatic, developing a load that met their criteria for bullet diameter, weight and velocity. The folks at Winchester and Smith & Wesson realized that the power level the FBI had settled on could easily be achieved using a much shorter cartridge. This would facilitate accuracy and allow use of a smaller, more comfortable grip frame.

General Comments Until quite recently none of the factory loads available actually took full advantage of this cartridge's potential. Several now offered actually generate about 500 fpe in typical guns. This is serious power for such a small package and rivals the best the 45 Automatic can offer. However, there are no free lunches; such a powerful and compact package requires comparatively high pressures. High peak pressure and a short barrel equates to high noise and muzzle blast. Nevertheless, for its purpose this has to be considered a superior cartridge design. It has already completely eclipsed the similar 41 Action Express.

40 S&W Auto Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
135 JHP	Universal	7.5	1324	524	Hodgdon
155 JHP	Universal	6.6	1186	482	Hodgdon
180 JHP	Universal	5.8	1046	435	Hodgdon
200 JHP	HS7	7.4	907	363	Hodgdon
155 JHP	FL		1140	447	Factory load
155 JHP	FL		1205	500	Factory load
155 FMJ-SWC	FL		1125	436	Factory load
180 JHP	FL		990	392	Factory load
180 JHP	FL		1015	412	Factory load

10mm Automatic



Historical Notes The 10mm Auto was introduced in 1983 as the cartridge for the Bren Ten semi-auto pistol as manufactured by the now-defunct Dornaus & Dixon Enterprises, Inc. of Huntington Beach, California. The ammunition is loaded by Norma and has a 200-grain full-jacketed bullet with a truncated cone shape, similar to some 9mm Luger and 45 ACP loads of some years back. According to data furnished by Norma, the ammunition is loaded to a mean working pressure of 37,000 psi with a maximum pressure of 44,400 psi plus or minus industry tolerance. This is getting up in the area of some rifle loads and makes this a pretty hot handgun cartridge. Muzzle velocity is listed as 1200 fps and energy at the muzzle as 635 fpe. This makes the cartridge more powerful than the 357 Magnum or the lead bullet police load of the 41 Magnum. The muzzle energy is about double that of the 45 ACP. The gun and cartridge are the brain children of Jeff Cooper and associates who are trying to develop the ideal combat weapon. Colt and several others now offer the 10mm chambering.

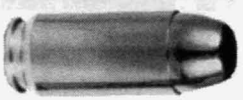
General Comments The Bren Ten semi-auto pistol was based on a modification of the much-praised Czech CZ-75 pistol design and had a 5-inch barrel, 11-shot magazine and weighed 39 ounces. It was a full-size combat-type pistol intended primarily for law enforcement/self-defense use but it had many design problems.

The 10mm cartridge should be an ideal combat round with good stopping power, particularly with an expanding-type bullet. However, recoil is quite heavy. It would also be a good field cartridge for small to medium game or larger animals in the hands of a good shot and skilled hunter. In the late 1980s, the FBI adopted this caliber in a slightly reduced loading with a S&W pistol as standard issue. Problems with the guns have delayed general issue. Evaluation of its stopping power against determined criminals will require much more information than is currently available. The ammunition was initially quite expensive. This discouraged non-handloaders from doing much shooting. All in all, the Bren Ten pistol and cartridge is an excellent concept for a combat handgun, and it reflects the extensive background and experience of Jeff Cooper. Hornady, Speer, Sierra and Nosler, offer suitable bullets. The 10mm Auto cartridge is now loaded by Federal, Winchester, Remington, CCI and other U.S. ammunition manufacturers. Actual ballistics are generally about 100 fps slower than early factory claims, therefore, actual 10mm Automatic factory loads do not significantly exceed 45 Automatic +P ballistics.

10mm Automatic Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
155 JHP	Blue Dot	12.0	1250	538	Hornady, Sierra
180 JHP	Blue Dot	10.0	1150	529	Hornady, Sierra
200 FMJ	Blue Dot	8.5	1100	537	Hornady
170 JHP	FL		1340	680	Norma Factors Wad
180 JHP	FL		1030	425	Factory Load
180 JHP	FL		950	361	FBI Factory Load
200 FMC	FL		1200	635	Factory load

41 Action Express



Historical Notes The 41 Action Express (41 AE) was designed by Evan Whildin, vice president of Action Arms, in 1986. The cartridge is unique among modern handgun cartridges in that it has a rebated rim that will fit 9mm bolt faces and can be used in guns originally designed for the 9mm without the need for extensive changes. The 41 AE is chambered in the Action Arms AT-88, which is a beefed-up copy of the Czech CZ-75 auto pistol. The cartridge was originally developed with a 170-grain JHP bullet at 1130 fps initial velocity. However, the first commercial ammunition, loaded by Samson in Israel and imported into the U.S., has a 200-grain flat-nose bullet with a muzzle velocity of 1000 fps, and a 180-grain JHP bullet, also at 1000 fps.

General Comments The 41 AE cannot be readily formed from any other brass case although it is possible to make cases from 41 Magnum brass by trimming to .866-inch and turning down the rim on a lathe. This is, in fact, how the first experimental cartridges were made by Evan Whildin. According to Bob Olsen of Action Arms, the cross sectional area of the bullet is 33 percent greater than the 9mm, and the bullets are one-third heavier. He also says that the Samson brass cases have been strengthened so as to prevent any bulging in blowback guns. Bullet diameter is the same as the 41 Magnum—.410-inch.

The 41 AE delivers practically the same ballistics as the 41 Magnum police load which should make it an effective police or self-defense cartridge. The AT-88 pistol is based on a well-proven design and is accurate and pleasant to shoot. Recoil of the 41 AE is quite noticeably less than the 45 ACP. The 180-grain load should be a good field load. However, one can handload cases with lighter jacketed or cast bullets. Israel Military Industries (Samson) is the only commercial manufacturer.

41 Action Express Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
170 JHP	Unique	6.9	1100	457	Sierra
170 JHP	Herco	7.1	1100	457	Sierra
210 JHP	Unique	5.5	900	378	Sierra, Hornady
180 JHP	FL		1000	400	Factory load
200 FMJ	FL		1000	448	Factory load

41 Remington Magnum

Historical Notes The 41 Remington Magnum revolver cartridge was introduced in June, 1964 along with the S&W Model 57 revolver. This is a heavy-frame gun, essentially the same as the older 44 Magnum, but of smaller caliber. The 41 Magnum is very similar to an old, but little-known wildcat cartridge called the 400 Eimer. Bullet diameter of the 41 Magnum is a true .410-inch rather than the .386-.387-inch of the 41 Long Colt. Both a police load and a more powerful softpoint hunting round were introduced at the same time.

Like most new cartridges, a number of individuals claim to have originated or influenced the design of the 41 Magnum. It might be well in passing to mention that the 400 Eimer appeared around 1924. Possibly a number of persons working over a period of time convinced Remington that it would be a good idea to bring out such a round. Probably Elmer Keith deserves the major credit. The author is one of few on record as stating flatly he didn't have anything to do with it.

General Comments There has been much argument as to the need for a police cartridge of greater stopping power than the 357 Magnum. Few understand why a blunt 200-grain bullet for the 357 wouldn't have served this purpose. Also, a lighter 210-grain police load could have been worked up for the 44 Magnum. However, someone wanted a new cartridge and the 41 Magnum was the result.

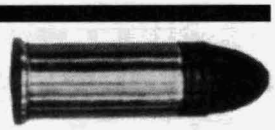
Actually, the new round is a more practical all-round hunting cartridge for the average individual than the 44 Magnum. The 357 is not entirely adequate for big game except in the hands of a good shot and experienced handgun hunter. The 44 Magnum is overpowered for anything but big game and most people don't shoot very well with it. The 41 Magnum covers the small, medium game and varmint-through-deer class quite adequately. Its effectiveness on anything heavier than deer would depend on who was using it and under what conditions.

Recoil and muzzle blast of the 41 Magnum are slightly less than the 44 Magnum, but still heavy. The average shooter will require about as much training and practice to master one as the other. The 210-grain lead police load with its 1150 fps is relatively pleasant to shoot and really quite adequate for small game or varmints at average handgun ranges. Factory-claimed velocities are for an $8^3/_8$-inch barrel. Velocity developed from the 6-inch barrel is about 1000 fps for the police load and 1360 to 1400 fps for the softpoint hunting load. In summing up, the 41 Magnum is not quite as powerful as the 44 Magnum, but it is all the gun the average handgun hunter needs. A number of police departments have adopted the 41 Magnum but most have since dropped it in favor of 9mm Luger or 40 S&W semi-automatic pistols. All major domestic commercial ammunition makers offer this caliber.

41 Remington Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
170 JHP	2400	21	1400	740	Sierra
210 JHP	296	20	1200	672	Speer, Nosler, Sierra, Hornady
210 JHP	H-110	20	1200	672	Speer, Nosler, Sierra, Hornady
170 JHP	FL		1420	761	Factory load
175 JHP	FL		1250	607	Factory load
210 Lead	FL		965	434	Factory load
210 JHP	FL		1300	788	Factory load

10.4mm Italian Revolver



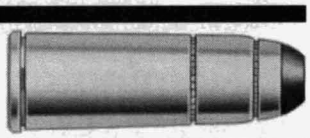
Historical Notes Developed for the Italian Model 1874 service revolver, but also used in the Glisenti Model 1889 revolver, it is sometimes listed as the 10.35 Italian Revolver or 10.35 Glisenti. Black and smokeless powder ammunition is encountered. Both of the above revolvers have been sold from time to time in surplus stores.

General Comments The 10.4 Italian cartridge is another one similar to the 44 S&W Russian. It would be an effective short-range self-defense or small game hunting number. Ammunition in this caliber is still commercially available from Fiocchi.

10.4mm Italian Revolver Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
177 Lead	FL	735	212	Blackpowder military load
177 Lead	FL	800	240	Smokeless factory load

44-40 (44 Winchester)



Historical Notes Designed primarily as a rifle cartridge, the 44-40 became a popular handgun chambering, and many early shooters carried both a rifle and revolver chambered for it. Historical notes and comments will be found in Chapter 2.

44-40 Revolver Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
200 SP	Unique	11.1	1125	560	Lyman
205 Lead	Unique	10.9	1095	545	Lyman#42798

44 Smith & Wesson Russian

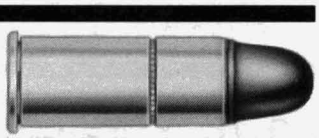
Historical Notes Designed by S&W for their Russian Model military revolver in 1870, the first models of which were made for the Imperial Russian Army. A civilian or commercial model was also manufactured beginning in 1878. The Colt Bisley Target Model and their regular single action were available in this caliber as well as several others. The German firm of Ludwig Loewe made copies of the S&W Russian Model revolver in the same caliber.

General Comments Originally loaded with blackpowder, the 44 S&W Russian was one of the most accurate and popular cartridges of its day. It was the favorite of Buffalo Bill Cody and many other western characters. Good accuracy was reported clear out to 200 yards, and some of the first precision handgun shooting was accomplished with this cartridge. It was made obsolete by the 44 S&W Special, which was better suited to the early smokeless powder. Any gun chambered for the 44 Special or the 44 Magnum will also shoot the 44 Russian. It makes a fairly good field cartridge, but it is not as good as the 44 Special because of the old blackpowder revolvers it was used in, and the fact that it can't be handloaded to the same level. Cases can be made by trimming 44 Special brass back to a length of 0.97-inch. Fiocchi offers 44 Russian ammunition and others will soon offer it for use in cowboy action shooting.

44 Smith & Wesson Russian Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
246 Lead	FL		770	324	Factory load
246 Lead	Bullseye	3.6	700	265	

44 Smith & Wesson Special



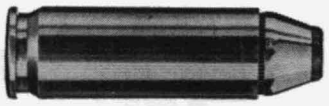
Historical Notes With the coming of the bulkier smokeless powders the 44 Russian cartridge case proved not quite large enough to permit efficient use of full charges of the new propellants. Though originally a blackpowder cartridge, the 44 Special which is about .2-inch longer than the Russian, eliminated this problem and provided more power as well, while using the same bullets as the older 44 Russian. The cartridge was introduced about 1907. Both Colt and S&W made revolvers of this caliber and a few Spanish and other European revolvers were also made to handle it. There has been a rebirth of interest in the 44 Special in the past few years.

General Comments The 44 Special is one of our most accurate and powerful big-bore revolver cartridges. However, it was never loaded to its full potential by the factory, and it was left to the individual handloader to develop truly effective hunting loads. Experiments by men like Elmer Keith to produce big game potential in the caliber culminated in the 44 Magnum. The 44 Special is still popular for target or field use and can be handloaded to nearly equal the 44 Magnum. However, revolvers for the 44 Special aren't strong enough to handle loads as heavy as those used in Magnum guns. Winchester, Remington and Federal still load ammunition in this caliber.

44 Smith & Wesson Special Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
180 JHP	231	6.8	900	324	Sierra, Hornady
200 JHP	231	6.0	800	284	Speer, Nosler, Hornady
240 JHP	HS-6	7.5	750	300	Hornady, Speer
200 JHP	FL		900	360	Factory load
200 L-SWC	FL		1035	476	Factory load (Very Optimistic Data)
246 Lead	FL		755	310	Factory load

44 Auto Mag



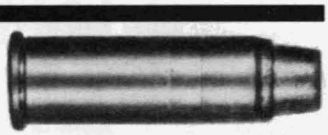
Historical Notes Introduced late in 1971, this cartridge was developed for the Auto Mag pistol designed by Harry Sanford of Pasadena, California. The gun was also made and marketed for a few years by High Standard. The cartridge is made by simply cutting off 30-06 or 308 Winchester cases to a length of 1.30 inches, inside reaming to make them accept .429-inch diameter bullets and finally trimming to a length of 1.298 inches. The newly formed brass is then loaded with standard .429-inch jacketed bullets of 200 to 240 grains weight. For a time, 44 Auto Mag cases were made in Mexico by Cartuchos Deportivos Mexico and headstamped CDM. Loaded ammunition was later offered by Norma of Sweden. A few custom loaders furnished loaded rounds. Loading and trim dies are made by RCBS. The 44 Auto Mag cartridge was used only in the Auto Mag semi-auto pistol which is no longer in production.

General Comments The Auto Mag semi-auto pistol operates on the short recoil principle with a six-lug, front-locking rotary bolt. Made almost entirely of stainless steel, it has a 6½-inch barrel, an overall length of 11½ inches and weighs about 3½ pounds. It was the most powerful commercial semi-auto pistol manufactured at that time. When loaded to maximum, a 200-grain bullet can be pushed at over 1500 fps and the 240-grain to 1400 fps. Unfortunately, the Auto Mag pistol had a rather short, stormy career marked by more than its share of manufacturing, marketing and mechanical troubles. The 44 Auto Mag pistol was developed primarily as a sporting gun. It has been used to take all kinds of big game including deer, elk, moose and the big brown bears. It is in the same class as the 44 Magnum revolver. Norma no longer offers this cartridge.

44 Auto Mag Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
180 JHP	2400	25	1600	1024	Sierra
200 JHP	296	26.5	1500	999	Hornady
240 JHP	296	24	1350	972	Sierra, Hornady
240 JHP	H-110	23	1400	1045	Hornady

44 Remington Magnum



Historical Notes Developed by Smith & Wesson and Remington and introduced in 1955 for a new heavy-frame 44 Magnum revolver. Ruger, Colt, Smith & Wesson and others make revolvers for this cartridge. Its development was inspired and much preliminary work done by Elmer Keith and that group of hand-cannon fanatics who insisted on the ultimate in handgun accuracy, range and power. Ruger introduced a semi-auto carbine in 44 Magnum caliber in 1961, and Marlin introduced their Model 94 lever action in 1967.

General Comments In addition to having been, for many years, the world's most powerful commercial handgun cartridge, the 44 Magnum also has a well-deserved reputation for superb accuracy. It is used more as a field or hunting round than anything else, but a few police officers favor it because of its ability to penetrate an automobile body. It takes a seasoned handgunner to shoot it well as both recoil and muzzle blast are considerable. It is one of the few commercial handgun cartridges that can be considered really adequate for big game. It has been used to take deer, black bear, elk, moose and the big Alaskan brown bears. It has often been chambered in rifles, with the Model 1894 Winchester or the Remington Rolling Block action generally used. In a 20- or 24-inch rifle barrel, the standard factory load will develop about 1720 fps at the muzzle and 1580 fp of energy. This equals the energy of the 30-30 rifle cartridge. It is a very flexible cartridge when handloaded, and can be made to cover any situation within the scope of the modern revolver. Very few, if any, police departments use it because it is simply too much for the average police officer to handle. Its use in police work is largely a personal thing. All major manufacturers of commercial ammunition offer this cartridge in a wide variety of bullet weights.

44 Remington Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
180 JHP	Unique	14	1500	900	Hornady, Sierra
200 JHP	296	26	1450	934	Hornady, Speer
240 JHP	H-110	23	1350	971	Speer, Hornady, Sierra, Nosler
250 FMJ	2400	21	1250	868	Sierra
180 JHP	FL		1610	1035	Factory load
210 JHP	FL		1495	1042	Factory load
210 JHP	FL		1250	729	Factory load
240 Lead	FL		1350	971	Factory Load.
240 JHP	FL		1180	741	Factory load
240 Lead	FL		1000	533	Factory load
240 Lead	FL		1350	971	Factory load
250 FMJ	FL		1180	775	Factory load

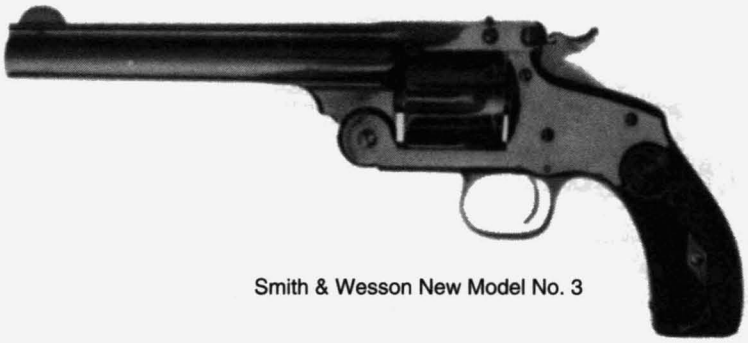
44 Smith & Wesson American

Historical Notes This is one of the earliest American centerfire revolver cartridges. It was used in the Smith & Wesson single-action Model 3 revolver, known more generally as the 44 S&W American model. It is known to have been in use late in 1870 and was probably introduced as early as 1869. The U.S. Army used the cartridge and revolver for a short time between 1871 and 1873. The Merwin Hulbert & Co. Army revolver also was made for this round. Commercial ammunition in black and smokeless types was manufactured until about 1940.

General Comments The 44 S&W American is another obsolete blackpowder number that survived an amazing number of years. It used an outside-lubricated bullet of the same diameter as the 44 S&W Russian inside the case, and a slightly larger diameter outside the case. Ammunition with both Boxer- and Berdan-type primers was loaded. Reloadable cases can probably be made by reforming 44 Magnum brass, and dies to do this are available from RCBS. Revolvers for this cartridge are of the older blackpowder type and loads should be kept mild. The 44 American could be used for hunting at short range, but there are better and more modern cartridges available. In power it is comparable to the 41 Long Colt. Cartridges in this caliber are now collector's items.

44 Smith & Wesson American Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
218 Lead	FFg	25.0	660	196	Factory load
200 Lead	Unique	5.5	765	259	Lyman#419180
205 Lead	FL		682	212	Factory load



Smith & Wesson New Model No. 3

44 Webley/442 RIC

Historical Notes The 44 Webley originated in 1868 for the Webley Royal Irish Constabulary model revolver. In England it is listed as the 442 Revolver Center Fire. In the U.S. it was loaded as the 44 Webley up to about 1940. At least one model H&R revolver chambered it. It was also loaded in Europe where it is called the 10.5x17Rmm or 442 Kurz (DWM #221). It is now obsolete.

General Comments The 44 Webley was popular for use in pocket-type or self-defense pistols. In power it is in about the same class as the 41 Long Colt or 44 S&W American. It has much better stopping power than some of the smaller calibers, but is strictly a short-range proposition. Original loading was 15 to 19 grains of blackpowder and a 200- or 220-grain bullet. Late manufactured ammunition used smokeless powder. It is long obsolete and cartridges in this caliber are now collector's items.

44 Webley/442 RIC Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
200 Lead	FL	715	230	Remington factory load
220 Lead	FL	700	239	Kynoch factory load

44 Bull Dog

Historical Notes The 44 Bull Dog appears to have originated about 1880, perhaps a year or two prior to that. The first reference the author could locate was in the 1880 Homer Fisher gun catalog reproduced in L.D. Satterlee's Ten Old Gun Catalogs. British Webley Bull Dog revolvers are advertised therein. American companies loaded the round up to about 1938-39. The 1933 Winchester catalog lists it as for "Webley, British Bull Dog and H&R revolvers."

General Comments The Bull Dog-type pocket revolver was quite popular through the late 1800s. The 44 Bull Dog cartridge was much superior to some of the rimfire calibers of that period. It provided reasonably good short-range stopping power in a fairly compact gun. However, it is solely a short-range, self-defense round of little value for anything else. It is in the same general class as the 41 Short Colt. The cartridge has been obsolete for a good many years. Both black and smokeless loadings are encountered.

44 Bull Dog Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
168-170 Lead	FL	460	80	Factory load

Webley's British Bull Dog

44 Colt

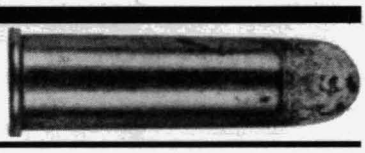
Historical Notes The 44 Colt is yet another blackpowder cartridge of importance primarily because it was once used by the U.S. Army. It was introduced about 1871 and used by the Army from then until 1873. It was used in the metallic cartridge conversion of the Colt 1860 percussion revolver, and could also be fired in the Remington Model 1875 44 Army revolver. Commercial ammunition was loaded in black and smokeless powder types up to about 1940.

General Comments The 44 Colt uses an outside-lubricated bullet and is similar to the 44 S&W American, but has a longer case of slightly larger diameter. Early ammunition used the inside Benet cup and Martin folded-type primers. Ammunition has become a collector's item and revolvers for this cartridge are very seldom encountered. Ballistically it is about the same as the 44 S&W American.

44 Colt Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
210	Bullseye	4.0	700	226	Lyman#429185
210 Lead	FFg	23	660	206	Factory blackpowder load
225 Lead	FFg	23	640	207	Blackpowder military load
210 Lead	FL		660	206	Factory load
225 Lead	FL		640	207	Factory load

11.75mm Montenegrin Revolver



Historical Notes Cartridge for the obsolete Montenegrin and Austro-Hungarian revolvers based on the Gasser system. The round was introduced about 1870 and is also known as the 11mm Austrian Gasser and 11.25x36mm Montenegrin. The revolver for the cartridge is a large, massive hinged-frame type weighing around 4½ pounds. G. Roth manufactured ammunition (#287) and apparently so did a number of other companies including a few lots made by Winchester. Both the 11.75mm cartridge and revolver are now in the realm of the collector.

General Comments The 11.75mm is quite a large revolver cartridge, being longer and larger in diameter than the 44 Magnum. The 282- to 313-grain .445-inch bullet is also unusually heavy for a handgun cartridge. As a blackpowder number, it should have knockdown and stopping power on a par with the 44 S&W Special or the 45 Colt, possibly better with the heavier bullet. The author has no loading data, but has been told ammunition can be made by shortening and reworking empty 45-70 cases.

11.75mm Montenegrin Revolver Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
282-313 Lead	FL	700	328	Factory load

11mm French Ordnance Revolver

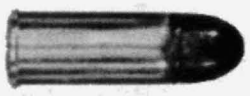
Historical Notes Early French military cartridge for the Model 1873 Ordnance Revolver. It became obsolete in 1892 on adoption of the smaller 8mm Lebel revolver and cartridge. A few of the old M73 revolvers have been sold in surplus stores, however, ammunition is very scarce. Evidently, the 11mm refers to bore diameter as barrels measure close to 0.451-inch across the grooves.

General Comments Most military establishments of the period around 1870 used similar handgun cartridges, usually of 43-, 44- or 45-caliber. The 11mm French round is another one not very much different than the 44 S&W Russian. Satisfactory ammunition can probably be made by shortening and reforming 44 S&W Special brass. Lyman #42798 (205 grains) cast bullets can be used although undersized. Bullet #452460 (200 grains) can also be used if swaged down to about .447-.450-inch. There really isn't an entirely satisfactory bullet for this particular cartridge. Power is a little less than the 44 S&W Russian, but the 11mm French cartridge would make an effective short-range self-defense or small game field round. Ammunition in this caliber has been obsolete for many years. Cartridges are scarce collector's items.

11mm French Ordnance Revolver Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
180 Lead	FL	695	195	Blackpowder military load

11mm German Service Revolver



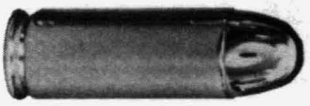
Historical Notes Cartridge for the German 1879 and 1883 model service revolvers. It has been obsolete since 1904, but a few of these revolvers were used in WWI and even the last stages of WWII. The cartridge is also listed as the 10.6 or 10.8mm German service or ordnance revolver load (DWM #200 & 200A). Moderate numbers of the above revolvers have been sold by surplus dealers in the U.S. This cartridge used a heeled bullet of about 0.451 inch maximum diameter.

General Comments The 11mm German ordnance cartridge bears a close resemblance to the 44 S&W Russian. The two are of the same power. The old German revolvers were designed for blackpowder and only low pressure smokeless loads should be fired in them. Ammunition can be made by shortening and reforming 44 S&W Special cases. This caliber is obsolete. Ammunition has become a collector's item.

11mm German Service Revolver Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
262 Lead	FL	700	288	Blackpowder military load

45 Winchester Magnum



Historical Notes The 45 Magnum was first listed in the 1979 Winchester gun and ammunition catalog although reports of the impending release were circulating some 2 years earlier. The cartridge is used in the on-again-off-again Wildey gas-operated semi-automatic pistol and has also been adopted as a standard chambering for the Thompson/Center Contender single shot pistol. The cartridge is essentially an elongated version of the 45 ACP. Both the gun and the cartridge were developed initially for silhouette competition, but with the ballistics developed (a 230-grain bullet at a muzzle velocity of 1400 fps) the cartridge should prove an effective hunting round.

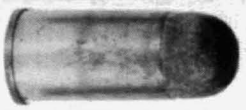
General Comments The 45 Winchester Magnum develops 72 percent higher velocity and 200 percent greater muzzle energy than the standard 45 ACP and is in the same class as the 44 Magnum revolver cartridge. With its rimless case, it would be a natural for eventual use in a semi-automatic rifle. Having made this suggestion, if it ever comes to pass, the author can now claim that it was all his idea. The Wildey 45 Magnum along with the 44 Auto Mag, the Desert Eagle and the LAR Grizzly are the only automatic pistols that truly qualify as big game handguns. The potential is there for a fine combination silhouette and hunting pistol. The price is high, and for strictly silhouette shooting, the much lower-priced Thompson/Center Contender in the same caliber might appeal to many potential buyers. The availability of commercial ammunition with hunting-type bullets would also be a factor, although there is a good variety of such bullets available to the handloader.

45 Winchester Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
185 JHP	Blue Dot	20.0	1850	1406	Hornady
200 JHP	2400	22.5	1500	999	Speer
225 JHP	H110	26	1500	1124	Speer
230 FMJ	Blue Dot	17	1550	1227	Hornady
260 JHP	296	25.0	1500	1300	Speer
230 FMJ	FL		1400	1001	Winchester factory load

All of the above loads were developed in a Thompson/Center Contender pistol with a 10-inch barrel. These loads are not recommended for any other handgun.

45 Webley



Historical Notes The earliest reference the author could locate regarding the 45 Webley was in the 1876 James Brown & Son gun catalog.* However, it may have originated a year or two earlier. American companies manufactured it up to about 1939. The 1933 Winchester catalog says it is for "Webley and Bull Dog double action revolvers." It is obsolete.

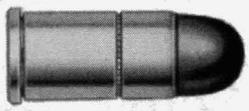
General Comments The 45 Webley is similar to the 450 Revolver cartridge, but has a slightly longer case. The two will interchange in most revolvers. Originally a blackpowder cartridge, the 45 Webley was loaded with 20 grains of powder and a 230-grain bullet. Smokeless powder was also used in late loadings. In power it is in the same class as the 41 Short Colt, but probably has superior stopping power because of the larger heavier bullet. Ammunition could probably be made by cutting off 455 Webley cases.

*L.D. Satterlee op. cit.

45 Webley Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
230 Lead	FL	550	150	U.S. factory load

45 Automatic Rim



Historical Notes During WWI, both Colt and Smith & Wesson manufactured revolvers for the 45 Automatic cartridge. This required the use of a half-moon clip to support and then eject the rimless 45 Automatic. Thousands of these revolvers were sold on the civilian market after the war ended. In 1920, the Peters Cartridge Company introduced a rimmed version of the 45 ACP which eliminated the need for half-moon clips in the revolver. It was also loaded with a lead bullet to reduce excessive wear on the rifling inherent in the use of the jacketed 45 ACP.

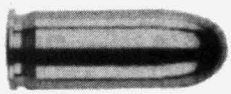
General Comments The 45 Auto-Rim (45 Automatic Rimmed), while practically identical in performance to the 45 ACP, is probably a better field or hunting cartridge because it can be handloaded with semi-wadcutter, hollowpoint and other lead hunting bullets. Using such bullets at slightly increased velocity, it is every bit as good as the 45 Colt revolver cartridge for small through medium game. Many war surplus 455 Webley revolvers have been altered to shoot the 45 Auto-Rim, and many of these are used in the field. The cartridge is probably more widely used than at anytime since it was introduced. This cartridge is no longer offered by commercial ammunition makers.

45 Automatic Rim Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
185 JHP	Bullseye	5.5	850	297	Hornady
200	Bullseye	4.90	750	250	Hornady, Sierra
230	Unique	6.6	800	327	Speer, Sierra
230 Lead	FL		805	331	Factory load

Any safe load for the 45 ACP can also be used in the 45 Auto-Rim with about the same results.

45 Automatic Short



Historical Notes In many countries such as Italy, France and Mexico it is illegal for private citizens to own semi-automatic pistols in military calibers such as 45 ACP. Gun owners in these countries created a strong demand for a powerful, semi-auto pistol in a non-military caliber. The 45 ACP Short was developed in response to the demand. It is sometimes called the 45 HP.

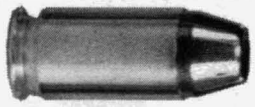
This cartridge uses a 45 ACP case shortened by 1 millimeter. All other case dimensions remain the same. A standard 230-grain FMJ bullet is used, and muzzle velocity is identical to the 45 ACP. Pistols originally designed for the 45 ACP cartridge can quickly be converted to the Short simply by installing a new barrel. All other parts remain the same.

General Comments Because the chamber of the 45 ACP Short is shorter than the 45 ACP, the latter round will not chamber in a 45 Short barrel. The letter of the law in the appropriate countries is, therefore, preserved, while shooters can still obtain 45 ACP performance. The 45 ACP is famous for its stopping power, and the Short offers identical ballistics. Loading data for the two is interchangeable. With the Western European Union consolidating firearms laws, the prohibition against private ownership of pistols in military calibers will soon be ended. Therefore, the purpose for which the 45 ACP Short exists will be ended and this caliber will become obsolete. Only Hirtenberger AG of Austria has commercially loaded this ammunition.

45 Automatic Short Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
230 FMJ	FL	835	356	Hirtenberger factory load

45 Automatic (45 Automatic +P/45 ACP)



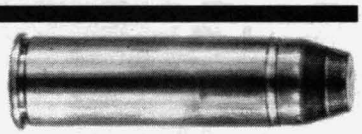
Historical Notes Developed by John Browning in 1905 and adopted by the United States Ordnance Department, with the Colt-Browning automatic pistol, in 1911, it has also been made the official military handgun caliber by several other governments, notably Argentina, Mexico and Norway. The 45 Automatic is the most powerful military handgun cartridge in use today. It is also one of the most difficult to master. The Colt Government Model auto pistol and the Colt and Smith & Wesson Army Model 1917 Model revolvers are the principal arms chambered for the 45 ACP in the United States. Ruger, S&W, Springfield and Numrich now also offer guns in this caliber. Several submachine guns have used it, and about 1943 a number of Reising semi-automatic rifles were marketed in this caliber. Imitations of the Colt auto pistol have been made in Argentina, China, Korea, Norway and Spain and the U.S. It was replaced as of 1985 as the official U.S. military handgun cartridge by the 9mm Parabellum. However, it remains in the U.S. Marine Corp service and has proven increasingly popular with police agencies in the U.S.

General Comments The 45 ACP has been proven in combat all over the world as having excellent stopping power. It has also developed into a first-class match cartridge with accuracy equal to the best. It requires a good deal of practice for the average person to develop any degree of skill with this cartridge, particularly when fired in the Colt Government Model semi-automatic. It is used far more for target shooting than hunting, its curved trajectory limiting its effective range. Despite this, it is quite adequate for any small or medium game. Like all the other semi-auto pistol cartridges, it is a better hunting round with softpoint and hollowpoint bullets. A number of police departments have switched from the 38 Special to the 45 ACP in the last few years. All major and minor commercial ammunition manufacturers offer this caliber. After several years of declining sales, it is enjoying a resurgence of popularity.

45 Automatic (45 ACP/45 Auto) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
185 JHP	Bullseye	5.0	900	333	Hornady, Sierra, Nosler
200 JHP	Blue Dot	10.0	900	360	Speer, Sierra
230 FMJ	Bullseye	5.0	800	327	Nosler, Speer, Sierra
230 FMJ	Unique	6.0	800	327	Speer, Nosler, Hornady, Sierra
185 FMJSWC	FL		770	244	Factory load
185 JHP	FL		1000	411	Factory load
185 JHP	FL		1140	534	Factory load (+P)
230 FMJ	FL		835	356	Factory load
230 JHP	FL		875	391	Factory load
230 FMJ	FL		855	405	Military load

454 Casull



Historical Notes The 454 Casull, originally called the 454 Magnum Revolver, was developed by by Dick Casull and Jack Fulmer in 1957. The first public announcement was made by P.O. Ackley in the November, 1959 issue of *Guns & Ammo* magazine. Solidhead 45 Colt cases and specially-altered Colt and Ruger single-action revolvers were used for initial development. The 454 Casull employs a special case made by Federal that is 0.1-inch longer than standard 45 Colt to prevent it from chambering in 45 Colt revolvers. A five-shot, single-action revolver designed by Dick Casull and manufactured by Freedom Arms Co. is chambered for this caliber. The revolver is made of stainless steel throughout, has a $7\frac{1}{2}$-inch barrel and weighs 50 ounces in standard configuration. Ammunition is loaded and marketed by Freedom Arms and Black Hills Ammunition.

General Comments The 454 Casull is primarily a hunting cartridge, although it will probably also find acceptance among metallic silhouette shooters. The 454 Casull is one of the most powerful revolver cartridges available. Anyone who contemplates hunting dangerous game with a handgun should give serious consideration to the 454 Casull and Freedom Arms revolver. For those wishing a reduced load, standard 45 Colt ammunition can be fired in the 454 revolver. There has been a persistent call for a 45 magnum revolver ever since the 44 Magnum was introduced, and the 454 certainly provides all that could be desired in 45 caliber.

454 Casull Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
240 FA JHP	AA#9	31.0	1916	1955	Accurate
260 FA JFP	AA#9	30.0	1835	1945	Accurate
300 H XTP	AA#9	26.0	1623	1755	Accurate
260 JHP	FL		1723	1730	Factory load
300 JHP	FL		1353	1220	Factory load

455 Revolver Mk II
455 Webley Revolver, Mk II

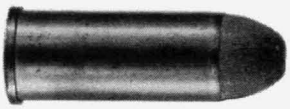
Historical Notes British military revolver cartridge adopted in 1897 and designated the 455 Revolver Mk II. It is a modification of an earlier round originally designed for blackpowder (455 Revolver Mk I). Modern revolvers will chamber and fire either the old or new cartridge. The 455 Webley was used officially in both WWI and II, although it was partly replaced by the 380/200 (38 S&W) adopted in the mid-1930s. In addition to the Webley revolver, both Colt and Smith & Wesson chambered arms for this cartridge. Ammunition was loaded by American companies up to about 1940.

General Comments The 455 Webley Revolver cartridge was never very popular or widely used in the United States because standard American sporting and military arms in 45 ACP caliber were more easily obtainable. However, after WWII many obsolete 455 revolvers were sold at low prices in the U.S., and this changed the situation somewhat. It is better known and more widely used than previously, but most 455 revolvers have been altered to shoot the 45 ACP, using half-moon clips or the rimmed 45 Auto-Rim. The 455 Revolver is not a very satisfactory field cartridge because of the low velocity and curved trajectory. On the other hand, it has excellent short-range stopping power. It can be improved by handloading and the use of semi-wadcutter hunting-type bullets. It is now obsolete. Commercial ammunition is currently offered by Fiocchi of Italy.

455 Revolver Mk II Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
260 Lead	Unique	5.0	610	213	
262 FMJ	FL		700	285	Fiocchi factory load
265 FMJ	FL		600	220	Military load

45 Smith & Wesson
(45 S&W Schofield)



Historical Notes An obsolete blackpowder cartridge introduced in 1875 for the Smith & Wesson Schofield revolver. This revolver was adopted by the U.S. Army in that year and used until 1892 when it, and the 45 Colt Army revolver, were replaced by the Colt Army & Navy Model in 38-caliber. Commercial ammunition of this caliber was loaded until about 1940. It is believed by some authorities that General Custer used a Schofield revolver at the Battle of the Little Big Horn.

General Comments The Smith & Wesson Schofield revolver was a single-action, hinged-frame type. It employed a special, heavy barrel latch designed by General Schofield, hence the name. The cylinder of this revolver was not long enough to accept the 45 Colt so a shorter version was designed. The 45 S&W cartridge was loaded by government arsenals and used in both the Schofield model and the Colt Army to simplify supply. The 45 S&W can be used in almost any 45 Colt revolver, but the reverse is not true. Although the Colt single-action Army revolver is the one always depicted as the universal sidearm of the old West, nonetheless the S&W was quite popular. These old guns were made for blackpowder so heavy smokeless charges should not be used. This cartridge and handgun are again in production with Black Hills Ammunition supplying loads that duplicate the original and Navy Arms a replica of the gun.

45 Smith & Wesson (45 S&W Shofield) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
230 Lead	Bullseye	4.6	740	277	
230 Lead	FFFg	28	730	276	Blackpowder load
250 Lead	FFFg	28	710	283	Factory blackpowder load
230 Lead	FL		730	276	Factory smokeless load
250 Lead	FL		710	283	Factory smokeless load

45 Colt

Historical Notes Introduced in 1873 by Colt as one of the cartridges for their famous "Peacemaker" single-action revolver, both the cartridge and the revolver were adopted by the U.S. Army in 1875. This served as our official handgun caliber until 1892 (some 17 years), when it was replaced by the 38 Long Colt. The 45 Colt is one of the cartridges that helped civilize and settle the American West. It was originally a blackpowder number loaded with 40 grains of FFg powder and a 255-grain lead bullet. Muzzle velocity of the original load exceeded 810 fps. The Ruger and several other single-action revolvers currently chamber it.

General Comments One of the most famous American handgun cartridges and still a favorite with big-bore advocates, the 45 Colt has been around for well over 120 years. It is extremely accurate and has more knockdown and stopping power than nearly any common handgun cartridge except the 44 Magnum. It is a popular field caliber and can be handloaded to velocities in excess of 1000 fps. Old model blackpowder revolvers should not be used with any load developing more than about 900 fps muzzle velocity. Although it has a larger case than the 45 ACP or the 45 Auto-Rim, it is not quite as efficient with smokeless powder. Using special revolvers, some very heavy loads have been worked up for the 45 Colt that put it in almost the same class as the 44 Magnum. Such loads should not be attempted except by an experienced person who fully understands what he is about and is using those loads in a revolver that will stand the pressures generated by those heavy loads. This is another cartridge that has developed a rebirth of interest. Federal, Remington and Winchester all offer this caliber.

45 Colt Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
185 JHP	700X	9.0	1100	497	Sierra
225 JHP	Unique	9.0	950	451	Speer
240 JHP	Unique	8.7	850	385	Sierra
250 JHP	IMR 4227	17	800	355	Hornady, Nosler
250 JHP	Unique	7.5	800	355	Hornady
260 JHP	IMR 4227	16	850	417	Speer
225 JHP	FL		920	423	Factory load
255 Lead	FL		860	420	Factory load

450 Revolver/450 Adams

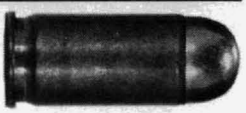
Historical Notes The first centerfire revolver cartridge adopted by the British army, it was adopted for the Adams revolver November, 1868 and saw service until replaced by the 476 Enfield (Mks I and II) in 1880. It was not a satisfactory military round but became a popular commercial caliber. American companies loaded it to about 1940 and both Colt and Smith & Wesson chambered revolvers for it. Also loaded in Europe, it is now obsolete. It is often listed as the 450 Short, 450 Adams or 450 Colt. A 450 Mk III was used in WWI as a reserve arm/cartridge in Britain.

General Comments The 450 Revolver cartridge was originally a blackpowder round loaded with 13 grains of blackpowder and a 225-grain bullet. Smokeless loads were also manufactured. The 450 can be fired in any 455 Webley revolver, and it was often used as a light target load. It is in about the same class as the old 44 S&W Russian and makes a fairly good short-range self-defense cartridge. Ammunition can be made from cut off 455 Webley cases. It has been obsolete for many years. Fiocchi still offers this cartridge.

450 Revolver (450 Adams) Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
225 Lead	FL	650	211	Kynoch factory blackpowder load
225 Lead	FL	700	245	Kynoch factory smokeless load
226 Lead	FL	700	245	Fiocchi factory load

455 Webley Automatic



Historical Notes The 455 Webley, semi-rimmed, pistol cartridge was adopted by the British Navy in 1912 for use in the 455 Webley self-loading pistol. The pistol was not entirely satisfactory and was replaced by the end of WWI. The cartridge resembles the 45 ACP, but uses a very blunt-pointed bullet.

General Comments This cartridge has seen very little use in the United States, although a number of Webley pistols in this caliber were sold in military surplus stores after WWII. In performance it is quite similar to the 45 ACP. Because of the relatively low velocity, it is not as good a field cartridge as the 45 ACP, but at short range would have comparable stopping power. It is long obsolete.

455 Webley Automatic Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
200 Lead	Unique	6.2	775	265	Lyman#452460
224 FMJ	FL		700	247	Military load

455 Revolver Mk I/455 Colt

Historical Notes The 455 Revolver Mk I was adopted by the British army in 1892 to replace the 476 Mk III and the 455 Enfield Mk I ammunition. Despite the different caliber designation, these two cartridges actually have the same case dimensions. They differ only in bullet diameter, type, and construction. The 476 was a blackpowder cartridge and so was the 455 Mk I at its inception. However, in 1894 the propellant was changed to the then new Cordite, and after a few years, it was found the smokeless powder burned more efficiently in a shorter case. Consequently a shorter case was adopted in 1897, and this altered round was designated the 455 Revolver Mk II. This is the present 455 Webley familiar to American shooters. It has a case 0.11-inch to 0.14-inch shorter than the original round.

The 455 Colt is nothing more than the Colt commercial designation of the 455 Revolver Mk I in a somewhat improved loading. It is listed in various publications and was loaded by American companies under this name, but was discontinued in the late 1930s. It is not a Colt designed cartridge, but does have different ballistics than the British Mk I. Later, the new cartridge dimensions were adopted and this round called the 455 Colt Mk II.

General Comments The 455 Mk I, 455 Mk II, 455 Colt and the original 476 Revolver are all interchangeable and can be fired in early British service arms. The 450 Revolver cartridge can also be fired in 455 revolvers. However, the 455 Webley is the only one still commercially loaded. Use the same bullet and 455 Webley loading data for any of the 455 cartridges listed here. Power and performance are the same.

455 Revolver Mk I, 455 Colt Factory Ballistics

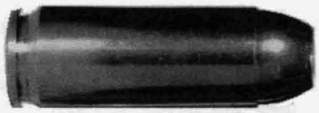
Bullet (grs.)	Powder/grs.	MV	ME	Source
265 Lead	FL	700	289	Kynoch blackpowder factory load
265 Lead	FL	600	212	Kynoch Cordite factory load
265 Lead	FL	757	337	U.S. smokeless factory load

476 Eley/476 Enfield Mk III

Historical Notes British military cartridge used from late 1881 to mid-1891, when the 455 Webley Revolver cartridge, Mk I was introduced. Sometimes called the 455/476, this round has the same case and bullet dimensions as the 455 Mk I except the latter is .05mm shorter in case length. Unlike the 476 Mk II, the Mk III has a clay plug in the hollow base. The charge was 18 grains of blackpowder. Also known as the 476 Eley and 476 Revolver, the Mk III can be used in any British service 455, but the bullet may be a bit oversized for use in 455 Colts or S&Ws of late manufacture.

General Comments The 476 has caused much confusion among collectors. Here are the facts, we believe: In November, 1868, the British army adopted the 450 Adams revolver cartridge (which see). Generally unsatisfactory, nevertheless the 450 was used in WWI as a reserve weapon, a Mk III 450 cartridge introduced at the same time. The 450 was officially replaced in 1880 by the 476 Enfield Mk I, shortly followed by the 476 Mk III as outlined above. In July, 1891, the 455 Mk I Webley appeared, a blackpowder load soon followed by the 455 Mk I, Cordite round (6.5 grains) in Sept., 1894. At about the same time the .442 cartridge for the R.I.C. was adopted (June 4, 1892), made in only one Mark as a service round; there was also, as there were with about all of these British handgun cartridges, blank cartridges in use. The 455 Mk II, Cordite, was adopted July, 1897, this being the first "short" case load, case length being reduced to 19mm from the original 22mm. A Mk III round, approved Feb., 1898, and a Mk IV, approved May, 1912, both Cordite-loaded, were dropped because of bullet form; both were considered of "dum-dum" or "explosive" quality. The last of the 455 ball cartridges was the Mk VI, adopted Sept., 1939, carrying a jacketed bullet and loaded with Cordite (5.5-7.5 grains) or nitrocellulose (5.5 grains), though a Mk V had briefly appeared, like the Mk IV but with antimony in the bullet as a hardening agent.

50 Action Express

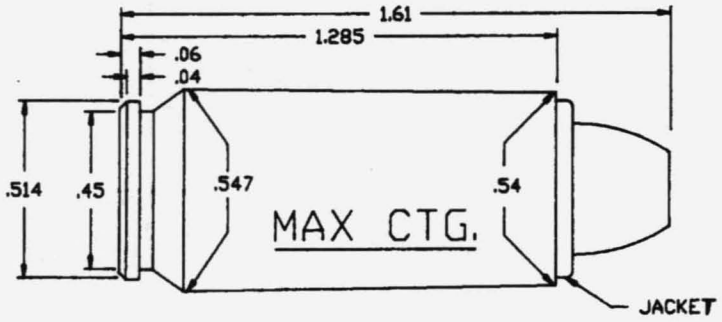


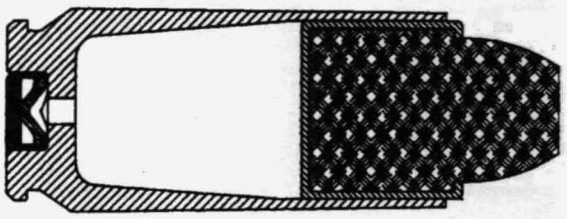
Historical Notes The 50 Action Express (50 AE) was developed in 1988 for the IMI Desert Eagle semi-auto pistol imported by Magnum Research, Inc. It is another development by Evan Whildin, then of Action Arms. It was part of a program to upgrade the performance of the semi-auto pistol through new cartridge design. The 50 AE has the same rim diameter, case length and overall length as the 44 Magnum. However, the base diameter is .547-inch, so like the 41 AE the 50 AE has a rebated rim. The reason is so the cartridge can be chambered in the Desert Eagle pistol without making any changes in the basic design. The pistol is already chambered for the 44 Magnum, and by retaining the same rim diameter, the change in caliber to 50 AE will require only a new barrel. This is a very practical approach.

General Comments The 50 AE uses a .500-inch diameter bullet weighing 325 grains at a muzzle velocity of 1400fps. The 300-grain bullet at 1400 fps develops 1414 fpe, which makes the 50 AE one of the world's most powerful pistol cartridges. It is an excellent field cartridge for deer-size animals or as a backup when hunting dangerous game.

50 Action Express Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
300 JHP	AAC7	27.5	1579	1568	Accurate Arms
325 Speer U-C	AA1680	37.8	1305	1227	Accurate
325 JHP	FL		1400	1414	





50 Remington (M71 Army)

Historical Notes Introduced in its original version as the 50 Remington Pistol, Navy Model 1867. The cartridge listed here is the 1871 Army modification. Both were used in slightly different models of the Remington single shot rolling block pistol. The older Navy cartridge had a straight, tapered case, the Army-type a slight, but distinct bottleneck. The Army cartridge also had a larger diameter rim that prevented it being fired in the Navy pistol. However, the Navy cartridge would chamber and fire OK in the Army pistol. Commercial ammunition of this caliber was available until about 1920, and used the Navy dimensions. Ammunition was loaded by both Remington and Winchester.

General Comments This is an obsolete blackpowder cartridge of the early centerfire-type originally made with an inside primer. It has been included to complete the record of U.S. military cartridges. The old Remington rolling block pistols are much esteemed for conversion to modern cartridges and for target shooting. Standard load was 25 grains of FFg blackpowder. This large heavy bullet should have been a good man-stopper and would certainly be adequate for the usual run of small to medium game at short range. Ammunition for the Army-type pistol can be made from 50-70 brass. Cases with the early inside primers are not reloadable. Some commercial cartridges made with Boxer primers could be reloaded. Cartridges in these two calibers are now collector's items.

50 Remington (M71 Army) Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
265 Lead	Unique	7.0	750	330	Lyman#518144
300 Lead	FL		600	240	Military load

PISTOL & REVOLVER CARTRIDGES OF THE WORLD
Current and Obsolete Centerfire—Blackpowder and Smokeless
Dimensional Data

Cartridge	Case type	Bullet dia.	Neck dia.	Shoulder dia.	Base dia.	Rim dia.	Case length	Ctge. length	Twist	Primer
2.7mm Kolibri	D	.107	.139	—	.140	.140	0.37	0.43	?	B
3mm Kolibri	D	.120	.150	—	.150	.150	0.32	0.43	?	B
4.25mm Liliput	D	.167	.198	—	.198	.198	0.41	0.56	?	B
5mm Clement Auto	C	.202	.223	.277	.281	.281	0.71	1.01	?	B
5mm Bergmann	D	.203	.230	—	.273	.274	0.59	0.96	?	B
5.45x18mm Soviet	C	.210	.220	—	.300	.300	.700	.98	?	S-B
22 Remington Jet	A	.223	.247	.350	.376	.440	1.28	1.58	10	S
221 Fire Ball	C	.224	.251	.355	.375	.375	1.40	1.82	14	S
5.5mm Velo Dog	B	.225	.248	—	.253	.308	1.12	1.35	8.2	S-B
25 Automatic	D	.251	.276	—	.277	.298	0.62	0.91	16	S
256 Winchester Mag.	A	.257	.277	.378	.378	.440	1.30	1.53	14	S
6.5mm Bergmann	C	.264	.289	.325	.367	.370	0.87	1.23	?	B
7mm Nambu	C	.280	.296	.337	.351	.359	0.78	1.06	12.5	B
7mm Bench Rest	C	.284	Based on Rem. 308 BR case shortened to 1.502				S			
7.62mm Nagant (Russian)	B	.295	.286	—	.335	.388	1.53	1.53	9.5	B
7.65mm Roth-Sauer	D	.301	.332	—	.335	.335	0.51	0.84	14.2	B
7.62mm RussianTokarev	C	.307	.330	.370	.380	.390	0.97	1.35	10	B
30 Borchardt	C	.307	.331	.370	.385	.390	0.99	1.34	?	S-B
7.63 (7.65) Mannlicher	D	.308	.331	—	.332	.334	0.84	1.12	10	B
30 (7.65mm) Luger	C	.308	.322	.374	.388	.391	0.75	1.15	9.8	S-B
30 (7.63mm) Mauser	C	.308	.332	.370	.381	.390	0.99	1.36	7.9	S-B
35 S&W Auto	D	.309	.345	—	.346	.348	0.67	0.97	12	S
32 Automatic	H	.309	.336	—	.336	.354	0.68	1.03	16	S
7.65mm MAS (French)	D	.309	.336	—	.337	.337	0.78	1.19	?	B
32 S&W	B	.312	.334	—	.335	.375	0.61	0.92	16-18	S
32 S&W Long	B	.312	.335	—	.335	.375	0.93	1.27	16-18	S
32 H&R Mag.	B	.312	.333	—	.333	.371	1.08	1.35	16	S
32 Long & Short Colt	B	.313	.313	—	.318	.374	0.92	1.26	16	S
32 Colt	B	?	.313	—	.318	.374	?	1.26	16	S
320 Revolver	B	.317	.320	—	.322	.350	0.62	0.90	22	B
7.5mm Swiss Army	B	.317	.335	—	.345	.407	0.89	1.29	?	B
8mm Rast-Gasser	B	.320	.332	—	.334	.376	1.037	1.391	—	—
8mm Nambu	G	.320	.338	.388	.408	.413	0.86	1.25	11	B
8mm Lebel Revolver	B	.323	.350	—	.384	.400	1.07	1.44	9.5	B
7.5mm Nagant (Swedish)	B	.325	.328	—	.350	.406	0.89	1.35	18	B
8mm Roth-Steyr	D	.329	.353	—	.355	.356	0.74	1.14	10	B
9mm Ultra	D	.355	.374	—	.386	.366	0.72	1.03	?	S-B
9mm Browning Long	D	.355	.376	—	.384	.404	0.80	1.10	12-16	B
9mm Gilsenti	D	.355	.380	—	.392	.393	0.75	1.15	10	B
9x21mm	D	.355	.380	—	.392	.393	.830	1.16	10	S
9mm Bayard	D	.355	.375	—	.390	.392	0.91	1.32	?	B
9mm Steyr	D	.355	.380	—	.380	.381	0.90	1.30	?	B
9mm Federal	B	.355	.382	—	.386	.435	0.754	1.163	9	S
9mm Luger	D	.355	.380	—	.392	.393	0.754	1.16	9.8	S-B
9mm Mauser	D	.355	.376	—	.389	.390	.981	1.38	1-12	B
9mm Winchester Mag.	D	.355	.379	—	.392	.394	1.16	1.545	1-10	S
380 Automatic (9mm Browning Short)	D	.356	.373	—	.373	.374	0.68	0.98	12-16	S
38 Long Colt	B	.357	.377	—	.378	.433	1.03	1.32	16	S
38 Special	B	.357	.379	—	.379	.440	1.16	1.55	16-18	S
357 S&W Magnum	B	.357	.379	—	.379	.440	1.29	1.51	16-18	S
357 Maximum	B	.357	.375	—	.375	.433	1.59	1.97	14	S
357 SIG	C	.357	.381	.424	.425	.424	.865	1.140	16	S
38 Automatic & Super Automatic	H	.358	.382	—	.383	.405	0.90	1.28	16	S
9.8mm Auto Colt	D	.378	.404	—	.404	.405	.912	1.267	?	S
38 S&W	B	.359	.386	—	.386	.433	0.78	1.20	16-18	S
9mm Makarov	D	.363	.384	—	.389	.396	0.71	0.97	?	B
380 Revolver	B	.375	.377	—	.380	.426	0.70	1.10	15	S-B
40 S&W Auto	D	.400	.423	—	.423	.424	.850	1.135	16	S
10mm Auto	D	.400	.423	—	.423	.424	0.99	1.26	16	L
41 Short Colt	B	.401	.404	—	.405	.430	?	?	?	S
41 Long Colt	B	.386	.404	—	.405	.430	1.13	1.39	16	S
41 Action Express	J	.410	.434	—	.435	.394	.866	1.17	16-18	S
41 Remington Magnum	B	.410	.432	—	.433	.488	1.28	1.58	18	L
10.4mm Italian	B	.422	.444	—	.451	.505	0.89	1.25	10	B
44 S&W Russian	B	.429	.457	—	.457	.515	0.97	1.43	20	L
44 S&W Special	B	.429	.457	—	.457	.514	1.16	1.62	20	L
44 Auto Mag	D	.429	.457	—	.470	.473	1.298	1.620	20	L
44 S&W Magnum	B	.429	.457	—	.457	.514	1.29	1.61	20	L
44 S&W American	B	.434	.438	—	.440	.506	0.91	1.44	20	L
44 Webley	B	.436	.470	—	.472	.503	0.69	1.10	20	L-B
44 Bull Dog	B	.440	.470	—	.473	.503	0.57	0.95	21	S-B
44 Colt	B	.443	.450	—	.456	.483	1.10	1.50	16	L
11.75mm Montenegrin	B	.445	.472	—	.490	.555	1.40	1.73	?	B
11mm French Ordnance	B	.451	.449	—	.460	.491	0.71	1.18	16	B
11mm German Service	B	.451	.449	—	.453	.509	0.96	1.21	23	B
45 Winchester Magnum	D	.451	.475	—	.477	.481	1.198	1.55	16	L
45 Webley	B	.452	.471	—	.471	.504	0.82	1.15	?	L-B
45 Auto-Rim	B	.452	.472	—	.476	.516	0.898	1.28	15-16	L
45 Automatic Short	D	.452	.476	—	.476	.476	.860	1.17	16	L
45 Automatic	D	.452	.476	—	.476	.476	0.898	1.17	16	L

PISTOL & REVOLVER CARTRIDGES OF THE WORLD Con't

Current and Obsolete Centerfire—Blackpowder and Smokeless

Dimensional Data

Cartridge	Case type	Bullet dia.	Neck dia.	Shoulder dia.	Base dia.	Rim dia.	Case length	Ctge. length	Twist	Primer
454 Casull	B	.452	.476	—	.480	.512	1.39	1.70	16	S*
455 Webley Revolver Mk-II	B	.454	.476	—	.480	.535	0.77	1.23	16-20	L-B
45 S&W Schofield	B	.454	.477	—	.476	.522	1.10	1.43	24	L
45 Colt	B	.454	.476	—	.480	.512	1.29	1.60	16	L
450 Revolver	B	.455	.475	—	.477	.510	0.69	1.10	16	L-B
455 Webley Auto	H	.455	.473	—	.474	.500	0.93	1.23	10	B
455 Enfield (455 Colt)	B	.455	.473	—	.478	.530	0.87	1.35	?	L-B
476 Enfield	B	.472	.474	—	.478	.530	0.87	1.33	?	B
50 Action Express	J	.500	.540	—	.547	.514	1.285	1.610	?	L
50 Remington Army	A	.508	.532	.564	.565	.665	0.875	1.24	?	L

Notes on handgun primers: Magnum pistol cartridges are usually loaded with Magnum pistol primers and the 22 Remington Jet and 256 Winchester are sometimes loaded with Small Rifle primers. During WWI, Frankford Arsenal made 45 ACP cases with special #70 primers of .204″ diameter instead of the standard .210″
A—Rim, bottleneck B—Rim, straight C—Rimless, bottleneck D—Rimless, straight G—Semi-rimmed, bottleneck H—Semi-rimmed, straight J—Rebated, straight
Primer: S—Small Pistol (.175″) L—Large Pistol (.210″) B—Berdan type
Unless otherwise noted, all dimensions are in inches.
*Always loaded with small rifle primers.

Current Military Handguns of the World

Nation	Weapon	Caliber	Type	Cap.	Bbl.	Wgt.	Remarks
Argentina	Browning Hi-Power P-35	9mm Luger	S-A	13	5	32	
Austria	Glock 80	9mm Luger	S-A	17	4.5	16	
	Walther P-38	9mm Luger	S-A	8	4.8	34	
Australia	FN35	9mm Luger	S-A	13	5	32	Browning Hi Power
Belgium	Browning Hi-Power	9mm Luger	S-A	13	5	32	Very good sporting weapon
Britain	Browning Hi-Power	9mm Luger	S-A	13	5	32	Adopted by Canada during WW-II
Canada	FN 35	9mm Luger	S-A	13	5	32	Browning Hi-Power
China (PRC)	Type 59	9mm Makarov	S-A	8	3.7	19	Similar to Russian PM
	Type 64	7.65x17mm	S/S-A	9	3.7	47	Silenced
	Type 51/54	7.62mm TOK	S-A	8	4.5	33	Tokarav 7F-33
Czech Republic	Cz M-52	7.62mm Russ.	S-A	8	4.7	25	Original design, very good pistol
Slovak Republic	Cz M-83	9mm Makarov	S-A	13	3.8	17	
Denmark	Browning Hi-Power	9mm Luger	S-A	13	5	32	
	SIG P210	9mm Luger	S-A	8	4.7	23½	
Egypt	Helwan	9mm Luger	S-A	8	4.5	23	Beretta 951 Copy
	Beretta M951	9mm Luger	S-A	8	4.5	23	
France	M-1950	9mm Luger	S-A	9	4.4	29	Similar to Browning Hi-Power
	MAB PA-15	9mm Luger	S-A	15	4.7	28	
	SIG P220	9mm Luger	S-A	9	4.7	21.6	
	Beretta	9mm Luger	S-A	15	4.9	25	
Germany	Walther P-38	9mm Luger	S-A	8	4.8	34	A most modern design
Hungary	Model 48	7.65mm Br.	S-A	8	4	24	Mod. Walther PP design
	Model 48	7.62mm Tok.	S-A	7	3.3	22	
India	FN35	9mm Luger	S-A	13	5	32	Browning Hi-Power
Israel	Beretta M951	9mm Luger	S-A	8	4.5	23	
Italy	Beretta M-51	9mm Luger	S-A	8	4.5	31	Very good. Available in U.S.
	Beretta M-34	9mm Br. Short & 7.65mm	S-A	7	3.5	24	Similar model sold in U.S.
	Beretta M-92	9mm Luger	S-A	15	4.9	25	
Japan	SIG P220	9mm Luger	S-A	9	4.7	21.6	
Mexico	Obregon	45 ACP	S-A	7	5	39	Resembles Colt 45 Auto
New Zealand	FN35	9mm Luger	S-A	13	5	32	Browning Hi-Power
Poland	P7M13	9mm Luger	S-A	13	4.1	25	
	P-64	Makarov	S-A	6	3.3	23	
South Africa	FN35	9mm Luger	S-A	13	5	32	Browning Hi-Power
	Z88	9mm Luger	S-A	15	4.9	25	
Spain	Llama 82	9mm	S-A	15	4.5	29	
	Astra A80	9mm	S-A	15	3.8	25	
	Star 30M	9mm	S-A	15	4.7	30	
Sweden	FN35	9mm Luger	S-A	13	5	32	Browning Hi-Power
	FN Browning M-07	9mm Brwon. (380)	S-A	7	5	32	Similar to Colt Pocket Auto
	SIG P-210	9mm Luger	S-A	8	4.7	24	
Switzerland	SIG P-210	9mm Luger	S-A	8	4.7	24	
Commonwealth	PSM	5.45mm	S-A	8	3.4	12	
of	Makarov M-PM	9mm Makarov	S-A	8	3.8	26	Mod. Walther PP
Ind. States	Stechin-APS	9mm Makarov	S-A	20	5	30	Full auto. fire selector
	Tokarev TT 30 & 33	7.62mm Tok.	S-A	8	4.5	33	Simplified Browning design
Turkey	MKE	9x17mm	S-A	7	3.9	18	
United States	Beretta M-92-S	9mm Luger	S-A	15	4.9	34	Adopted 1985
	Colt M-1911 & M1911A1	45 ACP	S-A	7	5	39	Military & civilian models

NOTE—Only the principal or official model is listed. Most governments used a variety of alternate types and officers often used nonofficial makes.
S-A = Semi-auto Cap. = Magazine capacity Bbl. = Barrel length in inches Wgt. = Weight in ounces

Chapter 7

MILITARY RIFLE CARTRIDGES OF THE WORLD

(Current and Obsolete—Blackpowder and Smokeless)

THE SALE and use of surplus military firearms in the United States goes back to at least the Civil War and probably earlier. During WWI, American companies manufactured rifles for the British, French and Russian governments and at war's end, when military orders were cancelled, found themselves stuck with undelivered quantities. As a result, a lot of new Enfields, Lebels and Mosin-Nagant rifles showed up in the civilian market, and for a time, 7.62mm Russian and 8mm Lebel sporting ammunition was loaded by American companies. However, nothing in previous history matched the variety and quantity of military arms that were sold on the American market following WWII. The first influx occurred about 1947-48, and those were mostly captured enemy weapons. However, in the 1950s, practically all of the world powers were in the process of adopting new and more modern military small arms, and their older models were sold off to surplus dealers who immediately offered them on the American market. The opportunities to shoot, experiment with and remodel military rifles during this period is unprecedented in the history of this country. Many fine military rifles and handguns were sold brand new at very low prices. Few of these arms sold at prices over $35 to $40 and many sold at $10 to $25. Some of these same weapons will bring upward of $300 on today's market. Not a single issue or model ever went down in value.

The Gun Control Act of 1968 ended the importation of surplus weapons on such a scale. It is doubtful that there will ever be anything comparable to the war surplus phenomenon that covered the two decades between 1948 and 1968, although things have loosened up considerably. As a result, a wide variety of military rifles are used for target practice, plinking and large and small game hunting in America. Most military rifles can be remodeled into first-class sporting arms, and many were. Naturally, the cartridges used by these various rifles are of interest to those shooting them because, after all, the gun is of no use without the ammunition. The American sportsman was exposed to calibers all but unknown prior to WWII, and this influenced cartridge development in this country.

Military ammunition represents one of the most highly-developed categories of the metallic cartridge. Millions of dollars have been invested in research to determine the best and most efficient combination of primer, case, powder, and bullet. That is why military cartridges are so popular for sporting use and one reason why the military round of a nation is also popular on the range and in the field. American military cartridges have been highly esteemed in sporting circles, and all but the old 6mm Lee and 50-70 are still loaded and used. Foreign military calibers do not offer the American sportsman anything new or different, even though most are basically quite good. They largely parallel what we already have available, the exception being the various 6.5mm and 7mm calibers which represent an area neglected here.

The middle European, Mediterranean, Scandinavian and Oriental countries have favored the 6.5mm-caliber in their military rifles. These cartridges are all quite similar in performance and power and offer little to choose from for sporting use. From the American point of view, the 6.5mm Mannlicher-Schoenauer and the 6.5x55mm Swedish are the best choices. Any of them are good deer and antelope cartridges, superior to anything in the 30-30 class for this purpose. Most can be used for larger game if loaded with the heavier bullets. The 7x57mm Mauser is another cartridge well known in sporting circles and adapted to North American game and hunting conditions. It is listed along with the 8x57mm Mauser and the 303 British under American sporting cartridges because they are loaded in this country and have been for many years. An interesting recent development has been the widespread availability of the 7.62x53R Russian and 7.62x39mm Soviet cartridges and guns to shoot them.

A surprising number of obsolete single shot and repeating blackpowder military rifles have shown up since 1948. Many of these are brand new or in first-class condition, which has created interest in shooting rifles of this type.

The centerfire blackpowder cartridges listed include those that would be likely to be encountered, and a few that are comparatively rare. Caliber varies from 32 to 60 with bullet weights from 250 to over 500 grains. The original powder used was coarse granulation blackpowder similar to what we know as Fg. The charge ranged from 40 to over 80 grains. There was also a variation of the powder charge even in the same cartridge because of the use of different bullets. Most countries also had a carbine version or a loading that was lighter than standard. In power, all these old cartridges are similar to our own 45-70 and are adequate for most North American big game at short to moderate range. They all have a very curved trajectory, which makes it difficult to hit anything beyond 200 yards, even though they will kill much further away. However, at known ranges they are quite accurate and will turn in good scores out to 500 or even 1000 yards.

Continued use of blackpowder military rifles will eventually require reloading of the fired cases. All but the American cartridges use Berdan primers, usually of 6.37mm (.251-inch), 6.46mm (.254-inch) or 6.5mm (.256-inch) size. These sizes are available in RWS brand. Loading dies for the more popular blackpowder calibers are made by Lyman, Hornady, RCBS and others. It is often possible to make reloadable brass from similar modern cases by trimming and reforming. Blackpowder charges should fill the case to the base of the bullet, and should actually be slightly compressed for proper burning. When using smokeless powder to load blackpowder cartridges, *never* exceed original velocity or pressure, as few rifles are strong enough to withstand this safely. After firing with blackpowder, the brass cases must be soaked and scrubbed in soap or detergent to remove the fouling and dried before reloaded. A bullet alloy of one part tin to 16 or 20 parts lead is about right for blackpowder, but a mixture of one to 10 is more satisfactory with smokeless charges. The use of hard, jacketed bullets in blackpowder rifles is not good practice as these will often wear the bore too quickly, sometimes destroying accuracy within only 100 rounds or so. However, swaged, soft, jacketed bullets designed for handgun use should eliminate this objectionable possibility. If you use common sense and exercise reasonable caution, obsolete military rifles are a lot of fun to shoot and, if in good condition, perfectly safe.

The subject of military rifles is too broad and involved to be covered adequately in a book devoted primarily to cartridges. We have, however, included tables listing the more common smokeless and blackpowder military rifles and their characteristics. In passing, it might be well to at least mention two badly-abused phases of the military rifle subject—safety and value. Some authors, who should know better, have stated bluntly and without qualification that all surplus military arms are unsafe, worthless pieces of junk. This simply is not true. The idea that any military power would arm its troops with weapons inherently dangerous to fire is too silly to merit serious discussion. Toward the end of WWII, Germany and Japan turned out some shoddy, makeshift arms for drill, guard or civilian use. Some of these used castings and were definitely not safe to fire. Others looked like hell but were actually quite stout. In any event, these were not standard military issue and few of these were sold in the surplus gun market. To have sold dangerous and unsafe weapons would have ended the big surplus military boom long before the Gun Control Act of 1968. This is just a matter of common sense.

I believe it is entirely correct to state that no standard military rifle is basically any more dangerous than any other if it is in good condition and fired with the cartridge and load for which it was designed. Use the correct ammunition and exercise common sense in reloading and you won't get in trouble. Alteration of military rifles to other than the original caliber is all right, too, if you know what you are doing. On the other hand, it can be dangerous if mishandled, for it requires a knowledge of the relative strength, mechanics and metallurgy of military rifle actions.

Value? Only you can determine how much a certain gun is worth to you. "Value," as such, has really been beat to death. Such terms as good, bad, worthless, or "a good buy" are all relative, for their meaning will vary with the buyer and his individual ideas. As late as 1940, one could buy U.S. 1873 45-70 Springfield rifles for $6.50 used and $11 brand new. I owned several and wish I had had both the money and the foresight to have purchased a whole garage full because they are currently worth around $500 in good condition. One must understand, though, alteration of a military rifle destroys its value as a collector's item, it may then be worthless. Time and availability are big factors in the value of anything.

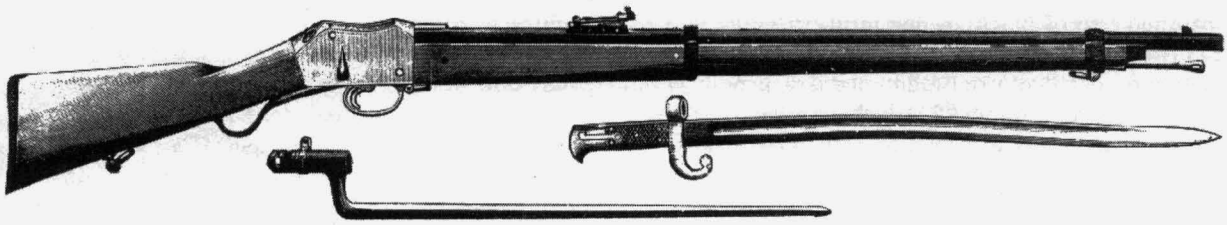
American-made sporting ammunition included the more popular foreign military calibers up until about the mid-1930s. The 6.5mm Mannlicher-Schoenauer, 7x57mm Mauser, 7.65mm Mauser, 7.62mm Russian, 8mm Mauser and 8mm Lebel were all made in the U.S., along with the 303 British. At present, few American sporting rifles are available for foreign military cartridges and only the 6.5x55 Swedish, 7mm and 8mm Mauser plus the 303 British are loaded here. However, Norma and RWS currently load some of them in sporting version, most of which are imported through dealers in this country.

Military ammunition should not be used on any game with the original full-jacketed bullet as this usually only wounds the animal and does not stop it. Bear in mind that full-jacketed bullets won't break up on contact and will, more often than not, ricochet badly. This is also true of the big, low-velocity bullets fired by blackpowder rifles.

The performance of most military cartridges can be improved in varying degrees by handloading. Most European ammunition is loaded with corrosive Berdan-type primers which is not as quick or easy to decap and reprime as the Boxer-primed cases used by American manufacturers. Many others have steel cases which are not reloadable. Norma continues to import ammunition and brass cases made for American primers in a number of military calibers. The availability of reloadable cases is an important consideration because the supply of surplus ammunition is not inexhaustable. The ultimate use of your rifle may depend on just such a small item as this. Sporting ammunition has never been loaded in some military calibers, but this is a deficiency you can correct by handloading. Some of the old blackpowder

military rifles have been relegated as wall hangers because of the lack of ammunition, but this situation is changing as small manufacturers now offer these cases to the reloader. Many cartridges listed in Chapter 6 can be considered obsolete from the military viewpoint. The United States, the United Kingdom and all NATO countries have adopted the 7.62x51mm NATO round as have Japan, Australia and many Asian countries. Also, practically all of them now use the 5.56x45mm (223 Remington) for their military rifles. The U.S. used this smaller round almost exclusively in Vietnam. Russia and most former satelite countries have adopted the Russian M43 or 7.62x39mm cartridge. In 1974, the Soviet Union adopted a new 22-caliber round designated the 5.45x39mm.

Recent military cartridge development has been in the realm of caseless cartridges. Efforts to develop caseless small arms ammunition have not been fully successful to date and the word from ordnance circles is that, "happiness is still a cartridge case."



PEABOBY-MARTINI MILITARY RIFLE. (Turkish Model.)

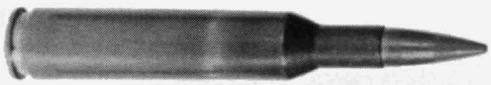
With Quadrangular and Sabre Bayonets.

Entire Length of Peabody-Martini Military Rifle,	49 inches.	Weight of Quadrangular Bayonet,	15 ounces.
Length of Barrel,	32¼ "	Entire Length of Sabre Bayonet,	$28\frac{1}{16}$ inches.
Weight, without Bayonet,	8½ pounds.	Length of Blade of Sabre Bayonet,	$22\frac{1}{16}$ "
Length of Quadrangular Bayonet,	23¾ inches.	Weight of Sabre Bayonet,	2 pounds.
Length of Blade of Quadranglar Bayonet,	20¼ "	Calibre,	.45 inch.

CARTRIDGE FOR PEABODY-MARTINI MILITARY RIFLE. (Turkish Model.)

Calibre, .45 inch. Powder, 85 grains. Bullet, smooth-patched; weight, 480 grains. Lubricating disc in shell

4.85mm British



Historical Notes An experimental British military cartridge of less than 22-caliber that more or less parallels similar developments by Germany. Although entered in the NATO trials in 1977, none of these small-caliber cartridges were ever adopted, although some of them developed initial velocities in excess of 4000 fps. The problem with these small, lightweight high-velocity bullets is that they lose velocity and energy rapidly, and, from a military viewpoint, are not very effective at extreme ranges. A gilding metal-clad steel-jacketed bullet of .192-inch diameter with lead alloy core and flat base was used. Both Ball and tracer types were made. Further development ended after the 1977 NATO trials.

General Comments The dimensions of the 4.85mm British are practically idential to the wildcat 5mm/223 except that the case is about 1/5-inch longer due to a longer neck. Muzzle velocity would be similar.

4.85mm British Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Comments
56	FL	3117	1210	Mil (L1E1 Ball)

5.7x28mm FN P90 (Belgium)

Historical Notes Developed in the late 1980s by FN for their new P90 personal defense weapon, this cartridge is intended to replace the 9x19mm Parabellum pistol cartridge. Claimed ballistic performance is much superior to the 9mm cartridge. As yet, no major country has adopted this new caliber.

General Comments The 5.7x28mm cartridge is somewhat similar in shape to the commercial 221 Fireball cartridge. However, the two are not interchangeable. A sharply pointed Ball bullet weighing only 23 grains is used as intended range is limited. Despite this, the bullet has been designed to penetrate helmets and body armor at 50 meters without breaking up.

5.7x28mm FN P90 Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME
23 FMJ-BT Ball	FL	2790	400

5.45x39mm Soviet

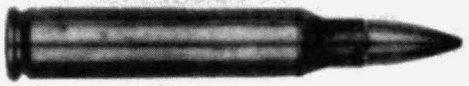
Historical Notes Russian military cartridge introduced about 1974 for use in the new AK-74 assault rifle. There are both fixed-stock and folding-stock versions and the 5.45mm rifle has a redesigned flash reducer/muzzlebrake that distinguishes it from the earlier AK-47. The cartridge has a more slender case and a thicker rim than the 7.62x39mm (M43) cartridge. The bullet is .221- to .222-inch in diameter and weighs from 53 to 54 grains. The bullet is almost 1-inch long with a very sharp spitzer point, boattail base, and a mild steel core with a short lead filler on top and air space in the nose. The bullet is designed to be unstable in tissue, producing a more severe wound. The British used somewhat the same idea in the design of their MKVII 303 bullet used in WWII. Casualty reports from Afghanistan, where the new 5.45mm cartridge and rifle first appeared, tend to confirm the lethality of the bullet. Muzzle velocity is approximately 2950 fps. The first 5.45mm Soviet cartridges publicly available to western military intelligence were brought out of Afghanistan by Galen Geer while on assignment for *Soldier of Fortune* magazine in 1980, and the first information made public was in the October, 1980 issue of SOF. Until that time, the existence of a new Russian military cartridge was mostly rumor. Later, the round was withdrawn from service in Afghanistan. Cases are lacquered steel with Berdan primers.

General Comments The Russians apparently designed this cartridge as the result of experience on the receiving end of the U.S. M-16 rifle and 5.56mm round in Vietnam. The 5.45mm Russian is a well-designed cartridge for its intended purpose. The long, thin boattail bullet reduces aerodynamic drag to the minimum and results in higher-retained velocity at long range. The bullet is designed to be stable in flight and provide good accuracy at all ranges out to maximum, but unstable on contact so as to tumble easily, which enhances lethality. It is a better-designed military bullet than the original bullet used in the U.S. M193 5.56mm cartridge. However, the new 5.56mm SS109 (M855) NATO standard round with its heavier bullet and improved shape has an edge over the Soviet bullet.

5.45x39mm Russian Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source/Comments
54	FL	2950	1045	Mil (SBT Ball)

5.56x45mm NATO



Historical Notes The 5.56x45mm cartridge was originally developed for the Armalite AR-15 rifle and first tested by the U.S. Air Force as a possible replacement for the M-1 Carbine in 1960-1961. The AR-15 later evolved into the selective-fire M-16 adopted by the U.S. military in 1964 after several years of testing by the U.S. Continental Army Command at Fort Monroe, Virginia. The rifle and cartridge were first combat-tested in Vietnam in the early 1960s.

General Comments As initially loaded, the 5.56x45mm Ball cartridge had a 55-grain spitzer boattail bullet at a muzzle velocity of 3250 fps. It was the standard U.S. military loading until 1984. In 1980, the 5.56mm FN-designed, 62-grain SS109 bullet was adopted by NATO. Designated the M855 in the U.S., the new load has a spitzer boattail bullet with a mild steel penetrator in front of the lead base. Muzzle velocity is 3100 fps. This also involved changes in 5.56mm rifles to a quicker rifling twist of one turn in seven inches to stabilize the longer, heavier bullet. This much-improved bullet resulted in higher retained velocity and greater accuracy at long range. It also has much improved penetration characteristics over the old M193 55-grain projectile at all ranges.

The 5.56mm case is similar in configuration to and interchangeable with the commercial 223 Remington, although SAAMI warns that dimensional differences between military chambers and commercial chambers may make it unsafe to fire military ammunition in sporting rifles. Additional information and loading data can be found under that listing in Chapter 2.

5.56mmx45mm NATO Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Comments
55 FMJ-BT M193 Ball	FL	3250	1325	Old U.S. loading
62 FMJ-BT M855 Ball	FL	3100	1325	New NATO loading

6mm SAW (U.S.)

Historical Notes In the early 1970s, the U.S. Army began studies to develop a new infantry squad machinegun called the Squad Automatic Weapon (SAW). Frankford Arsenal began computerized parametric design analyses in July, 1971, to design a cartridge to meet user requirements. After several experimental designs based on the 5.56x45mm case proved unsuccessful, a new case having a larger .410-inch diameter head and a length of 1.779 inches was adopted. A 6mm diameter (.243-inch), 105-grain FMJBT bullet was used.

General Comments Cartridge cases for the 6mm SAW will be found in both steel with a phenolic varnish finish and in aluminum with an anodized finish. The length of the aluminum case is longer than the steel.

The 6mm SAW was never adopted, although considerable quantities of ammunition were loaded experimentally by Frankford Arsenal. This cartridge is frequently encountered in collections. It is historically significant as the first cartridge designed using computerized parametric design analysis.

6mm SAW Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Comments
105 FMJ-BT	FL	2520	1480	XM732 Ball

6mm Lee Navy

Historical Notes The 6mm Lee cartridge (also known as the 236 Navy) was used in the 1895 Lee Straight Pull bolt-action military rifle manufactured by Winchester for the United States Navy. About 15,000 of these rifles were made and used by the Navy on a trial basis. Winchester, Remington and Blake also chambered sporting rifles for this cartridge. No factory-loaded ammunition has been available since 1935.

General Comments The 244 or 6mm caliber was revived in two cartridges introduced by Remington and Winchester in 1955, the 244 (now the 6mm Remington) and 243. The 6mm Lee cartridge died out mainly because it was too far ahead of its time. The powders available in 1895 were not suitable to this small caliber. A few shooters who have old rifles for this round reload and use it for hunting. It is a good varmint, medium game, deer, black bear and antelope cartridge at moderate ranges. It is not as powerful as the 6mm Remington or the 243 Winchester. By increasing the rim to fit the standard Mauser bolt face and necking the case to accept 0.224″ bullets, Winchester created the 220 Swift.

6.5x50mm Japanese Arisaka

Historical Notes Used in the 1905, Model 38 Japanese bolt-action rifle, a modified Mauser-type, this cartridge was actually introduced in 1897 for a discontinued rifle found unsafe in service. It was introduced in the United States after WWII as the result of captured rifles brought back by returning GIs, and later by the surplus arms dealers who sold large numbers of the Model 38 rifle and carbine. Sporting ammunition in this caliber is loaded by Norma, using the American-type primer; military ammunition has a Berdan-type primer, usually of .199-inch or .217-inch size. Some military Ball ammunition of recent production with steel cases and Berdan primers has recently been imported from China.

General Comments The 6.5x50 has a semi-rimmed case, but is otherwise not radically different from the other 6.5 military cartridges. It has the shortest case and least powder capacity of any of the military 6.5s, but is nonetheless an efficient design with smokeless powder. The Japanese Model 38 rifle has an unusually strong action which allows the cartridge to be loaded to its full potential. Because commercial sporting ammunition and reloadable cases are available, it is one of the more useful military cartridges. In power, it is on a par with any of the other 6.5 military rounds and is fine for antelope, deer, sheep and black bear. It makes a far more effective deer cartridge than the 30-30. To solve the ammunition problem, some 6.5mm Arisaka rifles have been rechambered to the wildcat 6.5/257-caliber.

6.5x50mm Japanese Arisaka Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
120 SP	IMR 4350	43	3000	2400	Max.
120 SP	H380	36	2680	1918	
120 SP	IMR 4895	34	2650	1870	
140 SP	IMR 4350	40	2680	2240	
140 SP	H-380	34	2360	1735	
156 SP	IMR 4064	28	2060	1460	Dup. fact. ball.
160 SP	IMR 4320	34	2500	2408	
139 Ball	FL		2500	1930	
139 SP (Norma)	FL		2430	1815	
156 SP (Norma)	FL		2070	1475	

6.5x54mm Mannlicher-Schoenauer (Greek)

Historical Notes This original Greek military cartridge, designed in 1900, was used in the 1903 Mannlicher bolt-action rifle. It is also a popular sporting number in Europe and the U.S. All major American ammunition companies loaded the 6.5mm Mannlicher until about 1940. The Austrian-made Mannlicher-Schoenauer sporting rifle is just about the only rifle available in this caliber presently. Sporting ammunition is loaded in Europe and RWS imports Boxer-primed, reloadable brass and a good variety of sporting loads. European ammo uses the Berdan primer, usually the 5.5mm or .217-inch size.

General Comments The 6.5mm M-S has always had a certain following in the United States, even though American rifle makers do not chamber it as a standard caliber. It is a very fine cartridge for North American hunting with far better killing power than the 30-30 or anything in that class. In fact, every species of big game on earth has been taken with this cartridge. A great many elephants were killed by ivory hunters using the little 6.5mm and solid bullets. It did not make enough noise to bother the herd and gave deep penetration for well-placed brain shots. In the hands of an experienced hunter, it will do for any North American big game. However, by today's standards, it is considered primarily a deer, sheep, antelope or black bear cartridge. In power, it is often compared to the 257 Roberts, and there is some validity for this. On the other hand, the 6.5mm M-S is loaded with bullets of around 160 grains in weight compared to the 120-grain top weight of the 257. It is the long, heavy bullet that makes it a good killer on the tougher varieties of game.

6.5x54 Mannlicher-Schoenauer (Greek) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
139-140 SP	IMR 3031	35	2510	1950	Antelope, deer
139-140 SP	IMR 4895	36	2400	1790	
156 SP	IMR 4350	38	2510	2182	
156 SP	IMR 3031	34	2460	2100	Dup. original Mil. load
160 SP	IMR 4064	38	2450	2140	Heavy game
140 SP	FL		2250	1575	Hirtenberger
159 SP	FL		2330	1740	RWS
159 Ball	FL		2223	1740	Military

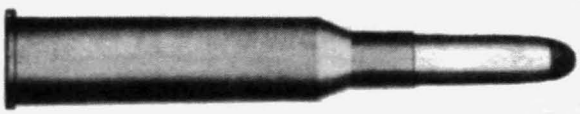
6.5x53.5mm Daudeteau

General Comments A collector's item today, this semi-rimmed type was introduced originally as a military cartridge for the French Navy in 1895. It was used in the Daudeteau bolt-action rifle and apparently there was also commercial ammunition made. Rifles and ammunition are quite rare, and you are not likely to have one to hunt with. If you do, it would probably be satisfactory for anything up to deer. According to Sr. Aivaro Casal, this cartridge was adopted by Uruguay in 1895 and used until 1898.

6.5x53.5 Daudeteau Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
150 Ball	FL	40	2395	1922	RN jacketed bullet

6.5x53Rmm Mannlicher (Dutch & Romanian)



Historical Notes This is an earlier, rimmed version of the 6.5x54 Greek cartridge, designed by Mannlicher and used in the bolt-action Dutch Models 1892 and 1895 and the Romanian Models 1892 and 1893. The cartridge was dropped by both countries after WWII.

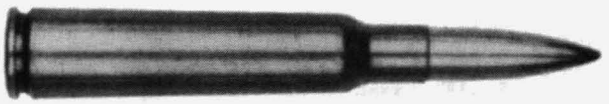
General Comments This cartridge delivers ballistics practically identical to the regular 6.5x54 Mannlicher-Schoenauer, known for many years in the United States and at one time loaded by most cartridge companies. The rimmed version is used in a few single shot and combination European sporting rifles. Commercial hunting ammunition in this caliber was once loaded in both England and Europe.

This cartridge was introduced in the United States after WWII when quantities of the Dutch and Romanian military rifles and carbines were sold in the surplus stores. Only imported sporting ammunition is available, but some dealers have furnished hunting loads based on the military round with the bullet replaced. Rifles in this caliber are suitable for deer, antelope, black bear and the like. The British listed this cartridge as the 256 Mannlicher and many bolt-action rifles were turned out for it by Jeffery and others. It has been popular in parts of Africa. No commercial manufacturers currently offer this caliber.

6.5x53Rmm Mannlicher Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
120 SP	IMR 4895	33	2440	1590	
120 SP	IMR 4064	35	2650	1875	
140 SP	IMR 3031	35	2550	2360	
156 SP	IMR 3031	34	2445	2095	Dup. military ball.
156 SP	IMR 4350	38	2510	2192	
160 SP	IMR 3031	34	2250	1810	
156, 159 mil. Ball	FL		2433	2085	
160 SP (sporting)	FL		2350	1960	

6.5x55mm Swedish Mauser



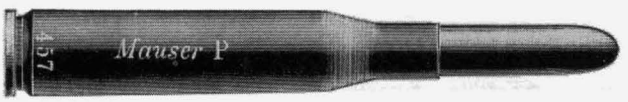
Historical Notes A Mauser- and Swedish-designed military cartridge adopted in 1894, it was used in the Swedish Models 94, 96 and 38 rifles and carbines. These are based on a modification of the Spanish Mauser 1893 bolt action. Norway also adopted this cartridge for its 1894 and 1912 Krag-Jorgensen rifles. Ammunition for sporting use is loaded by Norma. Military ammunition uses the Berdan primer, usually of .199-inch or .216-inch diameter. Sporting rifles are available on the American market in this caliber at present, and Federal and PMC produce ammunition in this caliber. Remington apparently produced a few free rifles in 6.5x55mm caliber some years ago and one model of the Model 70 Winchester was so chambered. The military Ball bullet is a spitzer boattail of very advanced design. Both copper and clad steel jacket types will be encountered.

General Comments The 6.5 x 55 Swedish cartridge is another surplus, post-war immigrant that has become quite popular in the United States. For North American hunting, it is one of the best of the foreign military calibers. It has been highly developed as a match and hunting round in the Scandinavian countries, and has a reputation for superb accuracy. With the lighter bullets of 77 to 100 grains it will do very well for varmint shooting of all kinds. The 120-grain bullet is fine for antelope or deer, and the heavier 140-160-grain bullets make it suitable for some types of big game. The Swedish Mauser and the Norwegian Krag are intended for working pressures of only about 45,000 psi and this must be considered when reloading. With a stronger action, maximum loads and performance could be increased a bit. Except for a slightly larger rim and base diameter and a shorter neck, this cartridge is very similar to the 6.5x57 Mauser cartridge. It is not known exactly who designed it, but undoubtedly its design was influenced by Mauser developments.

6.5x55mm Swedish Mauser Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
100 HP	IMR 3031	44	3100	2140	Varmint load
120 SP	IMR 4350	50	2780	2062	Deer, antelope
129 SP	IMR 4895	41	2625	1990	
140 SP	IMR 4350	45	2520	1980	
140 SP	IMR 4831	50	2590	2090	
156 SP	IMR 4350	43	2500	2168	
160 SP	IMR 4350	42	2430	2100	Heavy game
77 FMJ (Norma)	FL		3120	1660	Bird load
139 SP (Norma)	FL		2790	2395	
156 SP (Norma)	FL		2490	2150	
139 mil. Ball	FL		2625	2126	

6.5x58mm Portuguese Vergueiro



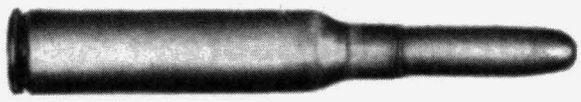
Historical Notes This was the original Portuguese military cartridge for the Mauser-Vergueiro bolt-action rifle—a basic Mauser-type, but with certain Mannlicher features such as the split bridge receiver. In 1937, Portugal adopted the 8mm Mauser cartridge and the Model 98 Mauser rifle. Many of the older Vergueiro rifles were then rebarreled to the new round. The military loading used a 155-grain bullet at a muzzle velocity of 2350 fps and 1908 fp energy. Sporting ammunition was once loaded by ICI in England and DWM in Germany and imported into the United States. Mauser bolt-action rifles have been chambered for this round in England and Europe, but it has never been used by any American manufacturer.

General Comments Another early military cartridge that achieved some popularity for sporting use. Its use in the United States has been very limited and confined to the few Mauser-type sporting rifles of this caliber imported from time to time. The cartridge case is similar to the 6.5x57 Mauser in shape and performance, but is a little smaller in diameter and has a longer neck. It is a good hunting cartridge for North American big game and ranks along with the other military 6.5s. Since the old Vergueiro rifles were largely rebarreled to 8mm, only a relatively few of these in the 6.5-caliber appeared in the surplus military gun stores. No commercial manufacturers currently offer this caliber.

6.5x58mm Portuguese Vergueiro Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
140 SP	IMR 4831	46	2530	1995	
140 SP	IMR 4895	38	2450	1870	Max.
156 SP	IMR 4350	43	2510	2183	Approx. fact. ball.
139 SP	FL		2775	2372	
157 SP	FL		2568	2292	
155 Ball	FL		2350	1908	

6.5x52mm Italian (Mannlicher-Carcano)



Historical Notes Official Italian military cartridge adopted in 1891 for the bolt-action Mannlicher-Carcano rifle. This rifle was a Mannlicher-inspired design in every respect except the bolt, which is a Mauser-type with double locking lugs at the front. It is also the only military rifle of smokeless powder design to use gain twist rifling. This Italian 6.5mm cartridge is very similar to the 6.5mm Mannlicher-Schoenauer in size, shape and performance. Both unprimed brass and loaded ammunition are made by Norma.

General Comments The Italian 6.5mm military cartridge was unfamiliar to American shooters until after WWII. Large quantities of Italian Model 91 rifles and carbines have been sold at very low prices, and because we are a great nation of bargain hunters, this is now a fairly widely-used caliber. Many of the surplus arms dealers furnished hunting ammunition that consisted of the military round with the full-jacketed bullet replaced with a softpoint-type. Reloadable cases can be made very easily from 6.5x54 Mannlicher brass. This is a good deer, antelope or black bear cartridge, but cannot be loaded as heavily as some of the other 6.5s because of the relatively low working pressure of the Carcano rifle. This is the cartridge used to assassinate President John F. Kennedy.

6.5x52mm Italian Mannlicher-Carcano Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
140 SP	IMR 4895	33	2250	1570	Max. for Carcano rifle
140 SP	IMR 3031	34	2320	1730	
156 SP	IMR 4064	37	2280	1806	
156 SP	IMR 4350	35	2340	1898	
160 SP	IMR 4350	35	2320	1919	
139 SP	FL		2580	2045	Norma load
156 SP	FL		2430	2045	Norma load
162 Ball	FL		2296	1902	

Italian Model 91 carbine

280 British

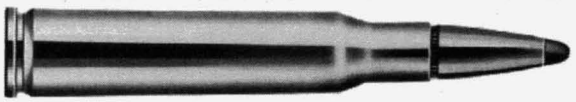
Historical Notes This is an experimental cartridge developed by the British army concurrently with a semi-automatic/automatic assault-type rifle, the EM-2. Work began in 1945, immediately after the end of the war, and by 1947 the rifle-cartridge combination was ready for field trials and was tested by both the British and the U.S. Its ultimate rejection was mostly a political decision to satisfy the U.S. military who were wedded to the 30-caliber, and by 1954, the British had adopted and were manufacturing the 7.62mm NATO round. The EM-2 rifle was a short bullpup design weighing 7 pounds and used a 20-round clip. I understand that the British continued field tests of the rifle and cartridge as late as 1951. The cyclic rate of the EM-2 was 600 to 650 rpm.

General Comments In 1948, the rim of the 280 British case was slightly enlarged to match the 30-06 and the name was changed to 280/30. Ballistics remained the same. The 280/30 case was developed by shortening and necking-down the standard 30-06 case so the rim and base diameter of the two cases are the same. The 280/30 case has a slightly-tapered body, probably an aid to feeding and extraction. Various bullet weights were used, from 130 to 140 grains and the muzzle velocity of the various loadings ranged from 2400 to 2530 fps. When tested in the U.S. and loaded with American powders, the velocity was increased to 2600 fps. The 280/30 would have made a potentially good sporting round, but I do not know of anyone who used it for that purpose. In a good strong bolt- or single shot action and loaded to maximum performance with American powders, the 280/30 could probably push the 139-grain bullet at something like 2700 to 2800 fps muzzle velocity. For some reason, very little, if any, work has ever been done with this cartridge in the sporting field. It is worth mentioning here because some experimenters, as early as 1962, necked the 308x1.5-inch down to 7mm, creating a very similiar round. However, the 280/30 British case is .20-inch longer than the 308x1.5-inch and case capacity is probably about 10 percent greater. Remington has now picked up this not very new or original idea in their new 7mm BR handgun cartridge used in the XP-100 Silhouette pistol. No sporting ammunition has ever been made in this caliber.

280 British Military Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Comments
139 Ball	FL	2530	1980	Spitzer bullet

7x57mm Mauser



Historical Notes The 7x57mm Mauser is another cartridge that, although designed as a military round, was widely adapted for sporting purposes. Contrary to what most cartridge books say, it was not introduced in 1893. It was actually developed in 1892 and used in a limited number of Model 1892 Mauser rifles, a modification of the Belgian-Mauser pattern of 1889. In 1893, Mauser introduced an improved bolt-action rifle in 7x57mm caliber that was officially adopted by the Spanish military. Subsequently, minor modifications of this 7mm rifle were adopted by other European and many Latin-American governments.

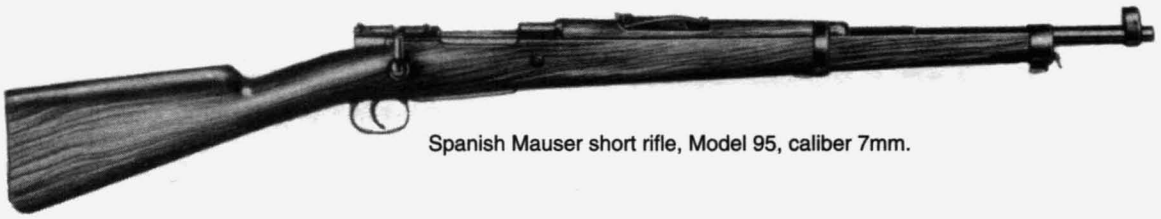
The original 7mm military round employed a 173-grain bullet with a muzzle velocity of 2296 fps and an energy of 2025 fpe. Other loadings were used by various countries with bullets ranging in weight from 139 grains up to the original 173-grain. Those on which data is available are listed below.

Model 93 Mauser rifles in 7mm caliber were used by Spanish troops in Cuba during the Spanish-American war. The effectiveness of this combination against American forces was responsible for the eventual adoption of the Mauser-system 1903 Springfield rifle. San Juan Hill was defended by only about 700 Spaniards armed with the new Mauser 7mm rifles, but they inflicted some 1400 casualties on the 15,000 Americans who attacked their position. The Remington Model 1902 rolling block rifle was also manufactured in 7x57mm Mauser caliber, as was the Model 70 Winchester.

General Comments There has been a large influx of surplus 7mm military rifles since the end of WWII. Many who purchase these immediately want them altered to a more familiar American sporting caliber. This is actually foolish because the 7x57mm is one of the best all-round calibers available for North American big game. With the proper bullet for the job at hand, the 7mm will handle any big game here. It might not be the choice for grizzly bear in heavy brush, but in the hands of an experienced hunter, it will be far superior to the 30-30 for any purpose. If the barrel is in good shape, it is best to leave 7mm military rifles in their original caliber. Loading data is in Chapter 2. Sporting ammunition in this caliber is offered by all major manufacturers.

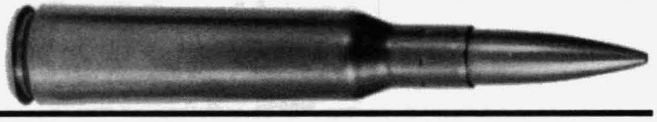
7x57mm Mauser Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Comments
139 Ball	FL	2950	2580	Brazil & Colombia
142 Ball	FL	2740	2365	Uruguay
155 Ball	FL	2300	1820	Mexico
162 Ball	FL	2295	1890	Mexico
173 Ball	FL	2296	2025	Original military loading used by Spain and others.



Spanish Mauser short rifle, Model 95, caliber 7mm.

276 Enfield



Historical Notes The 276 Enfield is an experimental military cartridge developed by the British beginning in 1909 for what later became the proposed Pattern 13 bolt-action rifle. It is very similar to the Canadian 280 Ross cartridge. Although the rifle and cartridge were issued for troop trials, they were not adopted due to the onset of WWI. However, the rifle was produced in a slightly-modified form as the Pattern 14 Enfield chambered for the 303 British cartridge, and many of these were manufactured in the U.S. for the British government. Most 276 Enfield ammunition was manufactured by Royal Laboratories at Woolwich, England, and headstamped R L. Bullet diameter is .282-inch. Bullet weights vary from 144-190 grains.

General Comments The 276 Enfield is primarily a collector's item because it was never officially adopted or used as a military cartridge. Also, it was not used as a sporting cartridge and is interesting mostly as a development that might have replaced the 303 British if WWI had not intervened. After the war, during 1923 to 1932, the U.S. experimented with a smaller cartridge—the 276 Pedersen. Sporting ammunition has never been made in this caliber.

276 Enfield Loading Data

Bullet (grs.)	Powder/grs.	MV	ME
165 Ball	FL	2800	2881

276 Pedersen

Historical Notes The 276 Pedersen was a U.S. Army experimental cartridge developed between 1923 and 1932 for the experimental Pedersen semi-automatic rifle. There were actually several variations of this cartridge (as many as nine or 10) with differences in case length, diameter and other dimensions. One version, the T2, had the same rim and head dimensions as the 30-06; another (T2-E1) was modified specifically for testing in an early version of the Garand rifle.

The 276 was tested with bullets weighing from 120 grains at 2550 fps to 150 grains at 2360 fps. Performance was not spectacular but was acceptable for a military cartridge at the time. However, in 1932, General Douglas MacArthur, then Army Chief of Staff, disapproved any caliber reduction and that ended the development program for the 276-caliber.

J.D. Pedersen, the originator of the 276 program, was a famous arms designer whose successful designs included the Remington Model 10 shotgun, Model 12 line of 22 slide-action rifles, the Model 14 and Model 25 centerfire slide-action rifles, and the WWI Pedersen device. The Pedersen semi-auto military rifle design employed a toggle breechblock system similar to the Luger pistol and Maxim machinegun. However, the Pedersen system differed because the barrel did not recoil with the breechblock, but rather remained stationary. The Garand system was adopted over the Pedersen rifle prior to WWII.

General Comments The 276 Pedersen was never manufactured as a commercial cartridge and no commercial sporting rifles were chambered for it. It would have made a good deer cartridge, but there were plenty of other cartridges in the same class that served just as well and there was no reason to bring out a sporting version. The 276 ammunition was quite common for a few years after WWII, and it is found in many collections.

276 Pedersen Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME
120 Ball	FL	2550	1732
150 Ball	FL	2360	1858

Note: There were other loadings in addition to the above.

7.35mm Italian Carcano

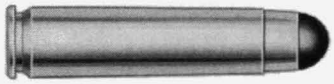
Historical Notes The 7.35mm cartridge was adopted by Italy in 1938 to replace the 6.5x52mm round that had been used since 1891. Experience in Ethiopia and other places had demonstrated the desirability of a larger caliber for combat use. The Model 91 Carcano rifle was modified slightly for the new cartridge, but retained the same basic action. That happened about the time Italy became involved in various military actions and the new cartridge created a critical supply problem and was withdrawn from service. Quantities of the 7.35mm rifles were used against the Russians by Finnish troops and reportedly gave good service. No sporting ammunition is loaded in this caliber at present, although Norma did so for some years.

General Comments Many thousands of the Italian Model 38 service rifles and carbines were sold here as surplus. The 7.35mm-caliber was unknown to the average shooter until that time. However, these rifles were sold at extremely low prices and are now in rather widespread use all over the country. In power, the 7.35mm is between the 30-30 and the 300 Savage, thus with proper hunting bullets, it's a good deer and black bear cartridge. It is actually a better cartridge than the 30-30 in many respects. Reloadable cases can be made from empty 6.5x54 Mannlicher brass as imported by RWS. This is done by expanding the neck, running the shell through a full-length sizing die and then trimming back to proper length. The Carcano action is designed for working pressures of only about 38,000 psi and the loads given below should not be exceeded. In a strong, modern action it would be possible to equal the 300 Savage in performance, but this cannot be done safely in the military Carcano.

7.35mm Italian Carcano Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
128 SP	IMR 3031	38	2495	1776	Approx. mil. ball.
128 SP	IMR 4895	40	2500	1782	
150 SP	IMR 4320	40	2550	2175	
150 SP	IMR 4895	38	2450	2005	
150 SP	H-380	41	2490	2070	
128 mil. Ball	FL		2483	1749	

30 Carbine (30 M-1 Carbine)



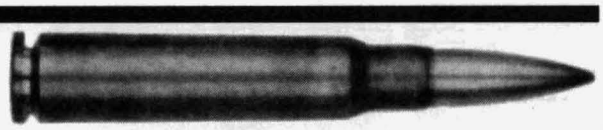
Historical Notes In 1940, the U.S. Ordnance Dept. concluded that a light carbine might have certain advantages over the 45-caliber semi-auto pistol in many combat situations. Various designs were submitted by a number of private manufacturers and, in the end, Winchester's offering was selected. The semi-auto 30 M-1 Carbine was officially adopted in 1941. The cartridge, a modification of the 32 Winchester self-loading round of 1906, was hardly a revolutionary new design, but it served the purpose. At about the same time, the Germans developed their assault rifle and the 7.92mm Kurz or short cartridge. The M-1 Carbine is not an assault rifle and the military insists it was designed to fulfill a different purpose. A few sporting rifles and handguns have chambered the 30 Carbine. (See Chapter 2.)

General Comments In mid-1963, the government released 30 M-1 Carbines for sale to civilians through the National Rifle Association at the very moderate price of around $20. Thousands of these rifles, as a result, have been used for sporting purposes. Federal, Winchester and Remington load softpoint sporting ammunition and for the first time, the M-l Carbine must be considered from other than a strictly military viewpoint. The 30 Carbine cartridge is in the same class as the 32-20 WCF, slightly more powerful if anything. It is wholly a small game and varmint number, despite contrary claims by those who love the short, light, handy M-1 Carbine. The modest accuracy of the Carbine combined with the ballistics of the cartridge limit the effective sporting accuracy range to about 150 yards, maximum. The author used an M1 Carbine to hunt small game and deer as early as 1943, before most people could get their hands on one, so he has a pretty good idea of the capability of the cartridge. Remember that the 32 Winchester self-loading round became obsolete in 1920 because it was ineffective and more or less useless for sporting purposes. The 30 Carbine was derived from it and shares the same shortcomings. However, the 30 Carbine can shoot relatively less expensive military ammunition and this allows use of the gun in many situations not economically feasible with the 32 SL. However, don't kid yourself about the terrific power of the 30 Carbine cartridge— it just isn't there. Despite this, it can be a very useful cartridge within its limitations and its use and popularity have increased considerably over the years.

30 Carbine Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
100	2400	15.5	2170	1045	Speer Plinker
110 SP	IMR 4227	15.0	2010	985	
125 Lead RN	A1680	15.0	1756	855	Accurate Arms
110 M1 Ball	FL		1975	955	
110 SP	FL		1990	965	Commercial load

7.5x54mm French MAS



Historical Notes In 1924, the French army adopted a new cartridge, the 7.5x58mm MLE 1924C, for a new automatic rifle. In 1929, the case was shortened 4mm to become the 7.5x54mm MLE 1929C. It was originally used in light machineguns and automatic arms, but in 1934 the Lebel Model 07/15 bolt-action rifle was modified for this round. In 1936, a newly-designed bolt-action rifle (MAS 36) in the new 7.5mm-caliber was adopted. This rimless cartridge replaced the rimmed 8mm Lebel, which the French army had used since 1886.

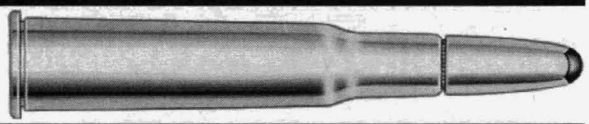
General Comments Fair quantities of French military rifles of this caliber have appeared on the surplus market in the last few years. The French are noted for hanging on to their obsolete military hardware long after it is of any real value. Sporting ammunition in this caliber has never been manufactured. However, A.L.M. Arsenal in France is now making this caliber with a Boxer primer. Some of the surplus dealers made up hunting ammo by replacing the military bullet with a similar softpoint type. The 7.5mm MAS is in the same class as the 30-40 Krag or the 303 British and can be used for the same range of game. Performance can be improved a little in handloading, but only Berdan-primed military brass has formerly been available. The military load develops about 40,000 psi breech pressure.

The initials MAS represent the French arsenal that developed the cartridge and rifle, *Manufacture d' Armes de Saint Etienne*.

7.5x54mm French MAS Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
150 SP	IMR 4831	54	2680	2400	Dup. mil. ball.
150 SP	IMR 4895	48	2800	2620	
180 SP	IMR 4895	44	2590	2692	
140 mil. Ball	FL		2600	2100	MLE 1929C

30 Army (30-40 Krag)



Historical Notes The 30 U.S. Army, or 30-40 Krag, was the first small-bore military cartridge adopted by the U.S. Army. It was adopted in 1892 for the Norwegian-invented, American-modified Krag-Jorgensen bolt-action rifle. Original loads used 40 grains of blackpowder with a 220-grain full metal jacket, round-nose bullet. This was soon changed to smokeless propellant.

The 30-40 Krag cartridge remained in service only a few years before being replaced in 1903 by the rimless 30-03 cartridge, predecessor to the 30-06.

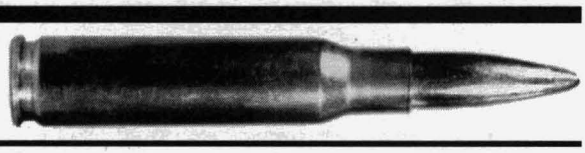
General Comments In 1893, Winchester began offering their High Wall single shot rifle in 30-40 Krag caliber, thus becoming the first commercial rifle in the U.S. offered for a small-bore, smokeless powder cartridge. It was nearly two years later before the 30-30 was available in a smokeless loading.

30-40 Krag Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Comments
220 FMJ-RN Ball	FL	2200	2365	Mil. Spec. Load

FN-FAL rifle

7.62x51mm NATO



Historical Notes For the NATO small arms trials in the early 1950s, the U.S. submitted their new T-65 cartridge. This was basically a shortened 30-'06 case using the same caliber of bullet and similar case head dimensions. Case length was reduced from 63mm in the 30-'06 to 51mm for the 7.62mm T-65. This allowed a lighter, more compact cartridge and rifle. Some of the other NATO Allies submitted entries which were far more advanced than the T-65 cartridge. However, the U.S. used its considerable influence to override all Allied objections to have the 7.62x51mm NATO cartridge adopted. It remains a NATO standard to this day.

In 1957, the U.S. Army adopted the M-14 rifle in 7.62x51mm caliber. The M60 machinegun is also chambered for this caliber as are various sniper rifles.

General Comments During the Vietnam War, the U.S. military adopted the 5.56x45mm cartridge for the new M-16 rifle which greatly upset the other NATO Allies. A new series of NATO tests was begun in the late 1970s which resulted in the 5.56x45mm cartridge being standardized in 1980. Both 7.62 and 5.56mm calibers remain NATO standard. Recent tendencies have been to chamber infantry assault rifles for the 5.56mm leaving the 7.62mm cartridge for machineguns. Nearly all NATO Allies manufacture the 7.62mm cartridge. Many non-NATO countries such as Japan, Australia, Brazil, Taiwan, South Africa, and many others also use this caliber. Ball, Tracer, Match, Armor Piercing, and Frangible types will be encountered.

7.62x51mm NATO Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME
150 FMJ-BT Ball M80	FL	2750	2520
168 HP-BT Match M852	FL	2680	2680

7.5x55mm Swiss Schmidt-Rubin

Historical Notes The first Swiss 7.5mm cartridge was adopted in 1889 for the Schmidt-Rubin straight-pull rifle of the same year. The original loading used a 0.299-inch diameter, 213-grain paper-patched lead bullet and a charge of 29 grains of semi-smokeless powder. Muzzle velocity was 1970 fps. Later, a steel-capped, hollow-base lead bullet was used, followed by a 190-grain copper or iron-jacketed, round-nose bullet and smokeless powder (Model 90/03). In 1911, the 174-grain, spitzer, boattail bullet was adopted and the diameter increased to .308-inch. Golden State Arms Corp. imported Japanese-made cases with 210 Boxer primers for loading sporting ammunition. Both unprimed cases and loaded rounds are available from Norma.

General Comments The 7.5mm Swiss military cartridge is another of the surplus items that has become well known to American shooters only since the end of the war. The Swiss army made a number of improvements in the straight-pull, Schmidt-Rubin rifle and the older, less desirable models were sold off as obsolete surplus. The original Model 89 with rear-locking lugs, very long receiver and protruding box magazine was one of those. The improved Model 1911 with shorter receiver, forward-located locking lugs and a less conspicuous magazine is another. The 190-grain load develops about 37,000 psi breech pressure and the 174-grain load about 45,500 psi, plus has a slightly larger diameter bullet. The 1911 cartridge, considerably more powerful than the older loading, should not be used in the Model 89 rifle. In a suitable action, the 7.5mm Swiss cartridge can be loaded to deliver performance equal to the 308 Winchester and is suitable for the same range of game.

7.5x55mm Swiss Schmidt-Rubin Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
130 SP	IMR 3031	46	3000	2608	Varmint load
150 SP	IMR 3031	45	2820	2658	
165 SP	IMR 4895	42	2570	2430	
180 SP	IMR 4064	45	2570	2642	
200 SP	IMR 4350	49	2460	2700	
174 Ball	FL		2560	2540	
180 Norma	FL		2650	2805	

Above loads are intended for the Model 1911 rifle or later with .308″ diameter bullets.

30-06 Springfield (30-06 Government/30-06 U.S.)

Historical Notes The 30-06 Springfield is a United States military cartridge adopted in 1906 for the Model 1903 Springfield service rifle, which was based on the Mauser bolt-action system. The 30-06 is actually a slightly-modified version of the original 1903 cartridge, which was loaded with a 220-grain round-nosed bullet at a muzzle velocity of 2300 fps. Because of cartridge developments in Europe, it was considered advisable to change to a lighter weight, pointed 150-grain bullet at an increased velocity of 2700 fps. At the same time the case neck was shortened by .07-inch. This improved round was designated the "Ball Cartridge, caliber 30, Model of 1906," but in practice, the nomenclature was shortened to 30-06. The 30-06 version can be chambered and fired in any rifle made for the original 1903 round, but the reverse is not true because of the difference in case length. For many years both the 1903 and 1906 configurations were loaded by sporting ammunition manufacturers. Shooting the '06 in the '03 chamber reportedly gave poor accuracy. Old catalogs list both rounds. Occasionally the 1903 version is called the 30-45 because the original loading used 45 grains of smokeless powder.

Again, because of military developments in Europe, the Army switched to a 172-grain bullet with a 9-degree boattail in 1926, the new round being designated the "Ball, caliber 30, M1." Muzzle velocity, originally the same as the 150-grain load of 2700 fps, was later reduced to 2640 fps because of difficulty maintaining pressure specifications at the higher velocity. In 1940, the 150-grain flat-base bullet was re-adopted as the "Cartridge, Ball, caliber 30, M2" and that was the load used in WWII. The return to the lighter bullet came about, at least in part, because of difficulties adapting the new Garand semi-automatic rifle to handle the 172-grain load. The heavier boattail bullet was superior for machinegun use because of its greater maximum range of nearly 6000 yards, compared to about 3500 yards for the 150-grain loading.

The rimless 30-03 and 30-06 replaced the older rimmed 30-40 Krag as the official U.S. military round. The 30-06 has, in turn, been superseded by the 7.62x51mm, also known as the 7.62mm NATO or, in its commercial version, the 308 Winchester. In Europe, the 30-06 is known as the 7.62x63mm.

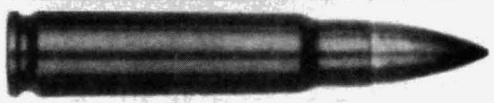
General Comments During WWII, the U.S. government supplied arms and ammunition in 30-06 caliber to many Allied nations including Great Britain, Netherlands, France, China, Australia, New Zealand and Brazil. To maintain their inventory of weapons, many countries undertook manufacture of 30-06 ammunition after the war.

In the 1950s and 1960s, vast quantities of surplus 30-06 ammunition was sold on the U.S. market. Shooters will often encounter Ball, armor piercing and tracer types. Ammunition loaded before and during WWII is corrosively primed. Practically all U.S. military ammunition loaded after 1952 has non-corrosive primers. The principal exception is Frankford Arsenal Match ammunition marked FA 53, 54 or 56, which has the old-style corrosive priming.

30-06 Springfield Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME
150 FMJ Ball M2	FL	2740	2500
172 FMJ-BT Ball M1	FL	2640	2660
220 FMJ-RN Ball (M1903)	FL	2300	2585

7.62x45mm Czech M52



Historical Notes This cartridge was independently developed in Czechoslovakia in the late 1940s. It was adopted for official Czech military use in 1952 along with the M52 assault rifle and the M52 machinegun. In the interest of standardization in the Warsaw Pact, the 7.62x45mm cartridge was dropped in the 1960s in favor of the 7.62x39mm Soviet round. The Czech cartridge is of interest historically as it is one of the very few successful independently developed assault rifle rounds outside the 7.62x39mm or 5.56x45mm cartridges. It is now obsolete.

General Comments The 7.62x45mm cartridge offers ballistic performance very similar to the Soviet 7.62x39. A .309-inch diameter spitzer boattail bullet weighing 130 grains was used at a muzzle velocity of 2440 fps. Cases were either brass or lacquered steel with Berdan primers. Both Ball and tracer types will be found.

The semi-automatic Czech M52 rifle was almost unknown in the U.S. until recently. About 8000 of the guns have been imported, as well as shooting quantities of ammunition.

AK-47

7.62x39mm (7.62x39mm Soviet M43)

Historical Notes Assault rifle cartridge adopted by Russia in 1943, it did not come into general use until after WWII, but the Russians now use it as their principal infantry small arms cartridge. Original use was in the SKS semi-automatic carbine, later replaced by the AK-47 selective-fire assault rifle. The RPD light machinegun also uses the M43 cartridge. Finland and those ex-satellite countries in the Soviet bloc use the M43 cartridge in arms furnished by Russia or of their own design. This cartridge was adopted as the result of Russian military experience against German assault rifles and the 7.92mm Kurz. Ruger introduced their Mini-30 semi-automatic rifle chambered for the 7.62x39mm during 1987, and the bolt-action M77 MKII rifle in 1991. Most military ammunition has a steel case and corrosive Berdan primer, but reloadable cases are now readily available.

General Comments The M43 catridge is, to some extent, a shortened, rimless version of the full-powered 7.62mm Nagant round. However, the body is reduced, and to make reloadable cases, it is necessary to start with 6.5mm Mannlicher or 7.35mm Carcano brass. The M43 is 1/4-inch longer than the German 7.92mm Kurz and will give substantially better performance with newer powders. Semi-auto rifle ballistics are marginal at best for deer-size animals. This caliber is now loaded commercially by Federal, Winchester and Remington with brass cases and Boxer primers.

7.62x39mm Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
110 SRA HP	A1680	27.5	2547	1580	Accurate Arms, Max. load (.308")
125 SRA SP	A1680	25.5	2368	1555	Accurate Arms, Max. load (.311")
150 SRA SP	A2015BR	26.0	2072	1430	Accurate Arms, Max. load (.311")
122 Ball	FL		2329	1470	

7.62x53Rmm Russian

Historical Notes Sometimes called the 7.62x54Rmm Russian, this cartridge was adopted in 1891 with the Model 1891 Mosin-Nagant bolt-action rifle. Its 150-grain spitzer bullet was adopted in 1909. This cartridge was standard issue in the Russian army during WWII. It is still standard issue for heavy machine-guns and the SVO sniper rifle. It was also adopted by Finland, China and most ex-satellite nations. It remains one of the few rimmed military cartridges still in standard issue. Russian Nagant rifles were manufactured in the U.S. by New England Westinghouse Co. and also by Remington and Winchester during WWI. After the war, a large number of surplus rifles were sold commercially and Remington loaded a 150-grain bronze-point hunting round. Additional Russian Nagant rifles and carbines have been sold in surplus stores since the end of WWII. Many were captured during the Korean conflict. New rifles are now being imported from China.

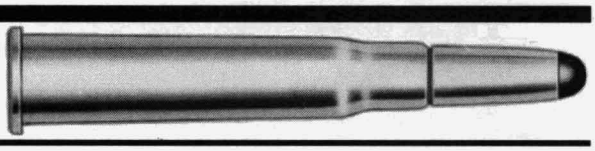
General Comments The 7.62x54R Russian cartridge has been kicked around since about 1919 and is fairly well known to American shooters. Remington discontinued loading this round about 1950. It is currently available here only from Norma. Russian military cartridges use Berdan primers, usually of 6.45mm (.254-inch) diameter.

With the 150-grain bullet, the 7.62mm Russian is in the same class as the 30-06. However, with its smaller case capacity, it won't do as well as the 30-06 when loaded with heavier bullets. Although bullets measure .309-.311-inch in diameter in military ammo, .308-inch bullets will work fine for reloading. Standard working pressure is about 45,000 psi.

7.62x53Rmm Russian Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
150 SP	IMR 3031	49	2800	2620	Approx. fact. ball.
180 SP	IMR 4320	48	2630	2772	
220 SP	IMR 4350	45	2350	2705	
147 Ball	FL		2886	2727	Type LPS bullet.
150 SP Norma	FL		2950	2820	
180 SP Norma	FL		2580	2650	
185 Ball	FL		2660	2910	Type O bullet

303 British



Historical Notes As a military cartridge, the 303 British must be considered one of the most successful of its type. Developed during 1887 and adopted in 1888, it was the official military cartridge of the British Commonwealth in WWI and II. It was replaced by the 7.62x51mm NATO cartridge in 1957.

Originally, the 303 cartridge was loaded with a 215-grain round-nosed bullet encased in a cupro-nickel jacket. This bullet, backed by 70 grains of compressed blackpowder, developed a muzzle velocity of 1850 fps. Energy at the muzzle was 1630 fp. In the 1890s, in response to reports from the frontier that the jacketed round-nose solid bullet was ineffective against tribesmen, Capt. Bertie Clay at the arsenal at Dum Dum, India, perfected the expanding bullet with the jacket open at the nose to expose the lead core, which mushroomed on impact. Such projectiles became known as Dum Dum bullets.

In 1892, the propellant was changed to the then-new Cordite smokeless powder and the velocity upped to 1970 fps. In 1910, a 174-grain pointed flat-base bullet was adopted and the velocity increased to 2440 fps. This was the Mk VII round, still in use when the 303 was discontinued.

Bullets for the Mk VII cartridge had an aluminum or fiber-filled tip with the base of conventional lead alloy. This made the bullet longer than normal for its weight. It also produced a stable projectile in flight that would tumble easily on contact, thus increasing the wounding potential.

The 303 cartridge was designed for the Lee-Metford Mk I magazine rifle, a turnbolt type invented by James Paris Lee, an American. In 1895, the segmental and shallow Metford-type rifling was discontinued in favor of the deeper Enfield-type. (Metford had, in fact, also patented the so-called Enfield rifling prior to his segmental form.) From this point on, the rifle was known as the Lee-Enfield. There are many variations and types.

General Comments The 303 British cartridge has been used extensively in Africa, Canada and India by settlers and government workers. It gained a bad reputation because the full-jacketed military bullet tended to break up on impact. However, with proper sporting bullets it does quite well on the lighter, non-dangerous varieties. Norma offers one loading: a 150-grain soft-nose and U.S. companies now load it with a 180-grain softpoint.

Although usually classed with the 30-40 Krag, the 303 actually has a slight edge over the Krag. For one thing, it has a nominal operating pressure of 45-48,000 psi compared to 40-42,000 psi for the 30-40. Also, late model Enfield rifles are much stronger than the Krag and will stand pressures up around 50,000 psi. Enfield No. 4 Mk I rifles have been converted successfully to use the 7.62mm NATO.

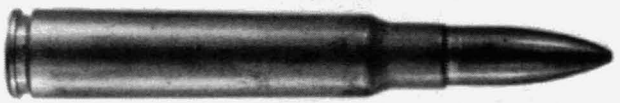
Ammo for the 303 loaded in Britain had the Berdan primer, and in older lots, usually Cordite powder. Military ammo loaded by American companies has the Boxer primer and American-type nitrocellulose powder.

Proper jacketed bullet diameter for the 303 is .311-inch. Cast bullets may run to .312-inch or even .313-inch. Loading data will be found in Chapter 2.

303 British Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
215 Ball	Cordite		1970	1850	Original load
215 Ball	Blackpowder	70.0	1850	1630	
175 Ball	FL		2440	2310	Mk VII Ball
215 Ball	FL		2050	2010	Mk VI Ball

7.7x58mm Japanese Arisaka



Historical Notes The 7.7mm cartridge was adopted by the Japanese in 1939 to replace the older 6.5mm, but they ended up using both calibers during WWII. They also adopted a new rifle, the Model 99 Arisaka, which was a modification of the earlier 1905 weapon. Norma makes empty cases and sporting ammunition in this caliber with American Boxer-type primers. No sporting rifles have ever been manufactured in this caliber.

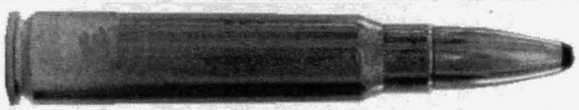
General Comments The 7.7mm, or 31 Jap as it is sometimes called, is very similar to the 303 British cartridge and uses the same .311-inch diameter bullets. However, it is a rimless type, whereas the British case is rimmed (there is also a semi-rimmed Japanese version for machinegun use). The 7.7mm Japanese can be used for the same kind and size of game as the 303 British. With good Norma sporting ammunition available, this has become one of the more useful military cartridges for North American hunting. Military loads develop about 42,000 psi pressure.

7.7x58mm Japanese Arisaka Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
130 SP	IMR 3031	46	2950	2510	Dup. fact. ball.
150 SP	IMR 3031	41	2680	2400	
180 SP	IMR 4064	45	2490	2470	Dup. fact. ball.
215 SP	IMR 4064	42	2240	2405	
130 SP (Norma)	FL		2950	2510	
175 mil. Ball	FL		2400	2237	
180 SP (Norma)	FL		2490	2470	

Argentine Model 1891

7.65x53mm Mauser (Argentine)



Historical Notes Mauser-designed for the 1889 Belgian pattern rifle, the 7.65mm was also adopted by Argentina, Bolivia, Columbia, Ecuador, Peru and Turkey. In the United States, Remington and Winchester loaded sporting ammunition and furnished rifles in this caliber until about 1936. It has been obsolete in the U.S. since that time, but sporting ammunition has always been loaded in Europe. The Remington Model 30 and Winchester Model 54 bolt-action rifles were chambered for the 7.65mm, and it enjoyed a limited popularity for a few years. With the influx of 1891 Argentine Mauser military rifles, it is having another go around on the American market.

General Comments The 7.65mm Mauser is a well-designed cartridge and gives excellent performance for North American hunting. In power, it is similar to the 308 Winchester, which makes it adequate for all medium game.

Arsenal primers are Berdan 5.5mm or .217-inch, a size available in several European makes. Occasionally one encounters discontinued American-made cases or ammunition, and these use Large Rifle (.210-inch) primers. Cases can be made from empty 30-06 brass by using case-forming dies available from several American manufacturers. Bullet size is .313-inch, but .311-inch or .312-inch diameter bullets will give satisfactory accuracy. Norma-made cases and loaded ammunition are imported with Boxer primers.

7.65x53mm Mauser Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
150 SP	IMR 4895	47	2810	2638	
150 SP	IMR 4895	42	2550	2172	
174 SP	IMR 489S	45	2590	2600	
175 SP	IMR 4350	49	2560	2550	
175 SP	IMR 4831	53	2456	2346	
180 SP (Norma)	FL		2590	2685	
150 SP (Norma)	FL		2920	2841	
155 FMJ-BT Ball	FL		2710	2530	Type S
174 FMJ-BT Ball	FL		2460	2340	Type SS
211 FMJ Ball	FL		2130	2150	Original load

8x50Rmm Siamese Mauser (Type 45)

Historical Notes Adopted in 1902, this cartridge derives its name from the Thai year of adoption—2445. It was the standard Siamese military cartridge from 1902 until WWII. It is historically significant for two reasons. First, the 8x50R Siamese is the only rimmed military cartridge adapted to a unique variation of the popular Mauser rifle. Second, it was the first cartridge to be manufactured in quantity in Thailand (at the National Arsenal in Bangkok). During WWII, the production machinery was moved to the hills to escape Japanese seizure. The machinery served to supply the guerrilla movement. When the war ended it was moved back to Bangkok.

General Comments The 8x50R cartridge was loaded with a .321-inch diameter cupro-nickel clad, full metal jacket, round-nose bullet and brass cartridge case with Berdan primer. Only Ball bullets were used. Some manufacture of this cartridge was also contracted out to Japan and Germany. In 1923, a new cartridge was adopted, the 8x52R. Rifles for the older round were rechambered and rear sights modified. During the late 1970s thousands of these surplus rifles were sold in the U.S.

8x50Rmm Siamese Mauser Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME
237 Ball	FL	2050 (est.)	2210

8x52Rmm Siamese (Type 66)

Historical Notes In 1923, the Siamese army adopted a new cartridge with a pointed bullet. The case length was 2mm longer than the older 8x50Rmm Siamese cartridge, so the two were not interchangeable. The new round was adapted to a new Mannlicher infantry rifle and carbine, as well as to Madsen, Browning and Vickers machineguns. Older rifles for the 8x50Rmm cartridge were rechambered. The 8x52R cartridge remained in production in Thailand until 1953, after which Ball ammunition was contracted out (chiefly to Kynoch in England) until finally discontinued in the late 1960s.

General Comments The pointed, flat-base Ball bullet of the 8x52R cartridge will be found with both cupro-nickel clad steel and gilding metal jackets. Cases are of brass with Berdan primers. Boxer-primed cases will also be encountered. In addition to Ball loadings, there were tracer, armor piercing and armor piercing incendiary types. This caliber was also made by Kynoch (U.K.), in Japan and Denmark, and recently by Sako of Finland. Surplus rifles in this caliber are often encountered in the U.S.

8x52Rmm Siamese Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME
181 Ball	FL	2250 (est.)	2615

8x58Rmm Danish Krag

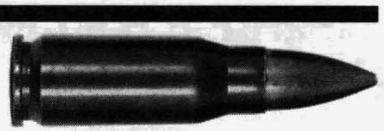
Historical Notes Danish-designed military cartridge adopted in 1889 for the M89 Krag-Jorgensen bolt-action rifle. The cartridge was adopted by Norway in 1888 for a Remington carbine and later adopted by both Denmark and Sweden in 1889. The original loading was the 237-grain round-nosed bullet, but in 1908, this was changed to a 196-grain spitzer bullet at a muzzle velocity of 2460 fps. This was at one time a popular sporting and target cartridge in the Scandinavian countries. Rifles based on the Remington rolling block action and chambered for this round were once common in Scandinavian countries, although not any longer. A few were imported into the U.S.

General Comments The Danish 8mm military cartridge has a good reputation for accuracy in the Danish Krag rifle. It is also noted for very satisfactory killing power on European big game. It was practically unknown in the United States until after WWII, when a number of surplus Norwegian Krags were sold. As a military cartridge, it is in the same class as our own 30-40 Krag or the 303 British. However, the sporting ammunition once offered by Norma was far more powerful than any commercial loads for the 30-40 or 303. In fact, the 198-grain bullet at 2740 fps develops more energy than any commercial 30-06 load. This is one of the better military cartridges from the point of view of the North American hunter. European sporting cartridges are loaded to pressures of from 42,000 to 45,000 psi. This cartridge is no longer commercially loaded and ammunition has become very scarce.

8x58Rmm Danish Krag Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
159 SP	IMR 3031	52.4	2870	2920	Dup. fact. ball.
196 SP	IMR 4895	54	2630	3020	Dup. fact. ball.
198 SP	IMR 4895	54.5	2740	3310	Dup. fact. ball.
159 SP (Norma)	FL		2870	2920	
196 SP (Norma)	FL		2630	3020	
198 SP (Norma)	FL		2740	3310	
237 (Ball)	FL		1968	2041	

7.92x33mm Kurz



Historical Notes Developed during 1940-41 for use in the newly-conceived German MKB42 assault rifle, it was first tested in combat against the Russian army at Cholm, Russia, in late 1942. Several changes and modifications culminated in the Sturmgewehr rifle, or Stg-44. This was the first successful assault rifle cartridge and as such marks an important milestone in military history that has had a profound effect on small arms development. The 7.92mm Kurz is a short version of the standard 7.92mm (8mm) Mauser cartridge. No sporting rifle has ever been made for this round. Ammunition was manufactured in East Germany for some years for export customers.

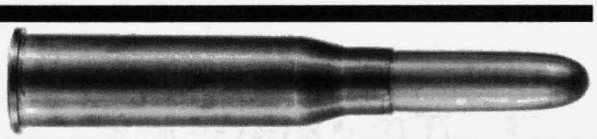
General Comments This is a medium-range cartridge designed to increase infantry firepower by permitting more accurate and controlled full automatic fire. This is not possible from lightweight shoulder weapons using full-powered cartridges such as the 30-06 or the German 8x57mm Mauser. The idea must have been quite effective because it was used against the Russians, who almost immediately copied it and brought out an assault rifle and cartridge of their own. It has been demonstrated that in close combat in cities, jungles or similar areas, these reduced-power cartridges have all the range and penetration necessary.

The German Sturmgewehr, or assault rifle, had a 16-inch barrel, weighed 10 to 11 pounds loaded and used a 30-shot magazine. As a sporting cartridge, the 7.92mm Kurz would be less powerful than the 30-30 and not very well suited for anything but small to medium game. Because guns for this cartridge are capable of full automatic fire, none have been sold in shooting condition because they come under the National Firearms Act. This caliber has never been commercially manufactured. Military ammunition is not reloadable as it is steel cased and Berdan primed.

7.92x33mm Kurz Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
125	4198	20	2070	1193	
125	4198	23	2310	1485	Max.
125 mil. Ball	FL		2247	1408	

8x50Rmm Austrian Mannlicher



Historical Notes Austrian military cartridge adopted in 1888 for the Mannlicher Model 88 straight-pull rifle, and also used in the later improved Model 95. This cartridge was also used by Bulgaria, Greece and Hungary. It remains fairly popular as a sporting cartridge in Europe and both Mauser and Mannlicher-Schoenauer rifles of this type have been chambered for it. Sporting ammunition is still loaded in Europe by Hirtenberger, and this caliber is being imported to the United States. This was originally a blackpowder design and smokeless powder was not used until about 1890.

General Comments During the 1920s and '30s, a few European sporting rifles chambered for the 8x50R cartridge were imported into the United States and used to a limited extent for big game hunting. This is another 30-40 Krag class cartridge, which is adequate for most North American big game. It uses .323-inch diameter bullets of which there is a good variety available for handloading. Berdan-primed cases appear to use the 5.1mm or .199-inch primer, although this is variable. Hirtenberger ammunition is Boxer primed and loaded at 40,000 to 42,000 psi. The Model 88 Mannlicher straight-pull rifle uses a hinged block on the underside of the bolt to lock the action. It is not noted for great strength and pressures must be kept quite low for safety. The Model 95 has a revolving bolt head and forward locking lugs, which provide greater strength. Many 95s were altered to shoot the standard German 8mm Mauser service cartridge.

8x50Rmm Austrian Mannlicher Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
159 SP	IMR 3031	48	2460	2142	
227 SP	IMR 3031	45	2040	2102	
244 SP	IMR 3031	45	2010	2200	Approx. mil. load
196 SP	FL		2310	2320	Hirtenberger sporting
244 Ball	FL		2030	2240	

Above loads are for the Model 88 action provided it is in good condition.

Mannlicher Model 1888

8x50Rmm Lebel

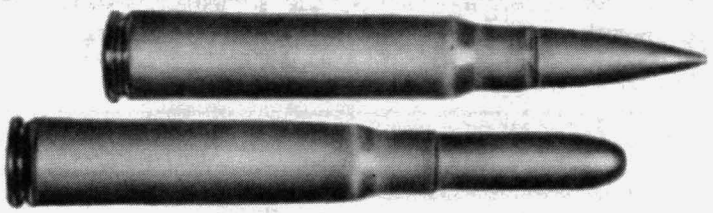
Historical Notes The 8mm Lebel was the first small-bore smokeless powder military cartridge developed by any world power. The cartridge and the Lebel bolt-action rifle were both adopted in 1886. The original loading used a 232-grain jacketed flat-nose, flat-base bullet called the Balle M. In 1898, a solid bronze, spitzer boattail, 198-grain bullet was adopted—the famous Balle D. The cartridge was further updated in 1932 with the adoption of the Balle 32M which had a cupro-nickel clad steel jacket over a lead core. This spitzer boattail bullet weighed 190 grains. Its rimmed case was not well adapted to automatic arms, so it was replaced by the rimless 7.5x54mm MAS round in 1929. Remington manufactured Lebel rifles and ammunition for the French government during WWI. When the war ended, all the surplus was sold commercially and Remington turned out sporting ammo with a 170-grain bronze-pointed bullet. No sporting rifles have been made in this caliber. Military production of this caliber in France continued even under German occupation.

General Comments Probably more 8mm Lebel rifles were sold during the 1920s and '30s than following WWII. The Remington factory products were all brand new and in perfect condition, which is more than can be said for the more recent war surplus models that have shown up. The 8mm Lebel cartridge is in about the 30-40 Krag class and makes a fine caliber for deer through elk hunting. Remington no longer lists 8mm Lebel sporting ammunition and it is difficult to find. Plenty of good .323-inch bullets are available and American cases can easily be reloaded. Military cases have Berdan primers of .199-inch or .216-inch size and are not very practical to reload.

8x50Rmm Lebel Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
170 SP	IMR 4895	49	2570	2500	
198 SP	IMR 3031	46	2380	2481	Dup. mil. ball.
198 SP	IMR 4895	45	2450	2645	
170 (Remington)	FL		2640	2630	
198 Ball	FL		2380	2481	Balle D, Balle 32M

7.9x57mm J and JS (8mm German Mauser)



Historical Notes The 8mm Mauser is one of the world's truly great military cartridges. It was the official German military caliber in both world wars and was also adopted by Czechoslovakia, Poland, China and other countries. It is also a popular sporting round in many parts of the world.

Although designated the 8mm "Mauser," the original military round was designed for the German Model 88 commission rifle, which was a modified Mannlicher-type, not a Mauser design. This rifle was known officially as the Gewehr 88, or German Infantry Model 1888. It was designed by the German Infantry Board or Commission at Spandau Arsenal. It was replaced in 1898 by the superior Mauser model of that year. The original J Patrone cartridge used a round-nosed, 226-grain bullet of .318-inch diameter. Muzzle velocity was 2093 fps. In 1905, the Germans adopted an improved cartridge that retained the original 8x57mm case, but employed a larger diameter bullet of .323-inch. The new S Patrone bullet was lighter at 154 grains and was of pointed, or spitzer-type. Muzzle velocity was upped to 2880 fps. All German military rifles manufactured since 1905 have the .323-inch bore.

The German 8mm military cartridge is designated by a "J" for "Infanterie" (the German I was mistaken for a J). The later .323-inch bore or caliber is indicated by an "S" for spitzer-type. Sporting ammunition in 8mm is labeled by the same system. The 8x57J or 1888 cartridge can be fired safely in the 1905 or S-bore rifles, though accuracy is poor. However, it is not safe to fire the larger S (.323-inch) bullet in the smaller J (.318-inch) bore.

General Comments Thousands of 8mm military rifles have been sold through surplus dealers since the end of WWII. Most were bought to obtain the 98 Mauser action, which served as the basis for building a sporting rifle in some U.S. caliber. In many instances, the cost of making up a new rifle on a military action is not justified. However, if the original caliber is retained and modification held to the minimum, many of these rifles are a good buy.

The 8x57JS Mauser is an outstanding sporting cartridge in its own right, being in the same class as our 30-06. Unfortunately, U.S. ammunition companies load only the "S" version of the 8mm. This has a 170-grain bullet at 2360 fps, which about duplicates the 30-40 Krag in power. Norma makes both 165- and 196-grain sporting loads that bring out the full potential of this cartridge. Sporting loads and handloading data will be found in Chapter 2.

7.9x57mm J and JS Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Comments
154 Ball	FL	2880	2835	S Patrone
226 Ball	FL	2095	2200	J Patrone

WARNING! Many J bore (.318²) rifles stillexist and will fire S bore (.323²) cartridges, creating dangerous pressures. When in doubt, check bore diameter CAREFULLY!

8x63mm Swedish

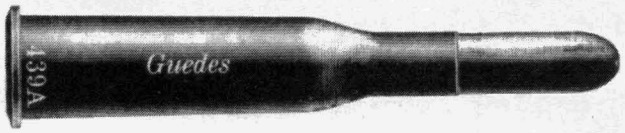
Historical Notes A Swedish military round introduced in 1932 for use in various Browning air- or water-cooled machineguns, and for the m/40 rifle. Swedish military rifles and light machineguns are chambered for the standard 6.5x55mm cartridge. Its use is confined to Sweden and it is practically unknown outside that area. Although listed in past issues of COTW as a sporting round, it was never actually loaded as a sporting cartridge.

General Comments The 8x63 nearly duplicates the wildcat 8mm/06 cartridge, which is the 30-06 necked-up to accept .323-inch bullets. However, the 8x63 has a slightly larger diameter case and should be capable of delivering about 15 percent more energy if loaded to the same pressure. (Incidentally, never fire a cartridge just because it looks like or has a similar designation to the one the gun is chambered for. This can be extremely dangerous. Almost is not good enough, so if you are at all uncertain about the proper cartridge, have a competent gunsmith check the bullet diameter, case dimensions and headspace. Some British and European cartridges look very much like similar American rounds, but they absolutely will not interchange safely.) The 8x63 Swedish is in the same class as our own 30-06.

8x63mm Swedish Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME
150 SP	4895	60	3050	3100
170 SP	4320	57	2820	3020
225 SP	4350	57	2450	2960
218 Ball	FL		2493	3025

8x60Rmm Guedes M85 Portuguese



Historical Notes Portugal adopted the 8mm Guedes rifle and cartridge in 1885; the gun was a single shot, under-lever type based on the Martini-Henry design. The rifles were manufactured by Steyr in Austria and were well made and finished. One of the last of the military single shots, it had a very short life.

General Comments The 8mm Guedes cartridge represented a ballistic advance similar to the 9.5mm Turkish Mauser. However, the Guedes rifle was a step in the wrong direction because all the powers of the time were rapidly developing repeating rifles. Both rifle and cartridge are rare.

The 8mm Guedes was replaced in 1896 by an apparently interchangeable cartridge, the 8x60R Kropatschek (later shortened to 56mm). This cartridge was used in the Austrian-made Kropatschek rifle, a tube-magazine repeater. No sporting rifles were made for either of these rounds.

8x60Rmm Guedes M85 Portuguese Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
175 Lead	Fg	75	1740	1182	Lyman #321232
175 Lead	IMR 4198	28	1670	1090	Lyman #321232
247 Ball	Fg	70	1706	1605	Military load

8x59mm Breda

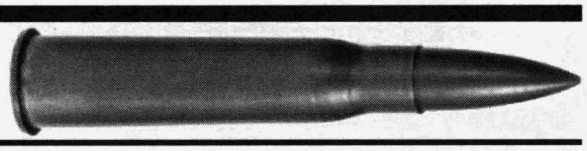
Historical Note Cartridge for the Italian Breda Model 1937 and 1938 machineguns. Insofar as can be established, it has never been used as a sporting cartridge.

General Comments Different bullet weights and muzzle velocities are listed for the 8mm Breda and this may reflect the various military loadings. Bullet diameter varies from .322-inch to .326-inch. The cartridge is similar to the 8mm Mauser, but the case is fatter and $^1/_{10}$-inch longer. The original purpose of the 8mm Breda was to replace the 6.5mm Italian cartridge as a more effective machinegun round.

8x59mm Breda Loading Data

Bullet (grs.)	Powder/grs.	MV	ME	Comments
210 Ball	FL	2600	3160	Military Ball

8x53Rmm Japanese Murata



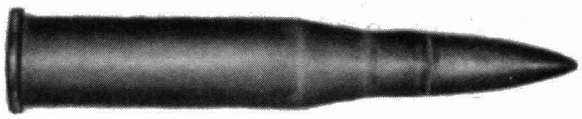
Historical Notes Japanese service cartridge adopted in 1887 for the tube-magazine Murata turnbolt rifle, a modification of the earlier single shot and repeating Murata rifles of 11mm-caliber. It is similar to the French Chassepot in design. The 8mm Murata was the principal rifle used by the Japanese in the Sino-Japanese war of 1894. It was known officially as the Meiji 20-8mm rifle and cartridge. Meiji refers to the period of the reign of the Emperor of that name (1868-1912). The cartridge was replaced in 1897 by the 6.5mm round.

General Comments Both the 8mm Murata rifle and cartridge are collector's items, and rare ones at that. The cartridge was loaded with smokeless powder and a 238-grain jacketed bullet of .320-inch diameter. Both have a flat nose for use in the tubular magazine. You are not very likely to have one of these rifles available for hunting or anything else. However, if you do, the cartridge would be adequate for anything to elk-sized animals at moderate range. The 8x53Rmm is unusual among military cartridges in that it has a protected primer which appears as a primer within a primer.

8x53Rmm Japanese Murata Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME
238 Ball	FL	1850	1810

8x56Rmm Austrian/ Hungarian Mannlicher 8mm Hungarian M31



Historical Notes This cartridge was developed in 1930 for the Solothurn machine gun. It was subsequently adopted by Hungary about 1931, actually goes back to the mid-1920s when it was developed to replace the 8x50Rmm Austrian round. It is usually designated the M31. It differs from the older Austrian 8x50Rmm having a longer, tapered shoulder, plus a bullet of slightly larger diameter. It was used in the Hungarian Model 35 Mannlicher bolt-action rifle and also the modified Model 95 straight-pull Mannlicher. In 1940, Hungary adopted the standard German 8mm military round and many of their rifles were then altered to this caliber. As far as we know, no sporting rifles were turned out in the 8mm Hungarian caliber.

General Comments This cartridge is often confused with the 8x56 Mannlicher-Schoenauer, which is a rimless sporting cartridge, whereas the Hungarian military round is rimmed. The two are not interchangeable as there is considerable difference in the case dimensions as well as bullet diameter.

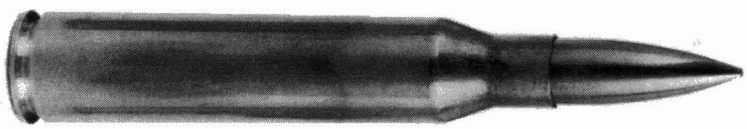
Rifles in this caliber are rare on the American market and ammunition is extremely difficult to find. The .329-inch diameter bullet makes reloading a problem because bullets of this size are not normally available. It is possible to use .323-inch bullets, but accuracy is poor. Military rifles in this caliber should be considered primarily collector's items because of the ammunition problem. In power, the 8x56R Hungarian and the 8x50R Austrian cartridge are in the 30-40 Krag class.

8x56Rmm Hungarian Mannlicher Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
198 SP	IMR 3031	46	2310	2358	.323″ bullet
206 Ball	IMR 3031	45	2300	2420	Mil. bullet

Model 95/34 Mannlicher
(Photo courtesy Century International Arms)

338 Lapua Magnum 8.58x71mm (Finland)



Historical Notes In 1983, Research Armament Co. in the U.S. began development of a new, long-range sniper cartridge capable of firing a 250-grain, .338-inch diameter bullet at 3000 fps. After preliminary experiments, a 416 Rigby case necked down to .338-inch was selected. Brass Extrusion Labs Ltd. of Bensenville, Illinois, made the cases, Hornady produced bullets, and Research Armament built the gun under contract for the U.S. Navy. Subsequently, Lapua of Finland has put this caliber into production.

General Comments You have to burn a lot of powder to launch a 250-grain bullet at 3000 fps. The 338 Lapua Magnum, as it is known commercially, or the 8.58x71mm, does just that. The full metal jacket, boattail military bullet is reportedly very effective at 1500 meters. The commercial soft-point bullet is intended for hunting very heavy game. Cartridge cases are brass with Boxer primers. Guns for this cartridge are bolt actions.

338 Lapua Magnum Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME
250 FMJ-BT Ball	FL	2950	4830
250 SP	FL	2855	4525

9.5x60Rmm Turkish Mauser

Historical Notes Adopted by Turkey in 1887 with the M87 Mauser bolt-action repeating rifle, which was a modification of the German Model 71/84. This last Mauser-designed blackpowder cartridge is one of the most efficient ever developed. Mauser concluded after extensive testing and experimenting that the 9.5mm bullet gave the maximum performance possible with this propellant. The cartridge was used for 3 years before it was obsoleted by smokeless powder. In 1890, Turkey adopted the 7.65mm Mauser cartridge. The 9.5mm is often referred to as the Turkish Peabody because it was used extensively also in the Peabody-Martini single shot rifle.

General Comments The Turkish Mauser Model 87 rifle is largely a collector's item because the Turks scrapped most of them when they adopted the 7.65mm in 1890. However, a good number of the single shot Peabody-Martini rifles in this caliber survived. The cartridge has been obsolete in Europe since the turn of the century. As a hunting number, the 9.5mm Turkish would be adequate for North American big game at moderate ranges.

9.5x60Rmm Turkish Mauser Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
285 Lead	Fg	70	1758	1961	Military load, paper-patched bullet
290 Lead	IMR 4198	34	1500	1445	Lyman #403173
284 Lead	FL		1758	1961	

10.15x61Rmm Jarmann

Historical Notes Military cartridge adopted by Norway and Sweden in 1881 for use in the Jarmann turnbolt, tube magazine repeating rifle, officially adopted in 1884, with a modified version adopted in 1887. It was used for only 7 years before being replaced by the 6.5x55mm cartridge and the Krag rifle.

General Comments The 10.15mm Jarmann is nearly unknown in the U.S. and the Jarmann rifle is a collector's item. The cartridge was not used long enough to build much of a following, even in the Scandinavian countries, although it was used to a limited extent in Norway and Sweden for sporting purposes. It is one of the more efficient blackpowder cartridges and is comparable to the 9.5mm Turkish Mauser.

10.15x61Rmm Jarmann Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
337 Lead	Fg	80	1625	1990	Military load, paper-patched bullet
290 Lead	IMR 4198	32	1430	1320	Lyman #403173
337 Lead	FL		1625	1990	

10.15x63Rmm Serbian Mauser

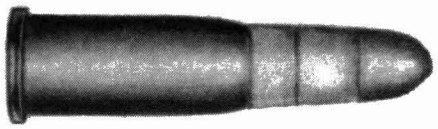
Historical Notes Military cartridge adopted in 1878 by Serbia for use in the Mauser Model 78/80 single shot rifle, which was nothing more than a slight modification of the Mauser Model 71 rifle. In the Serbian model, the left receiver wall enclosed the bolt more fully than in the original M71. This modification was later incorporated into the design of the Mauser 71/84 repeating rifle. Quantities of the German 71/84 were also chambered for the Serbian cartridge and sold to that country. It is reported that various 10.15 Serbian Mauser rifles were encountered in the Balkans as late as WWII.

General Comments This is another rare military cartridge not likely to be used for sporting purposes. I do not know of any of these Serbian Mauser rifles being sold in the U.S. However, one can never entirely anticipate what some alert arms scout may find hidden away in the future. If any of these rifles do show up, you can make ammunition by sizing 11mm Mauser cases, full length in a 10.15mm die. Lyman #412263 (290-grain) bullet intended for the 405 Winchester could be sized to the proper .411-inch and used with blackpowder or 34 grains of smokeless IMR 4198.

10.15x63Rmm Serbian Mauser Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME
340 Lead	FL	1460	1612

10.4x38Rmm Swiss Vetterli M69/81



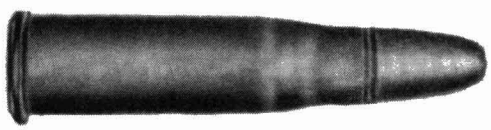
Historical Notes Swiss military cartridge adopted in 1869 for use in the Vetterli turnbolt rifle. The official military round is rimfire, but a centerfire version was also loaded in Europe. The cartridge and rifle were discontinued in 1889.

General Comments The 10.4mm, or 41 Swiss, cartridge is quite well known in the U.S. and most American companies loaded it until about 1942. Thousands of surplus Swiss Vetterli rifles have been sold in this country and a surprising number have been used for hunting deer. For a time, there was a good supply of both rifles and cartridges in dealers' stock. American ammunition was loaded with smokeless powder. The 41 Swiss would be a barely adequate short-range cartridge for deer-class animals. The rimfire military version can't be reloaded. This cartridge is unusual in that it is one of the few rimfire military rounds.

10.4x38Rmm Swiss Vetterli M69/81 Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME
334 Lead	FL	1345	1330
Some sources list the MV as 1427 fps.			

10.4x47Rmm Italian Vetterli M70



Historical Notes Italian military cartridge adopted in 1870. It was used in the Vetterli single shot, turnbolt rifle and a later modified box magazine repeater (Vitali system). Many of these cartridges were loaded with a brass-coated bullet.

General Comments The 10.4 Italian service cartridge has not been produced for many years, but occasional lots of surplus ammunition have appeared in the surplus arms stores. In performance it is practically identical to the 10.4mm Swiss Vetterli. Italian Vetterli rifles are fairly common in the U.S.

10.4x47Rmm Italian Vetterli M70 Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
313	Fg	62	1345	1264	Military load
250 Lead	IMR 4198	27	1300	948	Lyman #429251
313 Lead	FL		1345	1264	

10.75x58Rmm Russian Berdan

Historical Notes The 10.75x58R was adopted by Russia in 1868 and used in the Berdan I and the Krnka M69 rifles. After 1871, it was used in the Berdan II rifle—all single shot arms. This was the first military cartridge with the outside, centerfire, Berdan primer and a bottleneck case. Large quantities of these cartridges were manufactured in the U.S. by Remington and Winchester for the Russian government. Most of the Berdan rifles were made by Colt, but the Russians also manufactured them at their Tula arsenal.

General Comments This was primarily a military cartridge and was not used to any great extent for sporting purposes. During the 1950s and '60s, a fair number of the old Colt-made Berdan I and II rifles showed up in various surplus stores along with suitable blackpowder ammunition. In the U.S. this was known as the 43 Berdan cartridge.

The Berdan I rifle is a forward hinged, lift-block type (striker fired) and the Berdan II is a turnbolt single shot, somewhat similar to the Model 71 Mauser. The Krnka is a breech-loading conversion of the Russian muzzle-loading rifle. In 1867, the Berdan I-type action was tested by an American military board as a possible means of converting the muzzle-loading Springfield to breech-loading.

10.75x58Rmm Russian Berdan Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
250 Lead	IMR 4198	33	1400	1100	Lyman #429251
370 Lead	Fg	77	1450	1724	Military load, paper-patched bullet
370 Lead	IMR 4198	31	1410	1640	

11x60Rmm Japanese Murata

Historical Notes This is the original Japanese military cartridge designed by Major Murata for his single shot turnbolt rifle. Different authorities give varying dates for the introduction of the rifle and cartridge. The rifle is called the Meiji 13-11mm by the Japanese, which would make the date of introduction 1880. It was later replaced by an 8mm round. The Japanese purchased obsolete European military rifles until they developed their own. They used quantities of the French Chassepot and the Murata rifle is based on this French design. The 11mm Murata cartridge is also quite similar to the 11mm Gras, which was used in the modified Chassepot. The 11mm Murata cartridge is also quite similar to the 11mm Gras, which was used in the modified Chassepot.

General Comments The 11mm Murata is another collector's item, too rare and valuable to shoot even if you had several of them. Less valuable ammunition can be made by reforming 348 Winchester brass. Bullet diameter is .432-inch, but Lyman's No. 439186 (370-grain) bullet could probably be sized down and made to work. Use loading data for the 11mm Gras or the 11mm Mauser because power and range are almost identical.

11x60Rmm Japanese Murata Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Comments
420 Lead	FL	1487	2063	Military load

11x50Rmm Belgian Albini M67/72

Historical Notes Belgian military cartridge adopted in 1867 and used in the Albini-Braendlin single shot, lift-block rifle. It is often confused with the 11mm Comblain, which it resembles. It was originally loaded with blackpowder and a paper-patched bullet. Most of the original Albini rifles were sold off and many remodeled into sporter-types or rechambered for sporting cartridges of the late 1800s.

General Comments Moderate numbers of the old Albini Braendlin rifles have been sold in the U.S. as collector's items. Most of these were in good condition and sold for low prices. Ammunition is very scarce and much too valuable to shoot.

11x50Rmm Belgian Albini M67/72 Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
386 Lead	Fg	75	1368	1610	Military load, paper-patched bullet
370 Lead	IMR 4198	29	1350	1500	Lyman #439186

11x53Rmm Belgian Comblain M71

Historical Notes The 11mm Belgian Comblain was never an official military round, but was used by the Belgian civil guard. It was introduced in 1871 as the cartridge for the falling-block type Comblain single shot rifle. Rifles of this caliber were used to a limited extent by some of the South American countries. The 11mm Albini was the official Belgian military cartridge.

General Comments The 11mm Belgian Comblain is similar to the Brazilian Comblain, but they are not interchangeable and should not be confused because they are different cartridges. However, there is not much difference in the performance or power of the two rounds.

11x53Rmm Belgian Comblain M71 Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
370 Lead	IMR 4198	32	1460	1755	Lyman #439186
386 Lead	Fg	76	1445	1787	Military load, paper-patched bullet

11.15x58Rmm (43) Spanish Remington

General Comments The 11mm (43) Spanish Remington was not seen in the U.S. until after WWII, when large numbers of Remington rolling block rifles were sold as surplus. Blackpowder ammo was available for a short time, but is now a collector's item. Many of these rifles have been rebarreled to some other caliber. However, ammunition can be made from 348 Winchester brass. It is also possible to have these rifles rechambered to accept the 348 Winchester case, which is expanded to take .439-inch diameter bullets. This works quite well.

There are actually three blackpowder Spanish military 11.15mm cartridges. The one listed here, a carbine version with a case length of $1^{7}/_{8}$ inches loaded with 60 grains of powder and a 400-grain bullet, and the original centerfire cartridge with a straight case and a .454-inch diameter bullet. The latter is covered later in this chapter under the Spanish Reformado. The carbine round had the same case configuration as the standard cartridge and although shorter, could undoubtedly be fired in the standard rifle chamber, but the reverse would not be true. The carbine round is now a fairly rare collector's cartridge, so if you have any, please don't shoot them. Like most of the old blackpowder military cartridges, the 43 Spanish would make a good big game hunting cartridge for anything from deer through elk at close range.

11.15x58Rmm (43) Spanish Remington Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
375 Lead	Fg	78	1380	1590	Military load
387 Lead	IMR 4198	32	1360	1590	Lyman #439186
387 Lead	IMR 3031	40	1310	1470	Lyman #439186

Infantry Musket

11.15x58Rmm Austrian Werndl M77

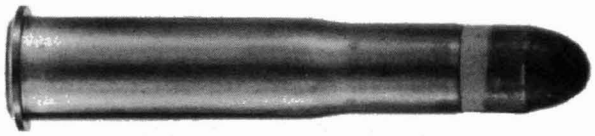
Historical Notes This is an improved bottlenecked cartridge adopted by Austria in 1877 to replace the earlier straight case of 11.4mm-caliber. It was used in the Werndl rotating block single shot rifle originally, but from 1886 to 1888 it was also used in the Mannlicher straight-pull rifle.

General Comments Rifles for the 11.15mm Werndl cartridge are scarce as is the ammunition. At one time, Winchester and other American companies loaded this round, but it has been used very little in the U.S. It is in the same class as the 11mm Mauser for sporting use.

11.15x58Rmm Austrian Werndl M77 Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
370 Lead	Fg	75	1437	1705	Military load; paper-patched bullet
370 Lead	IMR 4198	32	1360	1520	Lyman #439186

11x59Rmm French Gras 11x59mm Vickers



Historical Notes French military cartridge adopted in 1874 for the Gras single shot rifle, a metallic cartridge, breech-loaded conversion of the Chassepot needle gun. This was the first modern French military cartridge. It was replaced in 1886 by the then revolutionary 8mm Lebel. Many Remington rolling block rifles were chambered for the 11mm Gras and these, along with the Gras rifle, were used extensively in the Balkans and French colonial areas. Remington loaded this cartridge at one time. The Japanese purchased and used many of the Gras-modified rifles and the 11mm Gras cartridge.

The 11mm Vickers was used by both the British and French during WWI in the Vickers aircraft machinegun to shoot down German artillery observation balloons. The cartridge is also referred to as the 11mm Vickers Balloon Gun cartridge. It uses the same case as the 1874 French Gras rifle cartridge and was actually developed by the French for their Hotchkiss anti-balloon gun. The more reliable Vickers machinegun was later modified to shoot the same cartridge. By 1917, it was found that the standard rifle cartridge was not satisfactory for shooting down observation balloons as a larger caliber carrying a heavier tracer/incendiary pellet was needed. Thus the reason for the development of a special-purpose cartridge. Rather than waste time, the French simply used what was immediately available and adopted the Gras rifle case. Some of these cartridges are head-stamped WESTERN 2-17, indicating that they were manufactured in the U.S. by Western Cartridge Company in February, 1917.

General Comments Neither the rifle nor cartridge have ever been used to any degree in the U.S. It would be suitable for North American big game hunting at short range, like most of the other blackpowder military cartridges. It is very similar in performance to the 11mm Mauser.

The 11mm Vickers appears to have a longer, heavier bullet than the original Gras cartridge. It is also of the full-jacketed type and some are brass covered. One should be careful working with these because many have tracer/incendiary bullets.

11x59Rmm French Gras Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
365 Lead	IMR 4198	36	1420	1635	Lyman #446109
385 Lead	Fg	78	1493	1903	Military load
385 Lead	IMR 4198	33	1400	1675	
386	FL		1493	1903	

11.15x60Rmm (43) Mauser

Historical Notes This was the first of a long line of military cartridges designed by Paul Mauser. The 11mm Mauser was adopted by the German military in 1871 with the M71 bolt-action, single shot Mauser rifle. Later this rifle was converted to a tubular magazine repeater as the Model 71/84. This cartridge became a popular sporting cartridge in Europe and East Africa. It is no longer loaded in Europe. Canadian Industries Limited (Dominion Brand) once offered a smokeless powder version that was imported into the U.S.

General Comments A popular military and sporting round through the 1870s and '80s, the 11mm Mauser was loaded in the U.S. by Remington and Winchester. It enjoyed only limited popularity here because our own 45-70 military load was easier to obtain. A modernized version using smokeless powder was produced for H. Krieghoff of Suhl, Germany and chambered in Mauser bolt-action rifles in the 1920s. A few were imported into the U.S. The 11mm Mauser is still a potent short-range cartridge for North American big game. Most military ammunition uses the Berdan primer, usually of 6.5mm (.254-inch) size. Correct bullet diameter is .446-inch.

11.15x60Rmm (43) Mauser Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
370 Lead	Fg	77	1430	1680	Dup. mil. ball.; paper-patched bullet
387 Lead	IMR 4198	32	1335	1520	
387 Lead	IMR 4198	35	1510	1760	Max.
385 (CIL)	FL		1360	1580	
386 Lead	FL		1425	1752	

Mauser Model 71/84

11.43x55Rmm Turkish

Historical Notes Military cartridge used by Turkey from 1874 until 1887. It was replaced by the 9.5mm Mauser. This round was used primarily in the Peabody-Martini single shot rifle, many of which were made in the U.S. The cartridge was loaded in England and called the 450 Turkish Peabody-Martini and the 45 Peabody-Martini in the U.S. It was popular in the Balkans and on occasion is still used there.

General Comments This is another cartridge that was not distributed very extensively in the U.S.. A few of the old single shot under-lever Peabody-Martini rifles have been sold at various times, but 11.43mm ammo is hard to come by. A Lyman #446187 cast lead bullet weighing 465 grains can be used for reloading.

11.43x55Rmm Turkish Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
465 Lead	Fg	80	1280	1690	Approx. mil. load
465 Lead	IMR 4198	36	1410	2057	Lyman #446187
486 Lead	FL		1263	1811	

11.43x50Rmm (.43) Egyptian Remington

Historical Notes Military cartridge adopted by Egypt in 1870 for use in the single shot Remington rolling block rifle. The Egyptian government ordered 60,000 of these rifles between 1870 and 1876. Remington rifles of this caliber were also used by France in 1870-71 during the Franco-Prussian war. In fact, these rifles were part of a shipment intended for Egypt, but the Egyptians defaulted so the French bought them. The Egyptians then accepted a later order. Remington loaded huge quantities of ammunition in this caliber.

General Comments In appearance, the 43 Egyptian looks similar to the 43 Spanish Remington cartridge. Performance is almost identical, but the two are not interchangeable. The 11mm Egyptian also resembles and is very close to the 11x52R Beaumont in physical measurements. Early Remington catalogs list the 11mm Egyptian as also suitable for the Beaumont rifle so it can be fired in both rifles.

When the Egyptian rolling block rifles became obsolete, they were sold off in widely-scattered places all over the world. Many turned up on the American market. The 11mm Egyptian is adequate for most American game and is comparable in power to the 11mm Mauser.

11.43x50Rmm (43) Egyptian Remington Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
400 Lead	Fg	75	1330	1570	Military load; paper-patched bullet
465 Lead	Fg	70	1280	1680	Lyman #446187
465 Lead	IMR 4198	34	1440	2140	Lyman #446187
400 Lead	FL		1330	1570	

11.4x50Rmm Austrian Werndl M73

Historical Notes The official Austrian military cartridge from 1873 to 1877, it was used in the Werndl single shot rifle that featured a breechblock that rotated after the hammer was cocked. The block was turned via a protruding thumb-piece so as to expose the loading groove cut on the bottom. Both the rifle and cartridge are relatively rare in the U.S.

General Comments From time to time, a few Model 73 Werndl rifles are sold as collector's items. The cartridge is a scarce collector's item in the U.S. In power, it is on a par with similar black-powder cartridges.

11.4x50Rmm Austrian Werndl M73 Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
340 Lead	Fg	62	1270	1225	Military load
465 Lead	IMR 4198	29	1300	1745	Lyman #446187

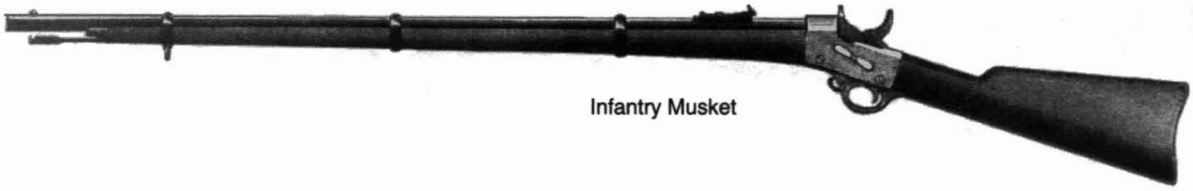
11.4x50Rmm Brazilian Comblain M74

Historical Notes Military cartridge adopted by Brazil in 1874 and used in the Belgian-made Comblain single shot rifle, a falling breechblock type similar to the Peabody. At one time, this cartridge was loaded by Winchester and others in the United States. Presently, cartridge and rifle are rare.

General Comments The Brazilian Comblain cartridge is quite similar in appearance to the Belgian cartridge of the same name. However, the two are not interchangeable. It has seen very little use in the U.S. In performance it is about the same as the 45-70.

11.4x50Rmm Brazilian Comblain M74 Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
485 Lead	IMR 4198	27	1280	1770	Lyman #451112
486 Lead	Fg	72	1310	1858	Military load
486 Lead	FL		1310	1858	



Infantry Musket

11.5x57Rmm Spanish Reformado

Historical Notes This was the original centerfire, Berdan-primed Spanish military cartridge. It was adopted about 1867 and used in early rolling block rifles manufactured by Remington for the Spanish government. It was also used in some Berdan and Snider conversions of the Spanish muzzleloader. Over a million rounds of this ammunition and many rolling block rifles were captured by American troops in Cuba during the Spanish-American war. It was replaced by the 11.15mm Spanish Remington cartridge in 1871.

General Comments Although this cartridge is listed as .43-inch-caliber, the bullet has a base band that is actually .454-inch in diameter. The bullet is brass covered and has a 10-degree beveled base.

In the tropical climate of Cuba, the brass-covered bullets often turned green with verdigris and were thought to be "poisoned" bullets by American troops. In terms of bacterial count and infectious wounds, they probably were for all practical purposes. Rim and base diameter and case length are almost identical to the 11.15mm Spanish Remington and cases could be made by expanding and trimming 11.15mm brass.

11.5x57Rmm (43) Spanish Reformado Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
250 Lead	IMR 4198	32	1220	833	Lyman #454485
395 mil. Ball	Fg	74	1280	1438	Military load
395	FL		1280	1438	

577/450 Martini-Henry

Historical Notes Military cartridge adopted by Great Britain in 1871 for use in the famous Martini-Henry falling block single shot rifle. Originally a rolled-type cartridge case, it was later changed to a drawn case. To some extent it still is a popular sporting cartridge in England, Africa and other parts of the British Commonwealth. It was loaded in England with both black and smokeless powders with nearly identical ballistics.

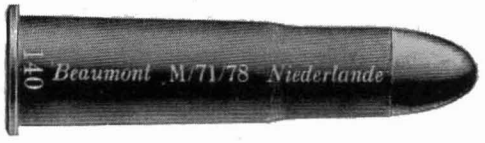
The 577/450 cartridge entered history with B Company, 24th Regiment of the British army on January 22-23, 1879. On that day, Lt. John Chard and Lt. Gonville Bromhead, with some 140 men, defended Rork's Drift in Natal, South Africa, from over 4000 Zulu warriors. When the battle was over, more than 20,000 rounds of 577/450 ammunition had been fired by the defenders.

General Comments Many Martini-Henry rifles were imported into the U.S., which has created a mild interest in this cartridge. With its large diameter and heavy, lead bullet it is a good killer on most game at close range. It has been used in Africa and India on all kinds of animals, including the dangerous varieties. It would be adequate for anything in North America out to 100-150 yards or so.

577/450 Martini-Henry Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
400 Lead	IMR 4198	38	1450	1920	Lyman #457124
500 Lead	Fg	80	1320	1939	Lyman #457125
325 Lead (Kynoch)	FL		1600	1850	
370 Lead (Kynoch)	FL		1450	1730	
480 Lead mil.	FL		1350	1939	

11.3x50Rmm Beaumont M71



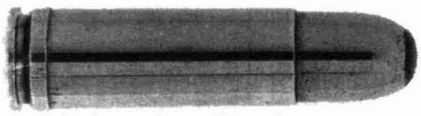
Historical Notes This was the original Dutch Beaumont cartridge adopted in 1871 for use in the Beaumont single shot rifle, a turnbolt-type similar to the French Gras. A few years after it was adopted, the rifle was altered to a box magazine repeater. In 1878, the Beaumont cartridge was redesigned slightly to use a shorter case and a bullet of .457-inch diameter.

General Comments Among cartridge collectors there is considerable argument regarding the Dutch Beaumont cartridge. Some claim it is identical to the 11mm Egyptian Remington; others say it is not. The difficulty is caused partly by the fact that both versions of the Beaumont cartridge are similar to the Egyptian Remington. The cartridge listed here is the original version. The slightly modified cartridge is the 11x52R M71/78, which has a longer case and a heavier bullet of .457-inch diameter. Old Remington catalogs list the 43 Egyptian as "adapted to Remington, Egyptian model military and Beaumont rifles." Undoubtedly, the 11mm Egyptian can be fired in Beaumont rifles. However, these three cartridges are not identical in physical measurements.

11.3x50Rmm Beaumont M71 Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
336 Lead	Fg	58	1378	1420	Military load
360 Lead	Fg	55	1300	1358	Lyman #509134
360 Lead	IMR 4198	35	1420	1620	Lyman #509134 max.

11.63x33mm Belted (458x1½-inch Barnes)



Historical Notes To paraphrase the late Robert Ripley, believe it or not, the 458x1½-inch Barnes cartridge was actually used as an experimental military cartridge by U.S. Armed Forces during the Vietnamese war. The cartridge was developed by this author in mid-1962 as part of the work on the 458x2-inch cartridge, which involved cutting the 458 Winchester Magnum case back to various lengths. All of this was duly reported in the June, 1963, issue of *Guns & Ammo* magazine, pgs. 38 to 41 and 66. Someone in the military establishment read the article and decided that the short 45-caliber cartridge just might have a certain specialized military application.

It appears there was a problem using the 5.56mm cartridge and the M-16 rifle in jungle ambush situations. The light, high-velocity bullet didn't always arrive on target when fired through a lot of intervening jungle growth. It was concluded that because the range of such shooting was fairly short, a proper loading of the 458x1½-inch might solve these problems. The military shortened Barnes original 1½-inch version to 1.312 inches.

After a short testing period, a load was developed using a 500-grain full metal jacket bullet at a muzzle velocity of about 1100 fps, which is below the sea level speed of sound, about 1150 fps. The load was accurate and worked well with a silencer. At least five, possibly more, bolt-action, heavy-barrel, silencer-equipped, scope-sighted, match-type rifles were made up and sent to Vietnam for experimental use. This was probably one of the best-kept secrets of the war as very few people know about it, even today. The experiment was not an unqualified success mostly because the troops didn't like the heavy, cumbersome rifles. A lighter, 20- or 22-inch barrel carbine might have been accepted easier in that particular combat environment.

In any event, the 458x1½-inch cartridge must be listed as an unofficial experimental military cartridge. After all, it actually did achieve combat status, which is more than can be said for some other experimental cartridges such as the 276 Pedersen, on which the military lavished considerable time, effort and money on and then abandoned. The last of the 458x1½-inch military ammunition with its full-jacketed, round-nose, 500-grain bullet was destroyed in Herlong, California in about 1984 or 1985. This is destined to become one of the rarer collector's cartridges because very few got into general circulation. It just goes to show that when you start something, you never know exactly where or how it is going to end up.

11.63x33mm Belted Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Comments
500 FMC	FL	1050-1100	1000	Velocity estimated.

11.7x51Rmm Danish Remington

Historical Notes Official military cartridge adopted by Denmark in 1896, it was used in the Remington rolling block single shot rifle. This cartridge and guns chambered for it were available as early as 1878. Some were made by Remington and some were manufactured by the Danes. Remington also loaded this cartridge for a number of years.

General Comments The 11.7mm, or 45 Danish Remington, has seen considerable use as a target and hunting caliber in the Scandinavian countries. It is less known in the United States, only because of the few Danish rolling block rifles that have trickled in. It is similar to the 45-70, but the case is a little (.09-inch) shorter. Performance is practically identical. Any load used in the 45-70 will give almost the same results in the 11.7mm. However, such loads should be reduced by at least 1-grain to compensate for the slightly smaller case of the Danish cartridge. It would be adequate for any North American game at short range.

11.7x51Rmm Danish Remington Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
300 Lead	IMR 4198	34	1480	1462	Lyman #457191
380 Lead	Fg	50	1350	1540	Rem. fact. load
405 Lead	IMR 4198	29	1340	1960	Lyman #457124
387 Lead	FL		1345	1564	

11x52Rmm Netherlands Beaumont M71/78

Historical Notes The cartridge listed here is the modified version of the Dutch Beaumont military round introduced in 1878. It was used in the turnbolt single shot Beaumont rifle, which is very similar to the French Gras. In 1888, the Beaumont single shot was altered to a box magazine repeater based on the Italian Vitali system. This employed a vertical single column of cartridges, inserted in the bottom of the action. It is similar to the Lee magazine. For additional information, see the 11.3x50R Beaumont.

General Comments This modification of the original Beaumont cartridge has caused considerable confusion in collecting circles. The longer 11x52R will chamber in any rifle made for the original 11.3x50R cartridge, but the reverse is not true because of the larger diameter of the original case and bullet. The 11mm Egyptian Remington cartridge will chamber in Beaumont rifles and early catalogs list it as being for these. However, the 11.3mm and 11mm Beaumont are not identical to the 11mm Egyptian. The three are very similar and largely interchangeable, but differ in actual physical measurements. The cartridge listed here is the most common and usually found in collections. Beaumont rifles and cartridges are not widely used in the United States and only a few rifles were sold from time to time in surplus stores.

11x52Rmm Netherlands Beaumont M71/78 Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
345 Lead	Fg	60	1476	1673	Military load
400 Lead	Fg	55	1360	1645	Lyman #457124
400 Lead	IMR 4198	31	1430	1820	Lyman #457124 max.

50 Browning 12.7x99mm

Historical Notes The German 13mm TUF anti-tank rifle of WWI made quite an impression on the U.S. Army who began developing a similar cartridge before the end of the war. Design genius John M. Browning undertook the project, completing his new heavy machinegun and cartridge work in 1921. Both gun and cartridge were adopted by the U.S. Army in 1923. It has remained standard ever since. The cartridge has been adopted and made by at least thirty countries, including the U.S., Britain, Canada, France, Belgium, Israel, Netherlands, Japan, Singapore and Taiwan. Many bullet types will be encountered, including Ball, armor piercing, tracer, incendiary, saboted hyper-velocity and others.

General Comments This cartridge is normally found with a Boxer primed brass case, although steel cases will occasionally be encountered. There are two FMJ-BT Ball bullet types, both with mild steel cores. The M2 Ball weighs 720 grains and has a muzzle velocity of 2810 fps; the M33 Ball weighs 668 grains with a muzzle velocity of 2910 fps. Recently, several sniper rifles from McMillan and Barrett have been chambered for this round. It has thus moved down from exclusive use in heavy machineguns.

50 Browning Factory Ballistics

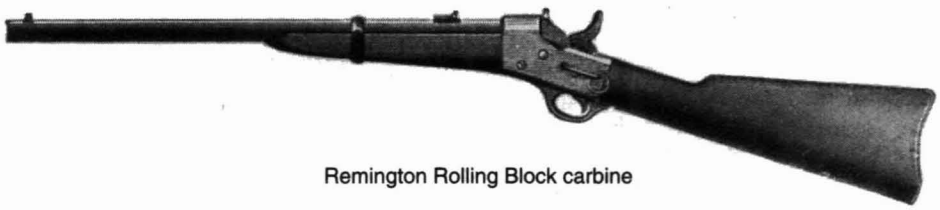
Bullet (grs.)	Powder/grs.	MV	ME
668 FMJ-BT Ball M33	FL	2910	12,565
720 FMJ-BT Ball M2	FL	2810	12,630

Barrett Model 82A1

50-70 Govt.

Historical Notes The 50-70 was the United States military rifle cartridge from 1866 to 1873. It was the first centerfire cartridge in general use by the U.S. military. The design was derived from the 50-60-400 Joslyn rimfire. It was used in various models and modifications of the single shot Springfield rifle until replaced by the 45-70 in 1873. It was also chambered in the Remington single shot military rifle and in a wide variety of sporting rifles, both single shot and repeating. The original cartridge had the inside, Benet-type primer. It has been obsolete since the turn of the century.

General Comments The 50-70, or 50 Government, was a popular cartridge through the 1870s and '80s. It was said to be very effective on buffalo and other heavy game. It was the popularity of this cartridge that induced Winchester to bring out the 50-110, which was, in effect, an improved and more powerful version of the 50-70. Very few rifles of this caliber remain in use and ammunition is almost non-existent. However, it would be adequate for any North American big game at short range. Cases with the later Boxer-type priming can be reloaded. Most 50-70 rifles were intended for blackpowder; only very light charges of smokeless powder can be considered safe. In 1934, Francis Bannerman & Sons of New York City advertised both 50-70 Springfield rifles and the ammunition. Rifles were still available as late as 1940. No sporting rifles have chambered this round since the early 1900s. There was also a carbine version with a shorter case (1.35-inches instead of 1.94-inches). Shortened 348 Winchester cases should work in most rifles.



Remington Rolling Block carbine

577 Snider (14.7mm)

Historical Notes British military cartridge adopted in 1867 for use in the Snider breech-loading conversion of the Enfield Musket. The Snider system was invented by Joseph Snider, an American, who first offered it to his home country, but was turned down. The converted rifle was usually referred to as the "Snider Enfield." The original cartridge had a cardboard body and a metal base. Later, this was improved by using a coiled brass case, designed by Col. Boxer, the man who invented the Boxer-type primer. Modern 577 ammunition has a drawn brass case. Some Martini-Henry single shot rifles were also chambered in this caliber. This cartridge was replaced in British military service by the 577/450 in 1871.

General Comments A large number of Snider Enfield rifles were sold in the United States by Francis Bannerman & Sons of New York City. Small numbers were also imported during the 1950s by various surplus military arms dealers. The 577 cartridge was loaded in England with either a solid lead bullet or a lead base copper-tubed type. The case appears to be straight at first glance, but it has a slight taper and shoulder similar to some American blackpowder cartridges of the same period. The dimensions of the 577 case are very similar to those of the 24-gauge shotgun shell. Brass 24-gauge shells can be used to make ammunition for 577 Snider rifles by trimming about $^1/_2$-inch off the length. Neither the Snider rifle nor the 577 cartridge are very practical for American hunting, but they are a lot of fun to shoot. The big bullet has ample power for hunting, but the curved trajectory makes it a short-range proposition.

577 Snider Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Comments
350 Lead	Fg	73	1310	1338	
350 Lead	IMR 4198	31	1380	1482	
450 Lead	Fg	73	1270	1620	
450 Lead	IMR 4198	30	1300	1690	
476 Lead	IMR 4198	30	1250	1655	Lyman #575213
480 Lead	Fg	70-73	1250	1666	Military load

UNCATEGORIZED OBSOLETE POWDERS

Ballistite-M A double-base, fast-burning powder for reduced trap loads. Economical because of small charge required.
A1-101 Single-base, fairly fast-burning powder for trap, skeet or light hunting loads. Easily ignited and clean burning.
Nike Single-base, crimson colored, flake powder of medium-fast burning rate. Recommended for Berdan type brass shotshells and for loading rifled slugs.
P-5066 Single-base, fast-burning powder for pistols and revolvers. For light to medium loads. Replaces Pistl #5. Also an excellent powder for reloading a wide variety of shotshell ammunition.
Hi-Skor A single-base, fast-burning shotgun powder for trap or light hunting loads. Sometimes used for light pistol loads and gives about the same results as Bullseye.
6Bulk Single-base. Only bulk powder available. Use only in guns with modern steel barrels. Produces approximately twice the chamber pressure of black powder. Although some people use Bulk powder in rifles and handguns I most emphatically *do not* recommend it.
Hi-Vel 2 Double-base, medium-burning rifle powder. This is one of the most flexible and versatile rifle powders available. It can be used for full charges in small, medium and magnum cases.
HS-10 A fast-burning pistol and shotgun powder.
H-375, Spherical Ball-type powder that burns slower than BL-C and works well in cases up to .30-06.
5BL-C1 Double-base ball type powder that gives best performance in the .222 Rem., but can also be used in larger cases.
H-870, Spherical Same burning characteristics as H-570 in a ball powder.
H-5010 A single-base powder, very coarse grained and slow burning. The slowest-burning powder adaptable to sporting use. Works best in large capacity cases with heavy bullets.
Norma Powders designated P-1, P-2, P-3, 10-10, 10-20, 20-10, 20-20, 203 and 205 are no longer available. However it may still be possible to find some of those powders (primarily 203 and 205) on dealer's shelves.
ReloderR 11 A good general purpose double-base rifle powder suited to cases as larger as the 30-06 with medium-weight bullets.
ReloderR 21 Slowest burning double-base ReloderR rifle powder; works well in medium-to-large capacity cases and with heavier bullets.
Herters 100 Slowest burning, single-base rifle powder of the series, best sited to heavy bullets in large capacity cases like the magnums.
Herters 101 A medium-slow single-base rifle powder closely approximating the burning speed of IMR 4320 (loading data may be used).
Herters 102 A medium-fast burning single-base rifle powder with characteristics similar to those of IMR 3031, for use in cartridges of the 30-30 size class.
Herters 103 Fastest of the Herter rifle powders, this single-base number burns just a bit faster than IMR 4198 and is best in the small rifle cases.
Herters 160 The fastest burning, double-base shotshell powder in this line, it is easily ignited and suited to target and light field loads.
Herter 162 Somewhat slower than 160, this double-base powder is useful in most shotshell field loads for all gauges except 410.
Herters 164 Slowest double-base shotshell powder from Herter's. It is best used for heavy field loads and magnums.
AL-120 Single-base, fairly fast-burning powder with characteristics very similar to Du Pont PB. A versatile powder for light to heavy shotshell loads. Recommended for Alcan metal shells.
TOPMARK A spherical shotshell powder intended for trap and skeet loads.
Gray B A spherical shotshell powder well suited to trap and light field loads in plastic shells.
TRAP-14 Gives excellent patterns in trap loads and can be used for medium field loads.
HS-5 A spherical shotshell powder for use in heavy field loads.
H-570 Single-base, very slow-burning powder, slower than 4831. Gives excellent results in all over-bore capacity cases and magnum calibes.
630-P A double-base powder, slower burning than 230-P, for centerfire pistol, revolver and some rifle loads.
AA12S A double-base powder for 12-gauge target and standard velocity shotshell loadings.
AA20S A doble-base powder for 20-gauge AA shotshells in target and standard velocity loadings.
450-LS A double-base shotgun powder for reduced loads.
500-HS Double-base shotgun powder for high velocity loads.

OBSOLETE MILITARY RIFLES THROUGH WW-II

Country	Make of Rifle or system	Model	Type	Caliber	*Bore diam., inches	*Groove diam., inches	*Number of grooves	*Rate of twist and direction	Barrel length, inches	Approx wt., lbs.	Mag. capacity
Argentina	Mauser	1891, 1909	B.A.[1]	7.65mm	.301/	.311/	4	9.8R	29, 29	9¼, 8½	5
Austria	Mannlicher	1886, 1895	S.P.B.[2]	8mmR	/.315	/.331	4	9.8R	30	8½	5
Belgium	Mauser	1889, 1924	B.A.[1]	7.65mm	.301/	.314/	4	9.8R	30½, 23	8½, 8	5
Brazil	Mauser	1904	B.A.[1]	7mm	.276	.287	4	8.65R	29	8	5
Chile	Mauser	1904	B.A.[1]	7mm	.276	.287	4	8.65R	29	8	5
China	Mauser	1888, 1924	B.A.[1]	8mm	.309/.311	.320/.324	4	9.4	29, 23	8½	4, 5
Colombia	Mauser	1891, 1904	B.A.[1]	7.65mm, 7mm	—	—	—	—	30	8½	5
Czechoslovakia	Mauser	1898, 1924	B.A.[1]	8mm	/.311	.324	4	9.5R	29, 23	9¼, 8½	5
Denmark	Krag-Jorgensen	1889	B.A.[1]	8mmR	.315	.330	6	11.8R	33	9¾	5
Equador	Mauser	1891	B.A.[1]	7.65mm	.301	.314	4	9.8R	28	8½	5
France	Lebel	1886, 1892	B.A.[1]	8mmR	.315/	.327/	4	9.45L	31, 17½	8 to 6¾	3, 5
France	MAS-36	1936	B.A.[1]	7.5mm,	.300	.307	4	L	22½	8¼	5
Germany	Mauser	1898, 1935	B.A.[1]	8mm	.311/	.324/	4	9.4R	29, 23	9¼ to 8½	5
Great Britain	Lee-Enfield	1895	B.A.[1]	303	.303	.314	5	10L	30-20.7	10 to 6½	10
Great Britain	Enfield Pat. 14	1914	B.A.[1]	303	.303	.313	5	10L	26	9¼	5
Greece	Mannlicher	1903, 1914	B.A.[1]	6.5mm	.256/	.269/	4	7.84R	28, 20	8¼	5
Netherlands	Mannlicher	1895	B.A.[1]	6.5mmR	.256	.269	4	7.9R	31, 17½	9	5
Hungary	Mannlicher	1935	B.A.[1]	8mmR	.315	—	4	9.84R	30, 24	8, 9	5
Italy	Carcano	1891, 1938	B.A.[1]	6.5, 7.35mm.	.256/	.268/	4	Gain R	30, 21½[5]	9 to 7	6
Japan	Arisaka	1905, 1939	B.A.[1]	6.5, 7.7mm	.256/	.268/	4	7.88R	30, 5¾	8½ to 7¾	5
Mexico	Mauser	1902	B.A.[1]	7mm, 30-06	.276	.287	4	8.6R	29, 24	9, 8½	5
Norway	Krag	1894	B.A.[1]	6.5mm	.256	.269	4	7.87L	30, 20	9 to 7½	5
Poland	Mauser	1898, 1924	B.A.[1]	8mm	.311	.324	4	9.5R	29, 23½	9, 8½	5
Portugal	Mauser	1904	B.A.[1]	6.5mm	.256	.2675	4	7.8R	29	8¾	5
Romania	Mannlicher	1893	B.A.[1]	6.5mmR	.256	.269	4	7.9R	25½	8¾	5
Russia	Mosin-Nagant	1891, 1930[4]	B.A.[1]	7.62mmR	.300/	.314/	4	9.5R	31, 20	9½ to 7	5
Spain	Mauser	1893, 1896	B.A.[1]	7mm	.276	/.287	4	8.7R	29, 19	9¼, 8	5
Sweden	Mauser	1894, 1896[4]	B.A.[1]	6.5mm	/.256	.269	4	7.8R	29, 17.7	9, 7½	5
Switzerland	Schmidt-Rubin	1889, 1909[4]	S.P.B.[2]	7.5mm	/.295	/.304	4	10.5R	31, 23	10 to 7½	12, 6
Turkey	Mauser	1890, 1905	B.A.[1]	7.65mm	.301/	.311/	4	10R	29	9, 8¾	5
United States	Krag	1892	B.A.[1]	30-40	.300	.308/.314	4	10R	30, 22	9¼, 5	5
United States	Springfield	1903	B.A.[1]	30-06	.300	.308	4	10R	24	8¾	5
United States	Garand	1936	S.A.[3]	30-06	.300	.308	4	10R	24	9½	8
United States	M1 Carbine	1941	S.A.[3]	30	.300	.308	4	16R	18	5½	15, 30
Yugoslavia	Mauser	1898, 1924	B.A.[1]	8mm	/.311	.324	4	9.4R	23	8	5

[1]Bolt action
[2]Straight pull bolt action
[3]Semi-auto
[4]And other models
[5]And other lengths

*Data under these headings taken mostly from the "Textbook of Small Arms 1909" (HMSO, London, 1909).

NOTE: Only basic pattern or principal model is listed. Most countries used many modifications or models.

MILITARY RIFLE CARTRIDGES OF THE WORLD

Current and Obsolete—Blackpowder and Smokeless

Dimensional Data

Cartridge	Case type	Bullet dia.	Neck dia.	Shoulder dia.	Base dia.	Rim dia.	Case length	Ctge. length	Twist	Primer
4.85 British	C	.197	.220	.353	.375	.376	1.925	2.455	—	B
5.7x28mm FN	C	.220	.249	.309	.310	.310	1.13	1.71	—	B
5.45mm Soviet	C	.221	.246	.387	.395	.394	1.56	2.22	—	B
5.56mm NATO	C	.224	.249	.349	.373	.375	1.76	2.26	9	Bx
6mm SAW	C	.243	.273	.382	.410	.410	1.779	2.58	—	Bx
6mm Lee Navy	C	.244	.278	.402	.445	.448	2.35	3.11	7½	Bx
6.5mm Arisaka	G	.263	.293	.425	.455	.471	2.00	2.98	7.9	B
6.5mm M-S	C	.263	.287	.424	.447	.450	2.09	3.02	7.8	B
6.5 Daudeteau	G	.263	.298	.466	.480	.524	2.09	3.02	—	B
6.5 Dutch & Romanian	A	.263	.297	.423	.450	.526	2.10	3.03	9.8	B
6.5mm Swedish	C	.264	.294	.420	.480	.480	2.16	3.15	7.9	B
6.5mm Portuguese	C	.264	.293	.426	.468	.465	2.28	3.22	7.8	B
6.5mm Carcano	C	.265	.295	.430	.445	.448	2.05	3.02	19.3-8.3*	B
280 British	C	.283	.313	.448	.470	.473	1.71	2.54	?	B
7x57mm	C	.284	.320	.420	.470	.474	2.23	3.06	9	B
276 Enfield	C	.284	.321	.460	.528	.521	2.35	3.25	9	B
276 Pederson	C	.285	.314	.389	.449	.451	2.02	2.85	?	Bx
7.35mm Carcano	C	.298	.323	.420	.445	.449	2.01	2.98	10	B
30 Carbine	D	.308	.335	—	.355	.360	1.29	1.65	16	Bx
7.5mm French MAS	C	.308	.340	.441	.480	.482	2.11	2.99	10	B
30 Army (30-40 Krag)	A	.308	.338	.415 (.419)	.457 (.4577)	.540	2.31	3.10 (3.089)	10	Bx
7.62x51 NATO (308 Win.)	C	.308	.338	.447	.466	.470	2.01	2.75	12	Bx
7.5mm Schmidt-Rubin	C	.308	.334	.452	.494	.496	2.18	3.05	10.5	B
7.62x63mm U.S. (30-06)	C	.308	.340	.441	.470	.473	2.49	3.34	10	Bx
7.62x45mm Czech M52	C	.309	.334	.412	.441	.440	1.77	2.36	—	B
7.62mm (M-43) Russian	C	.310	.340	.394	.443	.445	1.52	2.20	9.4	B
7.62mm Nagant	A	.310	.332	.453	.484	.564	2.11	3.02	9.5	B
303 British	A	.311	.337	.402	.458	.530	2.21	3.05	10	B
7.7mm Arisaka	C	.311	.338	.431	.472	.474	2.28	3.13	9.8	B
7.65x53mm Mauser	C	.313	.338	.429	.468	.470	2.09	2.95	10	B
8x50R Siamese	A	.321	.347	.450	.480	.550	1.98	2.97	—	B
8x52R Siamese	A	.321	.347	.460	.500	.550	2.04	2.96	—	B, Bx
8mm Danish Krag	A	.322	.355	.460	.500	.575	2.28	3.20	12	B
7.92mm Kurz	C	.323	.352	.440	.470	.470	1.30	1.88	10	B
8mm Austrian	A	.323	.351	.462	.501	.553	1.98	3.00	9.8	B
8mm Lebel	A	.323	.347	.483	.536	.621	1.98	2.75	9.5	B
7.9x57mm JS (8mm Mauser JS)	C	.323	.353	.443	.469	.473	2.24	3.17	9-10	B
8x63 Swedish	C	.323	.356	.456	.488	.479	2.48	3.36	?	B
8mm Guedes M/85	A	.326	.354	.490	.543	.620	2.34	3.25	11	B
8x59 Breda	C	.326	.357	.433	.491	.469	2.33	3.17	?	B
8mm Murata	A	.329	.361	.485	.492	.558	2.06	2.90	—	B
8mm Hungarian M-89	A	.329	.365	.473	.491	.554	2.20	3.02	10	B
338 Lapua Mag	C	.338	.370	.540	.590	.590	2.72	3.60	—	Bx
9.5mm Turkish Mauser	A	.389	.411	.487	.511	.612	2.37	2.97	20	B
10.15mm Jarmann	A	.403	.430	.540	.548	.615	2.40	3.06	22	B
10.15mm Serbian Mauser	A	.411	.433	.515	.520	.592	2.46	3.13	22	B
10.4mm Swiss Vetterli	A	.415	.437	.518	.540	.630	1.60	2.20	26	B-RF
10.4mm Italian M/70	A	.430	.437	.517	.540	.634	1.87	2.46	26	B
10.75mm Russian Berdan	A	.430	.449	.506	.567	.637	2.24	2.95	21	B
11mm Murata	A	.432	.465	.526	.542	.632	2.36	3.13	20	B
11mm Belgian Albini	A	.435	.472	.535	.580	.678	2.00	2.6	22	B
11mm Belgian Comblain	A	.436	.460	.532	.575	.673	2.10	2.76	22	B
11.15mm Spanish Rem.	A	.439	.458	.512	.516	.635	2.25	2.82	20	B
11.15mm Werndl M/77	A	.441	.466	.536	.545	.617	2.27	3.02	28	B
11mm French Gras, 11x59R Vickers	A	.445	.468	.531	.544	.667	2.34	3.00	22	B
11.15mm (43) Mauser	A	.446	.465	.510	.516	.586	2.37	3.00	22	B
11.43mm Turkish	A	.447	.474	.560	.582	.668	2.30	3.12	22	B
11.43mm Egyptian	A	.448	.479	.542	.581	.668	1.94	2.73	20	B
11.4mm Werndl M/73	B	.449	.472	—	.493	.571	1.97	2.55	29	B
11.4mm Brazilian Comblain	A	.452	.494	.530	.588	.682	2.02	2.62	22	B
11.5mm Spanish Reformado	B	.454	.466	—	.525	.631	2.26	3.06	20	B
577/450 Martini Henry	A	.455	.487	.628	.668	.746	2.34	3.12	33	B
11mm Beaumont M/71	A	.457	.484	.528	.576	.665	2.04	2.54	30	B
458x1½" Barnes	F	.458	.493	—	.509	.530	1.50	2.19	16	Bx
11.7mm Danish Remington	B	.462	.486	—	.514	.579	2.01	2.45	29½	B
11.3mm Beaumont M/71/78	A	.464	.486	.530	.581	.666	1.97	2.49	29	B
.50 Browning	C	.510 (.511)	.555 (.560)	.708 (.714)	.800 (.804)	.800 (.804)	3.90 (3.91)	5.43 (5.545)	16	Bx
50-70 Gov't.	B	.515	.535		.565	.660	1.75	2.25	24-42	Bx
577 Snider (14.7mm)	B	.570	.602	—	.660	.747	2.00	2.45	78	B

Dimensions shown in some instances do not exactly coincide with dimensions found in *The Book of Rifles* (W.H.B. Smith, Harrisburg, Pa., 1960). The difference amounts to only a few thousandths of an inch, doubtless attributable to specimen variations. Parentheses indicate maximum cartridge specifications.
A—Rim, bottleneck B—Rim, straight C—Rimless, bottleneck F—Belted, straight G—Semi-rim, bottleneck Primer: Bx—Boxer B—Berdan RF—Rimfire
*Gain twist. Unless otherwise noted, all dimensions are in inches.

Chapter 8

BRITISH SPORTING RIFLE CARTRIDGES

(Current and Obsolete—Blackpowder and Smokeless)

OVER THE PAST four or five decades there has appeared a tremendous volume of writing about British cartridges. Much of the writing that has appeared concerns the very biggest and most fascinating of them, the elephant cartridges. However, a lot of this writing has been, at best, misinformed. Some of it appeared on these pages.

Part of the reason for the lack of knowledge in years past about the big British cartridges was the great cost and relative scarcity of the rifles for them. Without the gun in hand it is difficult to discover the truth about them, much less generate the interest in digging for the truth. If one can't shoot one's 577 BPE, for example, not much can be learned about its performance. Few writers ever had the chance to examine, much less shoot, a big British rifle and therefore much of their reportage was second-hand.

In recent years, the resurrection of the manufacture of brass and bullets for the great rifles of old Africa has helped bridge the knowledge gap and helped generate enthusiasm. There has never been a lack of firearms to study, stored by collectors who couldn't shoot them. With brass, bullets, even loaded ammo again available, it is again feasible to take these rifles out and fire them, and we have all learned a lot from those who have done so.

A very few writers and gun collectors have come along over the years who had the intense interest in the old British rifles and cartridges to actually make them shoot. This required, in times past, a knowledge of what could be expected of the gun, so that one didn't blow up a good deer rifle trying to make it into an elephant stopper. One had to know how to get bullets of the right weight and composition, and how to modify or manufacture brass to fit, and know something of the loading techniques involved as well. Without someone to first make a given gun shoot to prove that it could be done, there would not be enough interest in shooting it to justify the commercial manufacture of appropriate components.

This writer, and perhaps every lover of English rifles, owes a large debt of gratitude to Mr. Ross Seyfried, who did much of the early testing and research on his own rifles, proving that they could be made to shoot just like they did when new. Mr. Seyfried was not alone in those endeavors, but he is unique in that he had the drive, luck, persistence and patience to get his results published.

Mr. Seyfried and this writer experimented together twenty years ago with paper patching bullets for cordite-cartridge double rifles. (Our results were published in *The American Rifleman*.) There was no other way to get bullets of the correct size, though it was possible to obtain a few types of brass and Berdan primers with difficulty. We both know how pleasant it is today to be able to buy top-quality Boxer-primed brass or bullets of the correct size and weight for what were, a few years ago, totally obscure British firearms. Such component production and availability were beyond our fondest dreams two decades ago. Today's availability of brass and components wouldn't exist but for the work of early experimenters who helped reestablish a demand for British brass and bullets.

This writer has had a very long-term interest in British cartridges and the rifles that shoot them, and had been fortunate enough to have acquired a few British double rifles, which I shoot as often as possible. That interest and involvement has led me to make the revisions to this chapter. While I make no claim to knowing everything about British cartridges, I have attempted here to correct the most grievous errors.

A short time ago there were exactly no metallic cartridges being loaded in England. Existing supplies of loaded cartridges were eventually exhausted, and ultimately the metallic cartridge portion of the English ammunition industry ceased to exist. Those who wanted to shoot their English rifles were forced to become reloaders.

There were a few exceptions. Federal Cartridge Co. came out with their 470 Nitro and 416 Rigby rounds, and before that, Jim Bell offered loaded ammunition for some of the more common British numbers. However, for the most part it was impossible to buy loaded ammunition.

Today, the grand old name of Kynoch is again seen on new cartridges being loaded in England. The company of Kynamco has begun development and loading of ammunition to match—perfectly regulate—double rifles made in the golden era of British rifle manufacture, specifically those rifles made between WWI and WWII. This is indeed a happy state of affairs.

In previous editions, it was mentioned that many, if not most, of the British cartridges were obsolete. This writer recently received a nice letter from Mr. Ronald Sichel, one of the directors of John Rigby & Co. He kindly informed me that their 275 Rigby (essentially their rather lively loading of the old 7x57) is alive and well and always has been, no matter that we had declared otherwise. He mentioned that Rigby & Co. also offer rifles in a variety of calibers including their new 450 Rigby, and still make double rifles for the 470 as well as for the 577 and 600 Nitros. We had stated that only Holland & Holland built English-

made double 470s, but of course several other companies still do, as well.

Many of the big double rifle cartridges from the 400 Jeffery on up have been mistakenly compared for decades with the 458 Winchester Magnum. However, the big English double rifle cartridges worked at relatively low chamber pressure, so the rifles would work perfectly under the blazing hot sun of Africa when one was faced with an unhappy elephant. The 458 was always (until very recently) loaded with a bullet that was too heavy for its small case, and its attendant high pressure gave many to curse it in that hot sun in front of that angry elephant. In some cases, those hunters are no longer with us; perhaps they would be if they had used a cartridge designed for just those conditions.

Early British blackpowder cartridges were loaded with lead bullets that were either grooved and lubricated, or without grooves and paper patched. Paper patching is simply wrapping the bullet with two layers of paper moistened for the application, then allowed to dry and then lubed with a waxy substance and loaded into the case. This provided a non-leading bullet of soft lead that was one of the most deadly projectiles ever devised. They were extremely accurate, expanded easily, and didn't break up, and as a result they performed very well.

The British went hunting in Africa at a time when no suitable rifles or cartridges existed anywhere in the world. Their desperate need for proper dangerous game rifles and cartridges was unique, because they were just about the only ones hunting in Africa. Incidentally, their development of the double rifle as the best of the best for hunting dangerous game came out of that need.

The first elephant rifles were muzzleloaders, and the first cartridge elephant guns also used blackpowder and lead bullets. These cartridges were so big as to be nearly unbelievable by today's standards. These were the gauge-rifles, ponderous 4-, 6-, or 8-bore weapons that weighed up to 25 pounds. A 4-bore rifle, nominally four balls to the pound, has a bore diameter of about one inch. Some of them were smoothbores, a holdover from the muzzleloader days, but most were rifled.

These big lead bullets weren't all that effective against elephant, as is so well recorded by early African hunter Frederick Courtenay Selous in his writings. To improve their performance, they were often hollowed and filled with explosive compounds, actually *shells*. They still didn't work all that well, as many a severely flattened hunter could attest.

Gauge-rifles for dangerous game were usually 10-bores and larger. The 12-bore was considered a bit small to be safely taken against the biggest game. The 450s and 500s and even the 577 BPEs (blackpowder expresses) of the latter days of the 19th century were essentially deer and medium-game rifles, not the elephant stompers they became when loaded with cordite.

Along the way came the Paradoxes (a name copyrighted by Holland & Holland) and their ilk, which were light smoothbores (usually 8- 10-, or 12-bores) with a bit of rifling in what would be termed the choke area of their bores. These fired shotshells quite well, and also gave enought spin to round balls or bullets to give adequate accuracy and performance on medium to large game at reasonable ranges.

The coming of smokeless or nitro powder (cordite in England) brought bullet designers many headaches as they attempted to design bullets to work at the higher velocities provided by the new propellants. Much history has been written on the success or failure of all the different types of jacketed bullets that have been, and are still being, developed. Much of the research in England was directed to answer the call from Africa for good bullets to use against dangerous game. It was discovered that "full-patch," or "solid" bullets (the bullet nose fully covered or protected with gilding metal or, with Rigby's bullets, mild steel) would reach the brain of an elephant or Cape buff or rhino quite easily, and therefore adequate elephant rifles could be built much lighter than ever before, and of smaller bore size.

Because there were no precedents, the British made some big mistakes in early smokeless cartridge and rifle production. Common among those were building rifles either too heavy or too light for the new smokeless powder loads, and using soft brass cartridges that worked OK with black, but poorly with smokeless. The 450/400 x 3¼" NE was one of these blackpowder rounds given a new lease on life through cordite. It preceded the 375 H&H Magnum as one of the best all-around cartridges for Africa.

Unfortunately, early rifles for the 450/400 x 3¼" NE often weighed 11 pounds or more, far too much for the performance level of the cartridge. A quarter century later, 465 and 470 Nitro Expresses were commonly made lighter than that. The early brass for the 450/400 x 3¼" was not hard enough for cordite usage. The cartridge design featured a rather long neck. Also, the chambers of hunting rifles were commonly pitted from neglect or fouling. The frequent result of this combination was a case stuck in the chamber with the brass cartridge rim broken off by the extractor. This tied the rifle up until the problem could be resolved. The solution eventually came in the form of better cartridge designs and better-quality brass cases.

The main problem in cartridge development was in determining how small the bore could be for any given game size; a problem that is still with us. Many hunters today believe that the biggest gun is the best, while others try to make the smallest work for everything. Clearly, the biggest guns will be adequate for the smallest game, but the converse has never been true. This, though, is the main reason behind the myriad early British cartridges. The British were hunting worldwide, and were among the very few hunting dangerous game at a time when nothing was known about the new cordite loads and their jacketed bullets.

Many British cartridges were decades ahead of their time, good ideas that needed better powders and better steels to bring them to fruition. The 275 H&H Belted Rimless Magnum, for instance, came out around 1912 and is a ringer for the 7mm Remington Magnum. Too often we are restricted by our sense of provincialism into making comparisons within our immediate sphere of knowledge, with the result that originators are often overlooked. Westley Richards, for instance, claims to have been the first to draw brass into cartridges, a fact seldom mentioned in American or German gun journals.

Rigby's 450 Nitro Express (NE) cartridge design eventually became the king of the cordite elephant slayers. It threw a 480-grain jacketed bullet at just over 2100 fps.

Every maker offered rifles in that caliber, and most of the world's hunters of dangerous game were happy. Then, for political reasons, the British government prohibited the importation into India and the Sudan of 450-bore rifles, so the British gunmakers invented variations on the 450 Nitro theme. The new elephant rifles were designated 465, 470, 476, and a few others. All of them worked just about like the 450 Nitro had, and you paid your money and took your choice. Each maker had his speciality.

If you wanted somewhat more power than these standard nitro-powered elephant cartridges offered, there were three choices: The 500 NE was just a bit more powerful than all of the 470 class, but the 577 NE and the 600 were tops. They were the ultimate life-insurance policies for those who were involved in frequent close encounters with elephant. The 700 Nitro did not exist during the golden age of African hunting, which ran from roughly 1900 to the early 1940s.

Today's gun collector and knowledgeable shooter is no stranger to many British cartridges, as perhaps he was a quarter century ago. While it was then extremely difficult to get brass or bullets for the British cartridges, today there are several good sources. Bertram, of Australia, offers good new brass that can be formed into most of the cartridges needed to feed British firearms. Brass is also offered by HDS, and some by A-Square and Mast. Bullets are made by Woodleigh, another Australian company. These are as close as you can get to original shapes and weights, and are of outstanding quality. Bullets are also made for some of the Brits by Barnes, Ballard, DKT, Hawk, Star, Liberty, and a few others.

To add flavor to today's user of British cartridges, Federal Cartridge Co. offers loaded ammo in 416 Rigby and 470 NE. Ruger chambers his single shot No. 1 and Express Model 77 in 416 Rigby and, recently, 404 Jeffery. American gunsmith Butch Searcy will make you a double rifle in 470 or in a variety of chamberings, at a reasonably affordable price. Several Italian, French, German and Dutch companies make pretty good double rifles in classic English calibers. In England, Holland & Holland, Purdey, Westley Richards, John Rigby & Co., Powell, and a few others still make good rifles in a variety of calibers, and Rigby even has a brand-new elephant stopper in their 450 Rimless Magnum.

Older rifles chambered for some of the more obscure cartridges pop up from time to time and, because of the happy state of affairs in today's gun-products market, are again permitted to sing their old songs through the loving ministrations of their new owners. Brass and loading components are available through Huntington Die Specialties or the Old Western Scrounger. The brass can often be reworked into what is needed through the purchase of custom dies from RCBS. Reloading data is published in the *Double Gun Journal* from time to time. It is no great effort to get just about any oddball British rifle shooting today.

Two books have appeared to help shooters and collectors of English cartridges, one by George Hoyem, *The History and Development of Small Arms Ammunition, Volume Three*; the other by Bill Fleming, *British Sporting Rifle Cartridges*. John "Pondoro" Taylor's classic *African Rifles and Cartridges* has been reprinted many times and is still the best book ever written on the hunting of African game with most of the British cartridges. Today there are many good reference books on British rifles and cartridges, and the collector/shooter has a much easier time finding information on them than ever before.

The 458 Winchester Magnum made its debut after WWII, when folks like John Taylor recommended something like it that would be inexpensive, American, and would work OK in Africa. In spite of its pressure problems, the 458 took care of business in Africa well enough for many years, and it is still widely used there.

Today, with makers like Ruger offering affordable rifles for the 416 Rigby and with the advent of the 416 Remington, there is a swing away from the 458 as more shooters realize its limitations. There has not been too great a swing back to the British cartridges yet except for the 416 and the 470. Those two have remained popular because of ammo availability and because they are two of the very best big game cartridges ever loaded anywhere, fully capable of keeping the spirit of British cartridges going for another century or so. We may see some of the other oldtimers become popular with Kynoch ammo again available.

For many of the reasons given here, there exists, at least in collections, a great wealth of oddball and never-very-popular British cartridges. Hoyem and Fleming depict many that have popped up, but firearms for some of them are exceedingly scarce. Here we tell the story of what we feel are the most successful British cartridges.

Many people take their British rifles hunting or target shooting today. If you would do so, please make sure yours is safe to shoot, and be certain to check the size of your rifle's bore and chamber before you attempt to shoot it. We know of some rifles that are over 120 years old, yet their owners shoot them frequently, even take them hunting. These guns are in perfect condition. The owners shoot loads that are very conservative and thoroughly safe. Because we can't personally inspect your firearms and advise you on the wisdom of shooting them, we give very limited loading data.

Another caution might be in order. It is the opinion of David Winks, the now-retired chief barrel maker for Holland & Holland, that homogeneous bullets of any type ought never to be fired from fine rifle barrels, specifically from British double rifles. Because of the bullets' extremely tough construction they are too hard on the bore, in his opinion.

Mr. Winks also told this writer that they used CARTRIDGES OF THE WORLD nearly every day at the H&H shop, a philosophy echoed by the folks at John Rigby & Co. We sincerely hope this revised chapter will be of some added value to them, and to the many lovers of British rifles and their cartridges worldwide.

We welcome your input to correct any misinformation found here, and please let us know of your ideas for future inclusions or omissions for the next edition of CARTRIDGES OF THE WORLD. We wish you good shooting with your British firearms.

Ray Ordorica, British cartridge Editor.

297/230 Morris Short, Long, Extra Long, & Lancaster Sporting

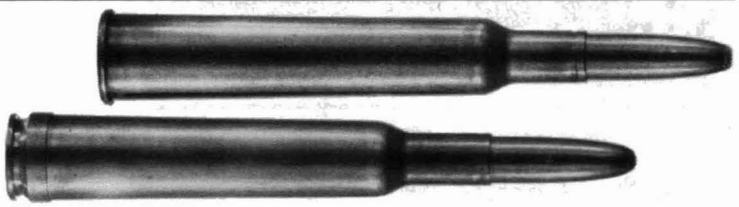
Historical Notes These cartridges are listed together because they are very similar. The Morris Long has a long neck, the Extra Long has a really long neck (1⅛" case length), and the Lancaster Sporting resembles the illustrated Short, but its shoulder is farther forward. They first appeared in an Eley ad in 1882. They are target or practice rounds to be fired from a barrel insert for the British 577/450 Martini-Henry service rifle. The idea originated with Richard Morris and was adopted by the British army. Some models of the 303 Enfield rifle used an insert for the Morris cartridges also. In addition, barrel and chamber inserts were available for the Webley & Scott 450 and 455 revolvers. European-made single shot pistols and rifles are occasionally found chambered for the Morris cartridges. They were listed in Eley-Kynoch catalogs as late as 1962. B.S.A. made Martini-actioned rifles for these cartridges.

General Comments The 297/230 cartridges were used for target practice and small game shooting. Power is about the same as the standard 22 rimfire. They lost adherents because 22 rimfire ammunition is cheaper, even though the centerfire Morris cartridges can be reloaded. They were originally blackpowder numbers, but late issue ammunition used smokeless powder. Bullets were of lead in solid or hollowpoint types.

297/230 Morris Short, Long, and Extra Long Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
43 lead	Unique	3	900	75	Lyman #225438
43 lead	2400	4	1200	138	Lyman #225438
37 lead	Black	3.25	875	63	Eley factory load
37 lead	Black	5.5	1200	120	Eley factory load

240 Magnum Flanged and 240 Magnum Rimless (Holland's 240 Apex)



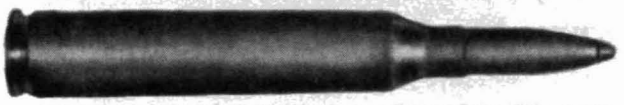
Historical Notes A pair of 6mm cartridges introduced by Holland & Holland in the early 1920s. The rimmed cartridge was, of course, designed for double rifles and the belted rimless version for magazine rifles. H&H also called it the 240 Super Express, but original ammo boxes from the maker give the names in the header here.

General Comments Performance of these two 240s is similar to that of the 243 Winchester. Holland data gives a velocity of 2900 fps with a 100-grain bullet for the belted version. In a strong modern single shot or bolt-action rifle, using modern powders, the performance could be increased significantly. However, this usually doesn't work for double rifles because they are sighted and regulated for a specific loading. If you change things, the rifle may not shoot your loads to the same point of impact as the original load. That is why most rimmed British cartridges have a limited selection of bullet weights and velocities. The British were well ahead of the U.S. in the development of good 6mm cartridges. Either of these cartridges would do anything that could be done by the 243 or 6mm Remington.

240 Magnum Flanged and Rimless (240 Apex) Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
100 SP	FL	2900	1870	Factory load

242 Rimless Nitro Express



Historical Notes Developed by Kynoch for Manton & Co., Calcutta, in 1923, this cartridge was first called the 242 Manton. It was listed in late post-war Kynoch catalogs.

General Comments The 242 rimless is very similar to the 243 Winchester and 6mm Remington in power and capacity. The case is a little longer than the American 6mms, but not quite as large in diameter. When loaded with American powders and used in a strong modern bolt action, it will deliver performance very similar to the 243 Winchester. This would be an effective cartridge for the same general range of game and shooting conditions as the 243 Winchester. Bullet diameter is .249-.253, so .243-inch bullets would not give satisfactory accuracy. One might be able to swage down 257-caliber bullets to fit, but be sure to slug your bore before attempting to reload for this cartridge.

242 Rimless Nitro Express Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
100 SP	FL	2800	1740	Kynoch factory load

244 Magnum (H&H)

Historical Notes This, the last belted magnum developed by Holland & Holland, was introduced in 1955 for their Mauser-type bolt-action sporting rifles. Custom-made rifles of this caliber are seen occasionally. American loading handbooks have listed it in the past.

General Comments The high-velocity 244 Holland & Holland Magnum is based on the 375 H&H Magnum case necked-down to 6mm. This is a large capacity case for the caliber. Only very slow-burning powders will develop maximum velocity in a case this big, so the British were forced to use something other than cordite for this cartridge. American powders such as IMR-4350, IMR-4831 and similar powders give good results with bullets of 100 grains. Holland & Holland advertise a muzzle velocity of 3500 fps with the 100-grain bullet. The 244 H&H Magnum is a long-range light-game cartridge. It would also be an excellent varmint and small game number under any conditions.

244 Magnum (H&H) Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
100 SP	FL	3500	2725	Factory load

246 Purdey

General Comments A rimmed, necked cartridge designed in 1921 for use in Purdey double rifles, the 246 Purdey was not popular or widely used and is now obsolete. With a 100-grain bullet at 2950 fps, it is in the same general class as the 243 Winchester or 6mm Remington, only slightly less powerful. As with most cartridges designed for double rifles, only one loading was available. Bullet diameter ranges from .251-.253.

246 Purdey Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
100 SP	FL	2950	1934	Factory load

297/250 Rook

Historical Notes Introduced by Holland & Holland for their semi-smoothbore rifles, this load dates back prior to 1880. It is a target and small game cartridge usually used in single shot rifles based on the small Martini action, though occasionally seen in very fine break-action single and double rifles. Incidentally, the rook is a bird similar to our crow.

General Comments In performance, the 297/250 is similar to the old 25 Stevens rimfire. However, it is a centerfire, bottle-necked shell and can be reloaded. There were a half dozen or more of these so-called "rook" cartridges and none of them were very widely used outside Britain. Like the others, this is entirely a small game cartridge. Bullet diameter is .250-inch.

297/250 Rook Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
56 lead	Black	6.5	1150	165	Factory load

255 Jeffery Rook

Historical Notes This small, rimmed, necked cartridge was introduced by Jeffery and used in rook rifles. It is long obsolete in Britain and quite rare in the U.S.

General Comments This is a small game and target number. Several loadings were provided, with 3 or 9 grains of blackpowder, and several with from 3½ to 4¼ grains of smokeless powder. The usual bullet was a 65-grain lead solid or hollowpoint bullet at a standard muzzle velocity of 1200 fps. The round may have been used in single shot pistols as well as in rifles.

255 Jeffery Rook Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
65 lead	FL	1200	208	Factory load

256 Mannlicher See 6.5x53R in Chapter 7.

Historical Notes There were four target loads developed from the basic shape of the 6.5x54 Mannlicher-Schoenauer case. They were the 256 Fraser Flanged and Rimless, and the 256 Swift Flanged and Rimless. None achieved any great popularity.

256 Gibbs Magnum

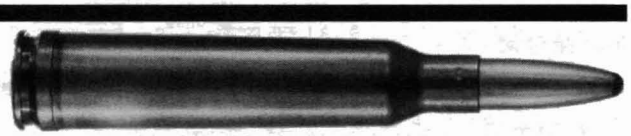
Historical Notes This cartridge is a rimless, necked 6.5mm introduced by George Gibbs in 1913 for Mauser-type magazine rifles of his workup. The case is very similar to the 6.5x55mm Swedish round in length and other dimensions. Powder capacity and ballistics are also about the same.

General Comments Loading data for the 6.5x55mm could be used as a guide in working up handloads for the 256. Bullet diameter is .264-.265, but be sure to slug your bore because there are a great many variations in 6.5mm rifles from all countries.

256 Gibbs Magnum Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
145 SP	FL	2600	2178	Factory load

26 BSA (26 Rimless Belted NE)



Historical Notes Introduced by Birmingham Small Arms (BSA) for their bolt-action sporting rifles based on the 1914 Enfield military action, the 26 Rimless Nitro Express originated in 1921. It is actually a belted rimless case of advanced design.

General Comments The 26 BSA was intended to appeal to those interested in high velocity, and it does this well with the light 110-grain bullet. It is also an example of what happens when every other feature is sacrificed for the last fps of velocity. It looks good on paper, but it isn't very effective. On the other hand, some other 26-caliber cartridges with heavier bullets at lower velocity have a fine reputation on all kinds of game. As factory loaded, the 26 BSA was not a suitable cartridge for North American hunting conditions. If handloaded with bullets of heavier weight, it can be made as effective as any other 26 of similar case capacity. Head diameter is close to that of the 300 H&H Magnum, and cases can be made by reforming 300 H&H brass. Bullet diameter of existing cartridge specimens ranges from .266-.269, so be sure to slug your bore.

26 BSA Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
110 SP	FL	3100	2345	Factory load

275 Rigby (7x57)

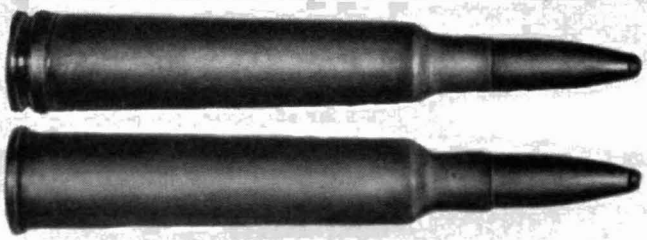
Historical Notes This round, identical to the 7x57mm Mauser, was adopted by John Rigby & Co. in 1907 for Rigby bolt-action magazine rifles. Rigby was, at that time, the British outlet for Mauser. Rigby's original rifle featured the 175-grain bullet. In their 1924 catalog, Rigby lists three versions of the Mauser, their No. 1 rifle for the 175-grain bullet, and their No. 2 and 3 rifles for the 140-grain bullet, designed for "deer stalking." The No. 1 and 2 rifles weighed about 7.5 pounds and the No. 3 was built to weigh about 6¾ pounds.

General Comments This cartridge was made famous by Walter D. M. Bell, the British hunter who slew nearly a thousand elephant with it in the early years of the 20th century. He killed them all with solid bullets of 175-grain weight, usually with one shot apiece. Bell was one of the finest marksmen the world has seen, and you can read about his successes in his *Wanderings of an Elephant Hunter*, *Karamojo Safari*, and *Bell of Africa*. Unfortunately, many men who read Bell's books and tried to emulate his success with this little cartridge without Bell's skill or luck have gotten themselves killed. The 275 Rigby is a fine deer and medium game cartridge. A light No. 3 Rigby, stoked with the 140-grain Nosler Partition, is one of the finest all-around rifles available for thin-skinned game in the 200-pound-and-under class. Don't use it on elephant.

275 Rigby (7x57) Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
140 Solid or LT Capped SN SP	FL	3000	2800	Factory load
175 Solid or SN	FL	2300	2066	Factory load

275 Belted Magnum (H&H)
275 Flanged Magnum (H&H)



Historical Notes Introduced in England in 1911-12, the belted version for bolt actions and the flanged for single shot and double rifles, these are the first 7mm magnums. They came out shortly after the 280 Ross created quite a stir in the small-bore, high-velocity field. A fair number of American custom rifles have been made for this round but no factory rifles. The belted version, known in the U.S. as the 275 H&H Magnum, was loaded by the Western Cartridge Company until 1939. The rimmed version was slightly down-loaded from the belted. It was developed by F.W. Jones as an improvement of the 280 Ross. Eley and Kynoch loaded bullets of 105, 140, 143, 150, 160, and 180 grains.

General Comments The 275 H&H Magnum is similar to the 7mm Remington Magnum. With modern powders in a good rifle, this ancient British number will do anything that can be done by the 7mm Magnum. Be sure to slug your rifle to get the correct bore size, and fit your bullets accordingly. This pair are good long-range calibers for mountain or plains hunting of light to medium game.

275 Belted Magnum & Flanged Magnum (H&H) Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
140 SP	FL	2650	2184	British factory load
160 SP	FL	2700	2600	British factory load
175 SP	FL	2680	2800	Western Factory load

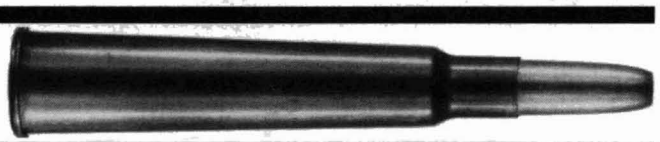
275 No. 2 Magnum, or 7mm Rigby Magnum Flanged

General Comments This is a rimmed, necked cartridge designed for Rigby double rifles. It was introduced in 1927 and was still available in the early 1960s. It is advertised for "deer-stalking and all classes of non-dangerous game." It is another cartridge in about the same class as the 7x57mm Mauser.

275 No. 2 Magnum Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
140 SP	FL	2675	2230	Factory load

280 Flanged (280 Lancaster)



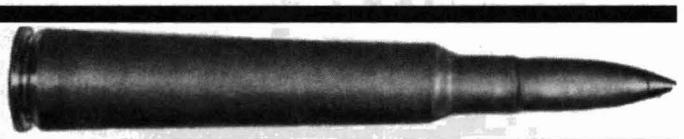
Historical Notes Developed by Lancaster, the rimmed 280 cartridge is similar to the rimless 280 Ross and used in single shot and double rifles. It was introduced shortly after the Ross cartridge appeared in 1906. It is said to have been a favorite with King George V.

General Comments The rimmed 280 is loaded to slightly lower velocity than the 280 Ross. When the rimless Ross cartridge was introduced in 1906, it created considerable interest all over the world. It was only natural to bring out a rimmed version for the man who preferred the double rifle. Both cartridges are practically the same power and effectiveness. However, these high-speed 280 cartridges lost popularity after a few big game hunters were killed while using them on heavy or dangerous game under adverse conditions. One of the most famous of these was Sir George Grey, killed by a lion in Africa.

280 Flanged (280 Lancaster) Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME
140 SP	NC	2800	2440
160 SP	NC	2600	2400
180 SP	NC	2400	2300

280 Ross (280 Rimless)



Historical Notes This timeless cartridge was designed by F.W. Jones, a consultant to Eley and Sir Charles Ross and introduced in 1906 for the Canadian straight-pull Ross rifle. This was one of the first modern high-velocity small-bore cartridges. It was originally a military design, but quickly caught the fancy of sportsmen because of the high velocity, flat trajectory and excellent killing power. The German 280 Halger Magnum is based on the Ross case. At one time, Remington and Winchester loaded the 280 Ross. American companies discontinued it in 1935. It is actually a semi-rimmed case.

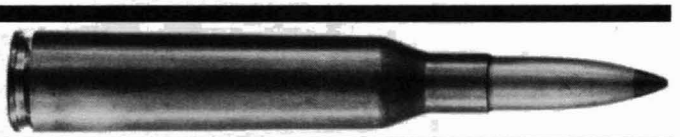
General Comments The 280 Ross is an example of what happens when hunters get overenthusiastic about something new. It proved to have fantastic killing power on thin-skinned game. Even dangerous species were dispatched occasionally as if struck by lightning. However, there is a big difference between killing dangerous game under ideal conditions and stopping them cold when conditions get rough. Some men gave their lives to find this out and the 280 Ross hit the skids. The original Ross bullet was made to expand quickly on medium-sized game. No one bullet weight or type will do all things. Other cartridges have been maligned because someone used them on game or under conditions they weren't designed for.

The 280 Ross is adequate for most North American game and non-dangerous African plains varieties if you select the proper bullet. The early straight-pull Ross rifles gained a bad reputation because they could be assembled incorrectly and dangerously. Some users were injured because of this.

280 Ross Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
140 SP	FL	2900	2620	Factory load
150 SP	FL	2800	2610	Factory load
160 SP	FL	2700	2600	Factory load
180 SP	FL	2550	2600	Factory load

280 Jeffery (33/280 Jeffery)



Historical Notes The 280 Jeffery is another of the series of 280-caliber cartridges designed as answers to the 280 Ross. The exact date of introduction is not established but was about 1915. The firm of Jeffery built Mauser-type bolt-action magazine rifles for this cartridge.

General Comments This cartridge is based on the 333 Jeffery case necked-down to accept .288-inch diameter bullets. It is a larger case than the 280 Ross and holds more powder, but is not loaded to a much higher velocity. With modern powders it could be handloaded to deliver a good deal higher velocity within safe pressure limits. However, today there are better and more modern 7mm cartridges available. The 280 Jeffery is a good cartridge for non-dangerous game at moderate to long range with good bullets.

280 Jeffery Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
140 SP	FL	3000	2800	Factory load

300 (295) Rook

Historical Notes Another of the small British rook cartridges, this one is of rather obscure origin and use. It dates prior to 1874 and was originally a blackpowder cartridge. It was used in single shot rifles and possibly pistols or revolvers. It was listed in the 1962 Eley-Kynoch catalog.

General Comments Aside from bullet diameter, the 300 Rook closely resembles the obsolete American 32 Extra Long, centerfire. The case is shorter than the 32 Extra Long making it possible to fire 300 Rook cartridges in old rifles for the American cartridge. This might interest owners of old Ballard or Stevens rifles. The 300 is strictly a small game or target number.

300 (295) Rook Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
80 lead	Black 10	1100	215	Factory load

300 Sherwood

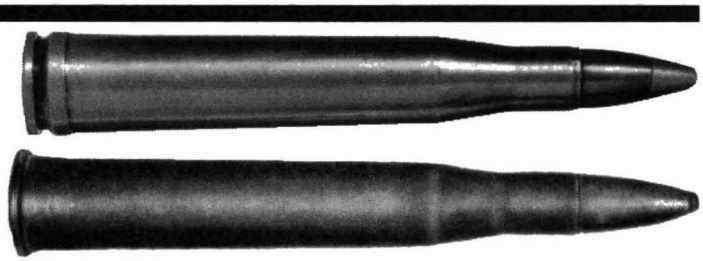
Historical Notes Introduced by Westley Richards as their answer to the 310 Greener cartridge in 1901 for use in Martini-action and in Sherwood target rifles. Both solid lead or the amazing LT capped bullets (designed by Leslie Taylor, then the Director of W-R) were available in it. About eight years later, W-R came out with a similar cartridge called the 298 Minex, with a slightly shorter and slightly bottlenecked case, and a bolt-action rifle to shoot it.

General Comments This is another British cartridge seldom encountered today. It is of interest primarily to cartridge collectors. In power it is on a par with the 38 Special, but has a smaller diameter bullet. It would be useful for small game or pest shooting at short to moderate ranges.

300 Sherwood Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
140 JHP	FL	1400	610	Factory load

300 Belted Rimless Magnum (H&H) 30 Flanged Magnum (Holland's Super 30)



Historical Notes The belted version here is the 300 Holland & Holland Magnum familiar to most of the world. The flanged version is for double rifles and is loaded a bit below the other. These cartridges originated in 1925. Additional data on the belted version is located in Chapter 2.

General Comments The performance of this pair with original factory loading is on a par with that of the 30-06, perhaps a bit better. The flanged version must be loaded to give proper regulation in the double rifle on hand, but the belted version, in a good bolt rifle, can easily beat the ballistics of the 30-06 with careful handloading.

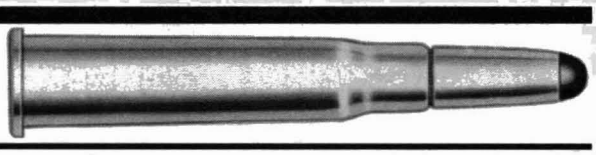
300 Belted Rimless Magnum (H&H's Super 30) Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
150 SP	FL	3000	3000	British factory load
180 SP	FL	2750	3020	British factory load
220 SP	FL	2300	2115	British factory load

30 Flanged Magnum Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
150 SP	FL	2875	2755	Factory load
180 SP	FL	2575	2653	Factory load
220 SP	FL	2250	2475	Factory load

303 British



General Comments: The 303 British military cartridge is also a popular sporting round throughout the British Commonwealth and much of the world. It is covered in detail under military cartridges and also listed with American sporting cartridges. English and Canadian loads offered greater variety and performance than those loaded in the U.S. See Chapter 2 for handloading data.

303 British Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
150 SP	FL	2700	2440	British factory load
174 SP	FL	2450	2315	British factory load
180 SP	FL	2540	2580	Canadian factory load
192 SP	FL	2200	2070	British factory load
210 SP	FL	2050	1960	British factory load
215 SP	FL	2050	2010	British factory load

375/303 Westley Richards
375/303 Axite

Historical Notes This cartridge was introduced in 1905, and was listed in their catalogs for several years thereafter. It was also listed in the 1909 Charles Lancaster & Co. catalog. It was used in high-velocity double rifles by Westley with Lancaster oval-bore rifling, in single shot falling-block rifles and in Lee-action magazine rifles.
General Comments Power is about the same as the 300 H&H Magnum. It was loaded with Axite, a new Kynoch powder said by the makers to be "comparatively free from erosive and corrosive effects."

375/303 Westley Richards Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
215 SP	FL	2500	2981	Factory load
200 SP	FL	2726	2980	Factory load

303 Magnum

Historical Notes This cartridge was introduced by Jeffery in 1919 and subsequently adopted by the British Match Rifle Committee. It had a short life, being listed by Kynoch only until 1930. Case configuration is the same as the experimental 276 military round and case capacity is the same as the 30-06.
General Comments This cartridge was designed for target shooting at long ranges. Its performance is identical to that of the 30-06.

303 Magnum Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
174 FMJ	FL	2850	3050	Factory load

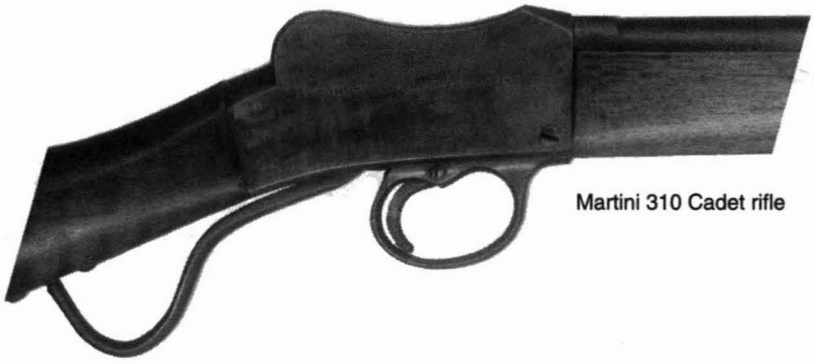
310 Cadet (310 Greener)

Historical Notes This cartridge was introduced by Greener in 1900 as a target round for the small Martini sporting and training rifles. Many were made for the Australian government as cadet rifles. It also became a popular sporting caliber for small game shooting. Thousands of the Australian Martini cadet rifles were imported into the U.S. after WWII. The 310 cartridge is rather well known in the U.S. as a result.

General Comments The 310 Cadet cartridge is similar in size and performance to the 32-20. In fact, 310 ammo can be made from 32-20 cases. Back in the '50s Winfield Arms Co. and Klein's Sporting Goods of Chicago sold several hundred 310 Martini rifles and actions. According to a 1955 data circular, these Martini actions were tested with proof loads of up to 60,000 psi in order to determine what range of cartridges they would be safe in them. Some were rechambered for the 32 Winchester Special, others were rebored to 357 Magnum. Quite a few have been rebarreled to 22 Hornet or 218 Bee. Ken Warner has one for the 44 Magnum. The 310 Cadet cartridge is a good small game and pest number at moderate ranges, and it also is a good target round.

310 Cadet Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
84 lead	FL				Factory load
120 lead	FL	6	1200	385	Factory load
125 lead	FL				Factory load



Martini 310 Cadet rifle

318 Rimless Nitro Express (318 Westley Richards/ 318 Accelerated Express)

Historical Notes This cartridge was developed by Westley Richards in 1910 for their bolt-action, Mauser-type magazine rifles. It was intended for Africa, and it made a fine name for itself there. It was one of the most popular medium bore cartridges in Africa, even after the advent of the 375 H&H Magnum. Many gunmakers have chambered bolt-action rifles for this round. It is very similar to Elmer Keith's 333 OKH and the current very popular wildcat, the 338-06. There was a square-shouldered version of this cartridge as well, designed to improve head-space control. Because this was not a major problem, the square-shouldered version didn't last. It was fired in the standard chamber.

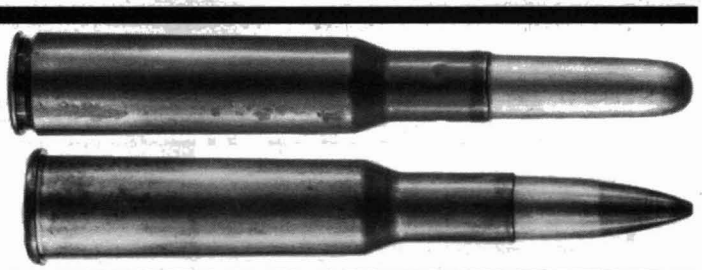
General Comments The 318 can be used in standard-length bolt actions of fairly light weight. This cartridge threw bullets of good weight at respectable velocity that proved very deadly on all sorts of game, and as a result, it became very popular. It worked so well on all African medium game that it got some hunters in trouble when they tried to extend its usefulness to dangerous game, and discovered their mistake sometimes at the cost of their lives.

The 318 case is very similar to the 30-06 in size, shape and capacity. The 180-grain bullet was used on the lighter animals, while the 250-grain was preferred for all medium to heavy game. Bullet types were in solid, softpoint and the Westley Richards copper capped. Fraser had their "ratchet" bullet load in this caliber. Bullets of the necessary .330-inch diameter for the 318 W-R can be obtained by swaging or centerless-grinding existing 338-caliber bullets. Also, Woodleigh makes best-quality bullets in soft-nose or solid persuasion of the exact size. The cases can be made from 30-06 brass. The 318 W-R has been used with great success on all North American big game, though it is not recommended for use against the biggest bears or any kind of dangerous game in a tight spot.

318 Rimless Nitro Express Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
180 SP	FL	2700	2920	Factory load
250 SP	FL	2400	3200	Factory load

333 Jeffery Flanged and Rimless

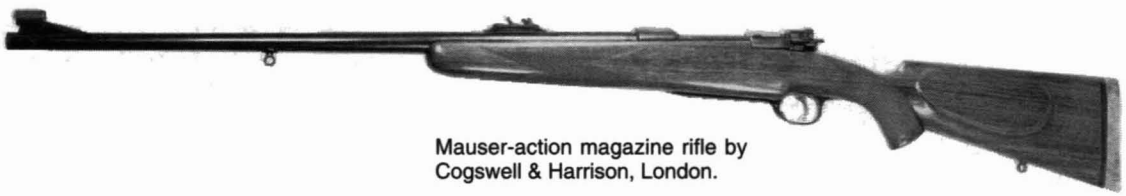


Historical Comments These are the two versions of the 333 Jeffery introduced in 1908. The rimmed cartridge was intended for double rifles, but the rimless-type for magazine rifles became more popular. The rimmed 333 was discontinued after WWII. Both have about the same power. German-made Mauser rifles were also chambered for the rimless version.

General Comments The 333 Jeffery earned a fine reputation on all varieties of African big game, including picked shots at elephant. Of course, most professional ivory hunters knew it was on the light side for such animals and took over their heavy rifles when in close cover or when they needed to drop the dangerous game quickly. On soft-skinned game it gave excellent penetration, particularly with the 300-grain bullet. It was the inspiration for the wildcat 333 OKH designed by Elmer Keith, et al.

333 Jeffery Flanged and Rimless Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
250 SP	FL		2500	3480	Factory Rimless load
300 SP	FL		2200	3230	Factory Rimless load
250 SP	Cordite	67	2400	3200	Factory Flanged load
300 SP	Cordite	63	2150	3090	Factory Flanged load



Mauser-action magazine rifle by Cogswell & Harrison, London.

33 BSA (33 Belted Rimless) (330 BSA)

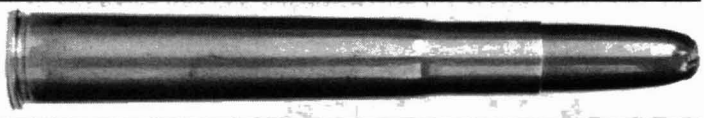
Historical Notes A belted cartridge, this was introduced by Birmingham Small Arms in 1921 for their bolt-action sporting rifles based on the military Enfield. It was never very popular and was discontinued many years ago.

General Comments Like the rimless 26 BSA, the 33 was an effort to furnish a high-velocity cartridge in a popular caliber. Neither effort was a commercial success. The 165-grain bullet starts out at 3000 fps, but it has poor sectional density, and at 100 yards the velocity is down to about 2650. The 33 BSA offered good killing power on light game, but failed to penetrate properly on heavy game. For this reason it was not a successful general-purpose caliber for African game. Why the manufacturer didn't offer a choice of bullets with weights up to, say, 250 grains is a mystery. Basically this is a good case design for modern rifles. The handloader can improve this one and put it in the same class as the 338-06 or the 318 Westley Richards. Properly handloaded, the 33 BSA would do well on most North American big game. This cartridge uses .338-inch diameter bullets. In fact, if you lengthen the case an eighth of an inch and move the shoulder forward a bit, you have the 338 Winchester Magnum. When handloading this cartridge, remember the British Enfield action will not stand the same high working pressure as will the Mauser 98.

33 BSA Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
165 SP	FL	3000	3290	Factory load
175 SP	FL			Factory load

400/350 Rigby



Historical Notes The first of John Rigby & Co.'s 350s, this was introduced in November 1899. This is the old 400 Purdey case necked-down to 350-caliber. Rigby provided single shot, double and bolt-action rifles in this caliber. The cartridge utilized outstanding softs and solids of 310 grains at about 2100 fps. The 400/350 was at one time the most popular and widely-used medium-bore cartridge for African hunting. It was succeeded by the 350 No. 2, which is identical in case dimensions but has a bullet of only 225 grains, at somewhat higher velocity. That cartridge was also loaded in a rimless version, but this one, the original and, some say, the best of the 350 Rigbys, was only available as a rimmed case. The magazine boxes of Rigby's bolt rifles were slanted to accommodate the rim.

General Comments The 400/350 is a rimmed case that resembles the old 35 Winchester in general appearance. However, it is longer and uses heavier bullets, and these are of .358-inch diameter. The popularity of the 400/350 was due in a large part to the excellent bullet design, which gave uniform and dependable results. The incomparable John "Pondoro" Taylor had a single-loader in this caliber, and that rifle was a great favorite of his. He used it on lion and other big game, and penetration and overall performance were excellent. The 400/350 would be a good cartridge for most North American big game, particularly where ranges are short.

400/350 Rigby Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
310 SP	FL	2100	3035	Factory load

350 No. 2 Rigby and 350 Rigby Magnum

Historical Notes The rimmed version, the 350 No. 2, was the successor to the 400/350 Rigby. The cases of the two are identical. The only difference from the 400/350 is in bullet weight and velocity. The rimless 350 Rigby Magnum was designed for bolt-action magazine rifles. Both of these came out in 1908, and both used a bullet of only 225 grains weight in order to up the velocity of what was already a fully successful cartridge. This, it was felt, was necessary to compete with speedier cartridges that were all the rage at the time.

General Comments The 350 Rigby Magnum and the No. 2 were popular with many African and Asian hunters. Their performance is similar to that of the 35 Whelen. Many hunters preferred the 350 Rigby Magnum over the 375 H&H Magnum because the Rigby had less recoil. Either of these would be a fine cartridge for any North American big game short of big bear, though some hunters who can put up with the poorer trajectory prefer the heavier bullet of the original 400/350. Today Rigby chambers their medium-bore double rifles for the 9.3x74R.

350 Rigby Magnum and 350 No. 2 Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
225 SP	FL	2625	3440	Factory rimless load
225 SP	FL	2575	3312	Factory No. 2 load

360 No. 5 Rook

Historical Notes Introduced between 1875 and 1880, this cartridge was loaded up until WWII. It was used in handguns and rifles. The 1909 Charles Lancaster & Co. catalog illustrates it for their under-lever single shot rifle and the Webley New "Express" revolver. Many other arms chambered the 360 No. 5.

General Comments In addition to the versions listed below, shot and blank cartridges were also offered. Although ammunition catalogs separate rifle and revolver loadings, in actual practice any version could be used in rifles or in late model revolvers. The 360 No. 5 cartridge is very similar to the 380 Long and the 38 Long Colt. This is a small game and target load.

360 No. 5 Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
82 lead	FL			Blackpowder factory load
125 lead	FL	1050	310	Blackpowder factory load
134 lead	FL	1025	312	Blackpowder & smokeless factory loads
145 lead	FL	1075	373	Smokeless factory load

360 Express (2¼") 360 Nitro For Black 360 Nitro Express

Historical Notes The 360 (2¼-inch) is an old blackpowder cartridge that first appeared before 1873. It was loaded with a great variety of bullet weights as a blackpowder cartridge: from 71 to 215 grains. Cartridge case length also varied considerably. The 2¼-inch version was the most common, but a length of 2 7/16 inches was also common, a favorite length of Alexander Henry, who was arguably the best craftsman of the 19th century. Some cases were as long as 2¾ inches.

Nitro loadings were with bullet weights of 190, 200, 250, and 300 grains (at least). Nitro versions date from around 1900-1902. Some blackpowder loads were paper patched, others of bare lead.

General Comments This is hardly a big game cartridge, but would be useful for small, thin-skinned game. In power it is about the same as the 38-55 and wouldn't be a bad short-range woods cartridge for deer-size animals. It was used mostly in single shot and double rifles. If you have a rifle in this bore size, be sure to make a chamber cast to find out the true dimensions before you attempt to reload for it. Bertram of Australia makes brass for the 360 that is long enough to make about any rifle in this caliber shoot.

360 Express (2¼")/360 Nitro For Black Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
190 (360 NBP)	FL	1700	1222	Smokeless factory load
300 (360 NE)	FL	1650	1820	Smokeless factory load

400/360 NE (2¾") Purdey/ Westley Richards/ Fraser/Evans

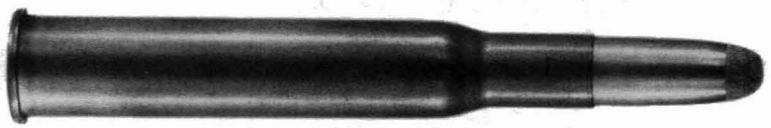
Historical Notes Although these cartridges have similar names they are not interchangeable. The Purdey version uses a bigger bullet than the others, of .367-inch diameter. The other versions have bullets from .358- to .360-inch diameter. The Purdey is usually marked 400/360P or 400/360B. There are significant variations in bullet weight and in rim thickness as well. In addition, Westley Richards had a rimless version of the 400/360, loaded with a 314-grain bullet.

General Comments These are all about the same power and all are fine for use against medium-size game, particularly for close-range or woods hunting. They appeared about 1900. The Purdey and Evans versions use a 300-grain bullet at 1950 fps, and the Westley Richards threw a 314-grain bullet at 1900 fps. The Fraser used a 289-grain bullet. Often the correct load is engraved on the rifle in question, or information leading to the correct load may be given in the proof marks of British firearms. These rifles are quite common today, and they often are very confusing. The best way to determine what you have is to make a chamber cast and measure it precisely. Be sure to slug your bore.

400/360 NE (2¾") Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
289 SP	FL			Fraser factory load
300 SP	FL	1950	2537	Purdey factory load
300 SP	FL	1950	2537	Evans factory load
314 SP	FL	1900	2520	Westley Richards factory load

360 No. 2 Nitro Express



Historical Notes This was introduced by Eley Brothers in 1905 as a cartridge for single shot and double rifles. The 360 No. 2 was moderately popular, but could not compete with the 375 H&H Magnum which appeared on the market only a few years later.

General Comments This is a large, rimmed, bottlenecked case noted for the low pressure it develops. In its day it was considered a good all-round caliber for thin-skinned African or Indian game. It would be adequate for any North American big game at moderate ranges and would make a good woods or brush cartridge.

360 Nitro Express No. 2 Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
320 SP	FL	2200	3442	Factory load

375 Flanged Nitro Express (2½") (370 Flanged)

Historical Notes Introduced in 1899, this is a straight rimmed case not to be confused with the 375 Flanged Magnum which has a larger necked case. It was used in single shot and double rifles, although BSA made a bolt-action Lee magazine rifle of this caliber.
General Comments The straight 375 rimmed cartridge is suitable for much hunting use, and would be adequate for almost any North American big game, particularly for hunting in woods or brush. Bullets are no problem. This one is very similar in concept to the 375 Winchester, but the two are not interchangeable. This cartridge lends itself to some improvement by handloading, which is OK in a single shot or magazine rifle. One can make brass from 405 Winchester cases, or seek out Mr. Bertram, of Australia, for new brass. Elmer Keith had a Lancaster oval-bore double rifle in this caliber which he used for elk on occasion. The grand old master liked the rifle and caliber very much once he got it regulated properly, which he said was quite a chore.

375 Flanged Nitro-Express (2½") Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
270 SP	FL	2000	2400	Factory load
300 SP	FL			Factory load

400/375 Belted Nitro Express (H&H)

Historical Notes This is the world's first belted case. It was introduced in 1905 by Holland & Holland to compete with the rising popularity of the 9.5mm Mannlicher-Schoenauer. The 400/375 was used mainly in bolt-action rifles, but some double and single shot rifles chambered it. It was listed in British ammunition catalogs until 1936-38. Many of Holland & Holland's rifles in this caliber were apparently take-downs, on Mannlicher and, later, on Mauser 98 actions.

General Comments The power of the 400/375 is nearly identical to that of the 9.5mm Mannlicher, or in the same class as the 358 Winchester. It would be adequate for most North American big game at moderate ranges. Cases can be made from 240 Weatherby brass. Bullets designed for 375 Magnum velocities will perform poorly at these low velocities, but one might have good luck with cast bullets or with those designed for the 375 Winchester rifle.

400/375 Belted Nitro-Express (H&H) Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
270 SP, FMJ	FL	2175	2840	Factory load
320	Cordite 43			Factory load

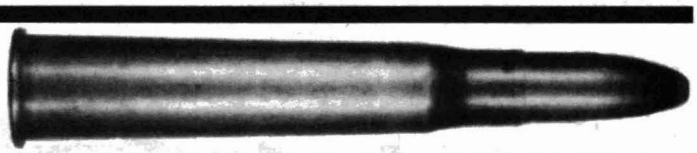
375 Rimless NE (2¼") 9.5x57 MS

General Comments This is the British designation for the 9.5mm Mannlicher-Schoenauer, and it may be listed either or both ways. There is a very slight difference in loading between the two listings, but they are interchangeable. This cartridge takes bullets of .375-inch diameter, and performance is similar to that of the 400/375. The 9.5mm M-S is not carried in late European catalogs. Additional data is in the section on European cartridges.

375 Rimless NE (2¼") (9.5x57 MS) Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
270 SP	FL	2150	2771	European factory load
270 SP	FL	2100	2643	British factory load

369 Nitro Express (Purdey)



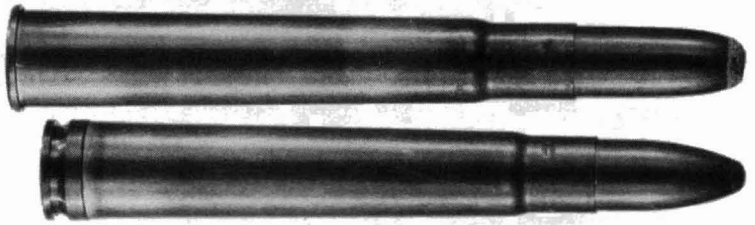
Historical Notes This cartridge was brought out in 1922 by Purdey for double rifles of their manufacture.

General Comments The 369 Purdey was loaded with only one bullet weight (270 grains) and offers ballistics practically identical to the 375 H&H Flanged Magnum with the same bullet. The 369 uses bullets of .375-inch diameter. It is a good cartridge suitable for any of the heavier varieties of North American big game. It could be improved by handloading, but because it was only used in double rifles, it isn't practical to change the performance.

369 Nitro-Express (Purdey) Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
270 SP	FL	2500	3760	Factory load

375 Flanged Magnum
375 Belted Rimless Magnum
375 H&H Magnum



Historical Notes In 1912 Holland & Holland brought out perhaps the most famous pair of cartridges ever devised, their 375 Magnum in belted and flanged versions. The belted version was for magazine rifles and the rimmed, for doubles and single loaders. When these came out there was nothing like them. Their only competitors were the 450/400 in doubles, the 404 Jeffery in magazine rifles, and the smaller 350 Rigby Magnum and No. 2. The 375 offered very flat trajectory, adequate bullet weight, and outstanding performance in handy rifles of top quality. The belted version has always been with us, and Kynoch again loads the rimmed version today.

General Comments This caliber has been very successful and hence very popular in Africa, and India, and of course Alaska. Nearly every manufacturer in the world makes or has made rifles in the belted version of this cartridge. Double rifles are still occasionally made for the flanged version of this caliber.

The 375 rimmed is loaded to slightly less velocity than the belted case, but not enough to make any real difference. One can use the same loading data as for the 375 belted magnum. However, you can't change the ballistics without causing the barrels of a double rifle to shoot to different points of impact. You have to regulate your load to the individual rifle by trial and error. A rifle in either version of this caliber makes a fine all-around hunting rifle for anything on the face of the earth.

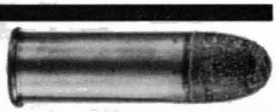
375 H&H Flanged Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
270 SP	IMR 4350	83	2620	4115	
300 SP	IMR 4350	80	2500	4160	
235 SP	FL		2750	3945	Factory load
270 SP	FL		2600	4050	Factory load
300 SP	FL		2400	3835	Factory load

375 Belted Magnum Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
235 SP	FL	2800	4090	Factory load
270 SP	FL	2650	4200	Factory load
300 SP	FL	2500	4160	Factory load

380 Short and Long (Rifle)



Historical Notes Old blackpowder cartridges that date back to the early 1870s, they were used in single shot rifles, pistols and revolvers. These were also loaded by DWM in Germany and chambered in cheap, European-made handguns.

General Comments The 380 Long is similar to the old 38 Long Colt. It is only suitable for short-range target and small game use. If you have a gun chambered for one of these, it is possible to make ammunition from 38 Special brass. The 380 has an outside-lubricated bullet of up to .376-inch diameter, but smaller inside-lubricated types can be used for handloading. Use the same loading data as for the 38 Long Colt.

380 Short and Long (Rifle) Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
124 lead	FL	1050	304	Blackpowder factory load

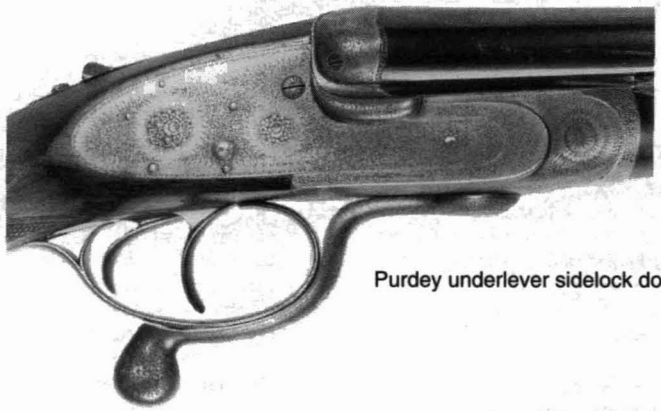
400 Purdey (3″) Light Express
400 Straight 3″

Historical Notes Numerous 400 straight cases were chambered in British rifles from the dawn of the breechloading era, including cases made of paper and coiled brass, some as short as 2 inches, others as long as 3¼. Purdey's utilized a 3-inch case loaded with "light cordite" for their double rifles, around 1905. Kynoch offered a shot cartridge slightly longer than 3 inches, perhaps for use in oval-bored rifles of 40 caliber.

General Comments According to a Purdey catalog, "The light 400 is an excellent firearm for deer, wild boar, etc., and has gained great popularity for tiger shooting in India, having the advantage of being a really powerful firearm and no heavier than a heavy 12-bore gun. The bullet is lead with a nickel base, and at 100 yards has a striking energy of 1,443 foot pounds." We hope not too many tiger hunters had to defend themselves with this one. A 40-caliber bullet weighing only 230 grains would work fine on deer, as it has about the sectional density of a 44 Magnum load, though at somewhat greater velocity. Penetration would depend on bullet construction. These rifles require .405-inch bullets, which nobody makes, so you'll probably have to cast them or swage down 41 Magnum bullets.

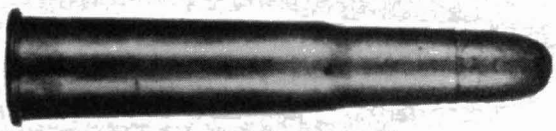
400 Purdey (3″) Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
230 lead	Cordite	47	2050	2150	Factory load



Purdey underlever sidelock double rifle

450/400 2⅜″ BPE
450/400 2⅜″ Nitro For BP
450/400 2⅜″ Nitro Express



Historical Notes These are different loadings of the same cartridge—a blackpowder load that originated circa 1880. The nitro-for-black and NE versions originated ca. 1899. These are based on the old 450-bore-base-diameter case shortened and necked-down to 40-caliber, and loaded (first) with 80 grains of blackpowder and a 210- to 270-grain lead bullet. The nitro-for-black version was made for use in blackpowder rifles, was loaded with 270-grain bullets, and developed very low pressure. The full nitro version featured 300- to 400-grain bullets over 40 to 43 grains of cordite. There was a similar BP Express cartridge of 2⅞″ length, and some other rather rare variations on this theme.

General Comments The British worked up smokeless loadings for many of their old blackpowder cartridges. For single shot rifles this was not difficult. However, with a double rifle, the load had to be balanced to shoot to the same point of impact as the original blackpowder load. Just working up the same velocity for the same bullet didn't always work. Various bullets and velocities had to be tried to arrive at the right combination. Once arrived at, you would have a good short-range deer rifle. The NE version with 43 grains of cordite and the 400 grain bullet would be quite a bit more powerful and generally more useful.

450/400 2⅜″ BPE, Nitro For BP, and Nitro Express Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
210 to 270 lead	FFg	79-84			Blackpowder load
270 RN lead, copper tube	Cordite	38	1650	1630	Nitro for black factory load
300 RN HP	Cordite	40			Nitro Express factory load
400 RN HP	Cordite	42-43			Nitro Express factory load

450/400 3¼" BPE, Nitro for Black, and Nitro Express

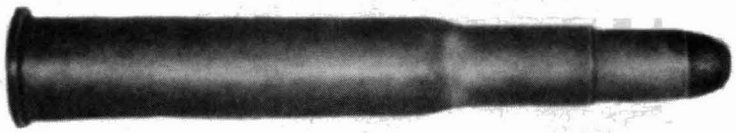
Historical Notes The 450/400 3¼" was based on the 450 3¼" case necked down. In blackpowder form it was loaded with about 110 grains of powder, and bullet weight varied from 230-300 grains. The nitro for black version was stoked with 45-48 grains of cordite and with bullets from 270 to 316 grains weight. The nitro version was loaded with 400-grain softs and solids over 56 to 60 grains of cordite. There were two thicknesses of rims on the nitro version of these cartriges. The later, thicker version is .042-inch thick, and it exists because of the great length of the neck of this case. In blackpowder versions it extracted easily, but on the nitro version, any slight bit of corrosion in the chamber caused the case to stick, and the rim would pull off. Hence the change. Jeffery eliminated the long neck in his version.

General Comments The blackpowder version of this cartridge was generally a light deer rifle; however, in nitro version it is the smallest of the British cartridges that can be considered a dangerous game cartridge. It is practical for all around use on African game, and was one of the most popular cartridges in the world before the advent of the 375 Magnum. If one is a cool and good shot, he can take this one against the biggest elephant, which is just what John "Pondoro" Taylor did many times. He speaks quite highly of it in his *African Rifles and Cartridges.* Many double rifles are encountered today for both blackpowder and nitro versions of this cartridge. The nitro rifles tend to be quite heavy for the caliber, probably because rifle makers didn't know the weight was not needed for cartridges of this power. Jeffery designed a similar 3-inch 40-caliber nitro round, called the 400 Jeffery, that is not interchangeable with this one (see below). Some of his rifles were quite light, but a great many were built on ponderous actions and weighed over 11 pounds, when 9½ would have been adequate.

450/400 3¼" BPE and Nitro Express Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
230-300 lead	FFg	110			Factory load
270-316 SP	Cordite	45-48			Nitro for black factory load
400 SP	Cordite	56-60	2150	4110	Nitro factory load

400 Jeffery NE 450/400 3"



Historical Notes This cartridge was designed by Jeffery in 1902. According to Pondoro Taylor* the short case was brought out because the longer blackpowder cartridge had a tendency to stick in the chamber after firing. The overall length is shorter but the shoulder is farther forward. The 400 Jeffery was designed exclusively for cordite; it was never available with black. As with the 3¼-inch version, this was very popular before the 375 H&H Magnum appeared. It is still one of the most effective all-round calibers for Africa.

General Comments The 400 Jeffery throws a 400-grain bullet at adequate velocity, and hence is more effective on the largest game than is the 300-grain 375 H&H Magnum bullet. However, it is less versatile as to available guns and loads, and that is where the 375 shines. Taylor wrote that he considered either of the 450/400s, the 3- or 3¼-inch version, adequate for any African game under almost any conditions, if used by an experienced hunter. Taylor killed about 1500 elephant, using about every available caliber in the process, so his opinion is something to consider. Elmer Keith wrote that a double rifle for this cartridge would be his first choice for crawling through an Alaskan alder thicket after big bear. Bullets of proper diameter may be obtained from Barnes or Woodleigh, or from many smaller custom makers. Bertram makes brass that can be formed into either of these two grand 40s. The availability of good bullets in this size (.411-inch diameter) has made this cartridge newly popular. Good, reasonably light double rifles for it are becoming hard to find.

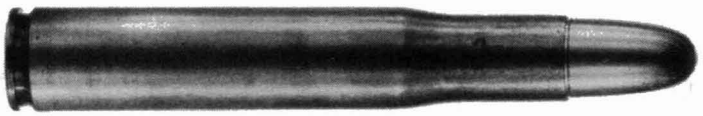
Op. cit.

400 Jeffery (450/400 NE 3") Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
400 SP	Cordite	55, 57, or 60	2100	3920	Factory load

The 55- or 57-grain charge was offered for use in extremely hot climates. There was a 300-grain bullet loading offered that was not a great success.

404 Jeffery
404 Rimless NE

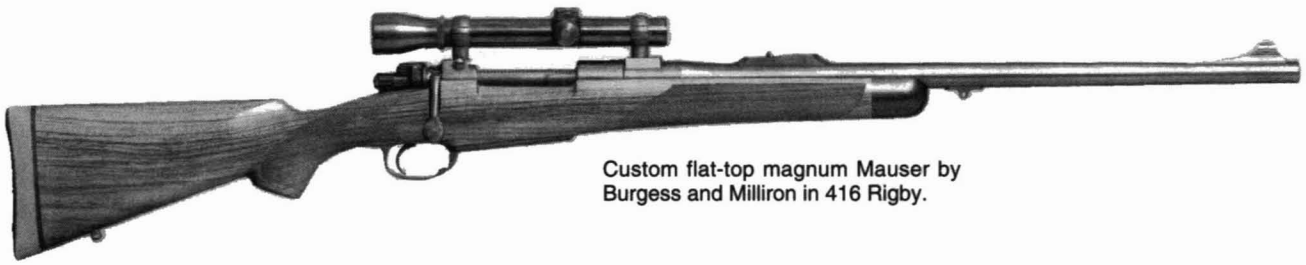


Historical Notes Introduced by W.J. Jeffery in 1909, vastly popular for many years, then slowing dying over many decades, the 404 Jeffery now has a new lease on life. In 1993, Dynamit Nobel announced they would restart production of 404 Jeffery ammo, and Ruger announced that their M77 rifle would be chambered in that caliber. A Canadian company, NASS, recently announced a line of proprietary cartridges ranging from 7mm to 458, based on the 404 case. In the United States, Dakota Arms of Sturgis, South Dakota, has introduced their own line of proprietary cartridges based on the 404 case, ranging from 7mm to 416. Bullets of .423-inch diameter are now available for the 404, but at this writing cases are still a bit of a problem. Only RWS amd Bertram make them. The 404 was designed to be a bolt-action cartridge that would duplicate the ballistics of the rimmed 400 Jeffery and the 450/400 3¼". The 404 is also popular on the Continent, and it is metrically named the 10.75x73mm. Today it is loaded a bit hotter than originally.

General Comments The 404 made a great name for itself in Africa, where inexpensive bolt rifles let its performance be experienced by those who couldn't afford a double rifle for one of the 400 NE's. At one time a higher-velocity 300-grain load was available for the 404. It gave good results on thin-skinned game but proved rather unreliable on the heavier species. With the standard 400-grain bullet, the 404 was a very popular general-purpose caliber in Africa and India. Properly used, it is adequate for any game found there. It is somewhat overpowered for North American game and lacks the flat trajectory and long-range potential necessary for much of our hunting, though the handloader can find all the flatness anyone would want. The 404 would make a good bear or other big game caliber in heavy brush or timber. The 404 uses .423-inch diameter bullets, and they are available from Barnes, Woodleigh, and RWS.

404 Jeffery Nitro Express Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
300 SP	FL	2600	4500	Factory load
400 SP	FL	2125	4020	Factory load
400 SP	FL	2300	4700	New load



Custom flat-top magnum Mauser by Burgess and Milliron in 416 Rigby.

416 Rigby

Historical Notes A proprietary cartridge introduced by John Rigby in 1911 for his magnum Mauser-actioned rifles, both cartridge and rifle established a record of reliability on dangerous game that endures to this day. Magazine rifles were initially offered for this round, but until recently Rigby only made one double rifle for it, by special order and with lots of monetary persuasion. Today it is chambered by Ruger in their single shot and magazine rifles, and by several other manufacturers. Federal Cartridge Co. offers premium loaded ammo of this caliber. The 416 Rigby is probably the best magazine cartridge for big game ever offered. Recently, two copies have appeared—the 416 Remington Magnum and 416 Weatherby Magnum. Both of them use a belted case, and this was a mistake. The clean line of the non-belted case makes for better feeding through the magazine, adding an extra margin of reliability. (See Chapter 2 for more information.)

General Comments The 416 Rigby is a more or less modernized version of the 404 Jeffery and delivers greater striking energy. For those who prefer the bolt-action rifle, it is a great favorite for use against dangerous game in almost any situation. Because the 416 Remington and Weatherby are now standard items, many great bullets are available in this caliber. This cartridge is a handloader's dream. Numerous moulds are available for those who would shoot cast bullets.

416 Rigby Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
410 SP	FL	2370	5100	Factory load
400 SP	FL	2430	5245	Federal load

425 Westley Richards Magnum and Semi-rimmed Magnum

Historical Notes Westley Richards introduced this cartridge in 1909. The most common and quite successful version has a rebated rim that fits the standard-diameter Mauser bolt face. Westley made double rifles as well as bolt actions for the 425. It is a very good cartridge and several unsuccessful attempts have been made to resurrect it. The 425 is a sort of poor-man's magnum. Its rebated rim is 30-06 size, so any 30-06 or 8mm Mauser action can be made to accept it with minimal gunsmithing. The result is a very good and powerful big game rifle for reasonable cost. Bullet diameter is .428-.435, and Barnes and Woodleigh make bullets for it.

General Comments The 425 was designed for use against dangerous game. It was intended to take the place of the 450-bore in India, though W-R offered their 476 for Africa. The 425 proved to be a fine cartridge, and was offered with solids and with the Leslie Taylor-designed capped soft-nose bullets. Taylor was the general manager of W-R at the turn of the century, and he was personally involved in bullet design, among many other things. The so-called LT capped bullets worked very well and were incorporated into most other W-R cartridges including their 318 and 476.

425 Westley Richards Magnum Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
410 SP	FL	2350	5010	Factory load

500/450 No. 1 Carbine No. 1 Express No. 1 Musket, etc.

Historical Notes Perhaps no cartridges in the world are more abundant or more confusing than those of British origin labeled 500/450, followed by one or another designator. There are no less than nineteen listings of individually identified cartridges in Fleming's *British Sporting Rifle Cartridges*. Many of them were loaded with a great variety of bullet weights. All of them were bottleneck cartridges, and all began life loaded with blackpowder. The No. 1 Carbine was Westley Richards' first drawn case, that appeared just before 1880. W-R was also responsible for the Musket and the 2¾-inch No. 1 Express, and possibly others of this lot. The oldest of the 500/450s is a coiled brass case of 2½-inch length that dates to 1871. Some of them were loaded well into the 20th century.

General Comments All of the 500/450s are in the same class as the 45-70 and would be a fairly effective short-range cartridges for North American game. Because of the great variation in designs the reloader should be careful to determine exactly which of the many variants he has, before attempting to build cartridges for it.

500/450 No. 1 Express Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
270 lead	FL	1900	2160	Factory blackpowder load

500/450 No. 2 Musket Factory Ballistics

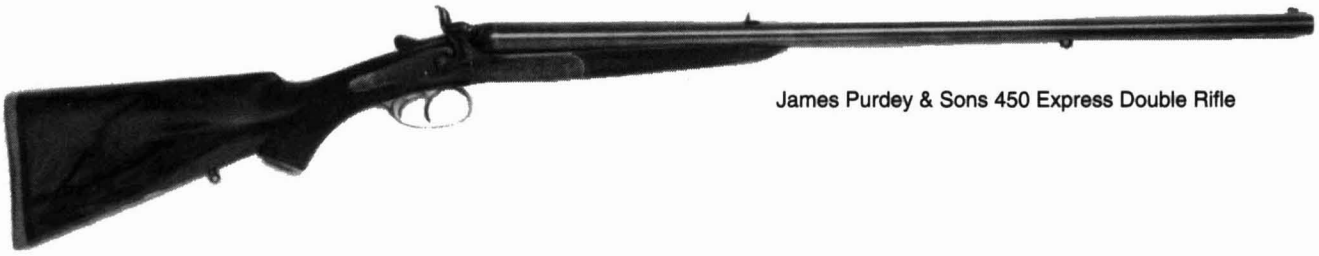
Bullet (grs.)	Powder/grs.	MV	ME	Source
480 lead	FL	1300	1805	Factory blackpowder load
480 lead	FL	1300	1805	Factory smokeless load
500 lead	FL	1350	2025	Factory smokeless load

577x450 Martini-Henry See Chapter 7.

450 3¼″ BPE

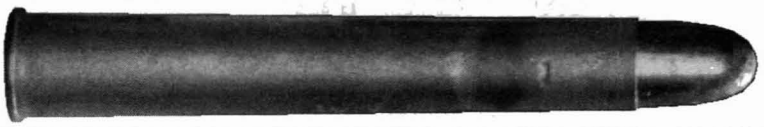
Historical Notes There were a great many "straight" British cartridges of nominal 450 designation, ranging from the 450 No. 1— barely longer than the 45 Colt—up to the 450 3¼″. In Fleming's *British Sporting Rifle Cartridges* there is a progression of no less than nine different lengths illustrated, in coiled paper, coiled brass, and drawn brass. The 3¼-inch drawn brass version originated prior to 1877, and coiled brass versions were in existence before 1871. Bullet weights ran from about 270 grains up to 365 in the nitro-for-black versions. Powder charges were from 105 to at least 120 grains of black (Greener indicates 150 grains). Nitro loadings for blackpowder rifles used up to 55 grains of cordite. The 450 3¼″ was loaded in France, Germany, Austria and Canada, and most likely elsewhere also. It was one of the best blackpowder cartridges in the world.

General Comments The 3¼″ BPE version became one of the most popular cartridges ever devised. It was a deer cartridge, or for medium-size game at best. Selous and Taylor both used this cartridge to take elephant, but they both knew this was something of a stunt. The 450 BP and nitro-for-black versions lasted until well into the 20th century, and many rifles that chamber it are still in use. The editor of this chapter once owned a plain-grade Watson hammer double that would regulate perfectly with bullets from 300 to 400 grains weight, and shot to its sights out to well over half a mile.



James Purdey & Sons 450 Express Double Rifle

450 3¼″ Nitro Express



Historical Notes When cordite was loaded into one of the world's most popular deer cartridges, along with suitable full-patch bullets, it became the new standard-of-the-world elephant cartridge, replacing the ponderous 8-, 6-, and 4-bore blackpowder rifles. John Rigby and Co. introduced this cartridge in 1898. For many years it was considered the standard elephant or dangerous game cartridge, and enjoyed great popularity. It utilizes 480-grain bullets of .458-inch diameter.

General Comments The 450 Nitro is considered adequate for dangerous African game—or any other game for that matter—under almost any conditions. It would most likely have been the only British cartridge used for big game hunting but for a British law that prohibited the importation of 45-caliber rifles or cartridges into India. British riflemakers had to come up with something new, so the 425, 470, 476, and others came into being. But the 450 NE was and still is a winner, and a great many double rifles for this cartridge are still in service.

450 3¼″ Nitro Express Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
480 lead	FL	2150	4930	Factory smokeless load

500/450 3¼″ Magnum Express (BPE)

Historical Notes This one originated in coiled form in the 1870s. Loaded with about 140 grains of blackpowder in drawn brass version, it was once very popular in Africa. Typical express-bullet weight was 325 grains.

General Comments This was popular enough that it was loaded in both black and smokeless (nitro for black) versions until the start of WWII. This must have caused some problems with owners of nitro versions of this cartridge, which was an extremely powerful elephant cartridge, and surely some orders of ammo arrived in the heart of Africa that would fit the rifle, but would not give the needed performance.

500/450 3¼ Magnum BPE Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
325 SP	FL	1950	2745	Factory blackpowder load
325 SP	FL	1950	2745	Factory smokeless load
365 SP	FL	1875	2850	Factory smokeless load

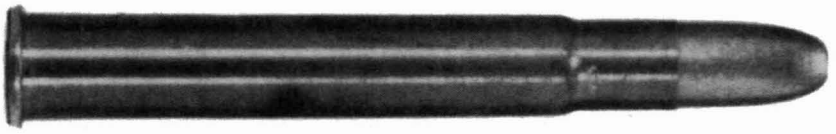
500/450 3¼" Nitro Express

Historical Notes This is a rimmed, necked case introduced (probably by Holland & Holland) around the turn of the century. It is based on the blackpowder 500/450 Magnum Express shell. It was used in single shot and double rifles, and made a great name for itself in Africa. It was usually loaded with 480-grain bullets in soft or solid, but other, slightly lighter loadings sometimes appear. It is a fine performer, and Theodore Roosevelt had a double rifle in this caliber. H&H opened this up to become their 500/465 after the ban on 450-bore rifles in India and the Sudan.
General Comments This was a prime competitor of the 450 3¼" NE, but performance of the two is about identical. The British developed several 45-caliber large bores, all of which produced about 5000 foot-pounds of muzzle energy. They have about the same killing power and the choice becomes more or less a matter of individual preference. All are large cartridges that develop quite low pressure, suitable for hot climates where dangerous game abounds. Younger African guides have, in many instances, switched to bolt action rifles in contemporary calibers because these rifles are cheaper than the classic English doubles, if not as quick for the second shot. The bullet used in British 45-caliber cartridges varies from .454- to .458-inch in diameter so there are plenty of jacketed or cast bullets available to fit almost any of them.

500/450 Magnum Nitro-Express (3¼") Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
480 SP	FL	2175	5080	Factory load

450 No. 2 Nitro Express (3½")

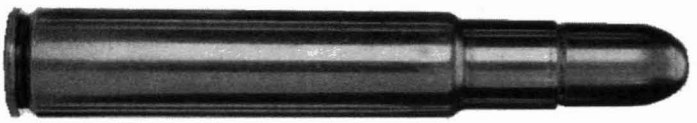


Historical Notes This is a longer case than the 500/450 Magnum, but uses the same bullet weight at the same velocity. It was introduced in about 1900-1902 by Eley. It was designed to give very low pressure in single shot and double rifles, and has a thick rim to aid extraction. It was loaded with 480-grain bullets, 70 to 80 grains of cordite, and with a great variety of bullet types. It later was opened up to become the 475 No. 2 for importation into India.
General Comments The only logical reason for designing a larger capacity case to deliver the identical ballistics of a smaller cartridge is to reduce breech pressure. It appears that some British calibers had extraction difficulties during the transition from black to smokeless powder. At first, this was believed to be the result of the higher pressure developed by smokeless powder. Later they discovered most of the trouble could be eliminated by making the case heavier. Plenty of rifles of this caliber are still around, though brass might present a difficulty from time to time.

450 No. 2 Nitro-Express (3½") Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
480 SP	FL	2175	5050	Factory load

450 Rigby



Historical Notes Introduced in 1995, Rigby's newest cartridge is just one more feather in the hat of this very old but still progressive and always innovative company. John "Pondoro" Taylor said that Rigby's always had Africa in mind when they brought out a new cartridge, and that tradition continues today, with the company under the direction of Mr. Paul Roberts. Mr. Roberts actually went to Africa himself to test and see the results of the 450 Rigby in the field. The cartridge has already made a good name for itself there and will surely become another of the all-time great classics.
General Comments Rigby offers the 450 Rigby in bolt-action or double rifle versions. In its standard factory loading, this cartridge throws a 480-grain Woodleigh soft-nose or solid bullet at 2350 fps. This gives it quite a trajectory and terminal-performance edge on the 450-470 group, and it far surpasses the somewhat overstrained 458. The case is basically the same one that the 416 Rigby uses, with a sharp shoulder for good and consistent resistance to the striker blow, and with a .458-inch bullet. Similar in size to the 460 Weatherby, this improved design is unhampered by a belt and thus gives smooth, quiet and sure feeding from the magazine. This will be a good choice for the person wanting to take only one rifle to Africa. It will also be right at home with anyone who appreciates a good, powerful rifle.

500/465 Nitro Express

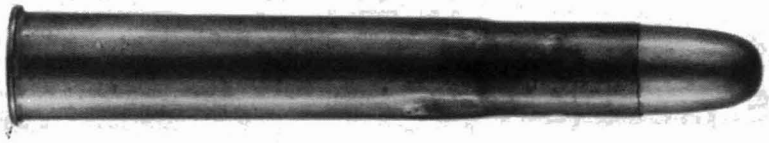
Historical Notes This rimmed, necked cartridge was introduced by Holland & Holland in 1907 to replace the 450 when that caliber was outlawed by the British governments in India and the Sudan. This was an act of military expediency to prevent rebel forces from obtaining ammunition or components that could be used in military-caliber guns. The 465 Nitro Express subsequently became quite popular in Africa. The 465 was used in single shot and double rifles and was listed in Kynoch and H&H catalogs as late as 1963. Holland and Holland continues to make double rifles in this caliber.

General Comments The 465-caliber is rated as an excellent all-round number for Africa, including heavy or dangerous game. Components are available from U.S. suppliers. It is still tops for African game. Only one bullet weight was used, but the 480-grain slugs were available in solid, softpoint and metal-covered split types. Bullets are available from Barnes and Woodleigh, and Bertram and HDS offer brass.

500/465 Nitro Express Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
480 SP	Cord. 73	2150	4930	Factory load

470 Nitro Express

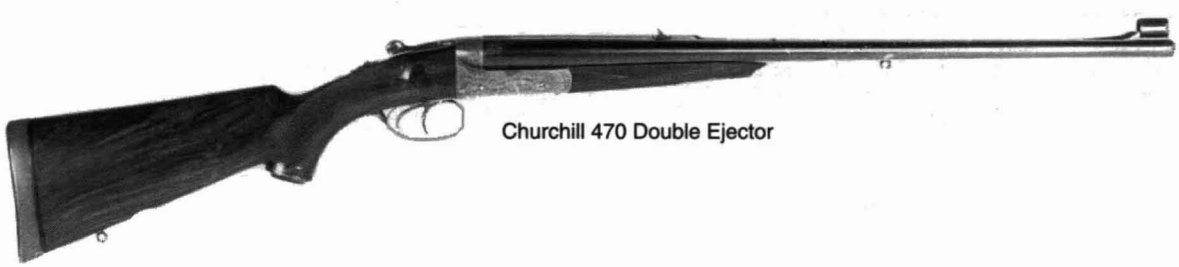


Historical Notes The 470 was introduced in 1900 and, according to John Taylor, was designed by Joseph Lang. It is another extremely popular caliber of the British gun trade which was adopted by most rifle makers. It was used mostly in double rifles and was a favorite of elephant hunters. Like most cartridges in this group, it originated as a replacement for the 450 Nitro Express, which was banned in India and the Sudan for a number of years. Holland & Holland, Purdey and others still make guns in this caliber in England. It was (and still is) Rigby's choice when they gave up their 450 NE.

General Comments The 470 Nitro was probably the most popular and widely used of the various 470-caliber cartridges. It is certainly the most enduring. It had plenty of killing power for any of the heavy or dangerous varieties of game and it is potent lion or tiger medicine in a tight spot. It can, like any powerful cartridge, be used for smaller game than that for which it was designed, and that in fact is how most of the big double rifles are still used today. Federal Cartridge Co. began making loaded ammunition in 1989 using best-quality 500-grain solids and softpoints at 2150 fps. Reloading components are today widely available, and many makers still offer double rifles in this caliber. It is one of the best choices in any new double rifle because of ammo and component availability. Federal does not offer components to the reloader, but bullets are available from A-Square, Barnes, Trophy Bonded Bullets and Woodleigh, and from many smaller custom shops. HDS and Bertram make brass, and Kynoch again offers ammunition.

470 Nitro-Express Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
500 SP, FMJ	FL	2150	5140	British factory load
500 SP, FMJ	FL	2150	5140	
500 SP, FMJ	FL	2150	5130	Factory load



Churchill 470 Double Ejector

475 3¼" Nitro Express

Historical Notes This cartridge, like the 470, was designed to replace the 450 calibers in India and the Sudan. Most were introduced between 1905 and 1910. This one came out in about 1900. It is a straight, rimmed shell intended for single shot or double rifles, and took a 480-grain bullet of, apparently, varying diameter. Cartridges with bullets as small as .474 and as large as .483 have been encountered.

General Comments The 475 Nitro has about the same performance as the 470, 465, etc., and was considered a good general-purpose round for heavy and dangerous game of all types.

475 Nitro Express Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
480 SP	FL	2175	5040	British factory load

475 No. 2 Nitro Express and 475 No. 2 Jeffery

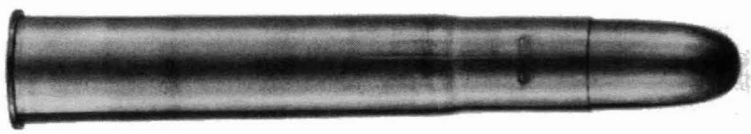
Historical Notes Developed to replace the 450 No. 2 (see page 333) when the British government prohibited that caliber in India and the Sudan. The 475 No. 2 Nitro Express was used, of course, in double rifles. The standard version used a 480-grain bullet with 80 or 85 grains of cordite. Jeffery's load was with a 500-grain bullet and three different powder charges, 75, 80, and 85 grains of cordite. The various cartridges would interchange but unless the load matched the rifle, it wouldn't regulate properly. There were some bullet variations, but the most common was of .489-inch diameter.

General Comments The 475 is a very large, impressive-looking cartridge with an overall length of almost 4½ inches. It undoubtedly gave its user some added bravado or confidence that might have been well needed in a tight spot, in spite of the fact that performance was about the same as that of shorter cartridges. It has ample power for any African or Indian game, and would also take care of anything in North America. The brass case of the 475 is made unusually heavy to reduce expansion and facilitate extraction, and pressure is quite low.

475 No. 2 Nitro-Express Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
480 SP	FL	2200	5170	Standard factory load
500 SP	FL	2150	5140	Jeffery factory load

476 Nitro Express 476 Westley Richards



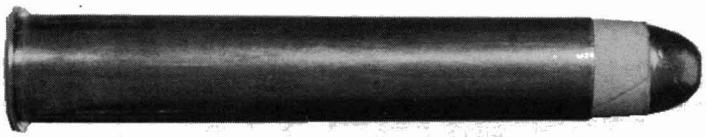
Historical Notes This cartridge was a Westley Richards development introduced in 1907. It was used in single and double rifles, but was not as popular as others of the same class. The 520-grain bullets were of 0.476-inch diameter, and the impressive LT capped bullets were available as softs.

General Comments Nothing much can be said about the 476 Nitro Express that hasn't already been mentioned about other cartridges in the same class. They are all nearly identical in power. The 476 is considered adequate for any and all African or Indian big game. It was a favorite of Elmer Keith's.

476 Nitro-Express Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
520 SP	FL	2100	5085	Factory load

500 Express (BPE) Nitro for Black



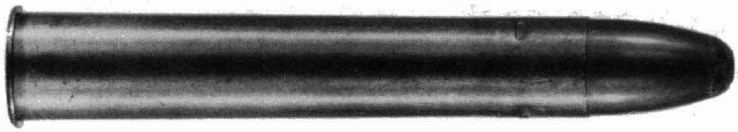
Historical Notes The straight 500 was offered in a great variety of lengths, including 1½-, 2-, 2¼-, 2½-, 2⅝-, 3-, and 3¼-inch. All were blackpower cartridges. Some were quite successful and lasted; others faded long before the turn of the century. This cartridge size originated in about the mid-to-late 1860s and over time a great many lengths were tried and, of course, chambered in rifles still encountered today. The most successful of these is their 3-inch version. Bullet weights run from 340 to 440 grains, and the charge was from 123 to 142 grains of blackpowder. Around the beginning of the smokeless era, Westley Richards came out with two versions of this caliber, one 3-inch, and the other in a shorter case, both called their Long Range cartridge. They utilized heavier bullets and either light charges of cordite or heavy blackpowder loads.

General Comments The blackpowder 500 was popular in India as a good general-purpose firearm, but was not highly regarded in Africa. This cartridge is similar to the 50-140 Sharps. It would be adequate for any North American big game. Late loadings used smokeless powder, but delivered the same ballistics as the original blackpowder load. There is a variety of bullet moulds available today that will make just about any of the 500 BP cartridges work.

500 Nitro For Blackpowder Express Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
400 SP	FL	1900	3530	Factory load

500 Nitro Express (3″ and 3¼″)



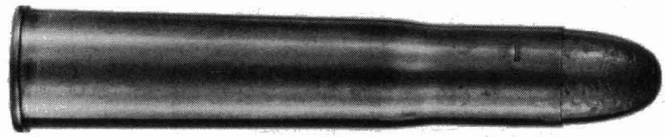
Historical Notes The 500 Nitro Expresses were derived from what were originally blackpowder cartridges. The smokeless versions were introduced in the 1890s. A 570-grain bullet is used in both case lengths, and ballistics are about identical. The longer case works at a bit lower pressure. There were loadings utilizing a 480-grain bullet and slightly reduced charges of cordite.

General Comments The 500 NE was considered a real killer on practically anything. John A. Hunter, who did game control work for the Kenya Game Department for 26 years considered it his favorite. His book *Hunter* is recommended reading for those who enjoy good firsthand experience as a guide to African shooting. The 500 Nitro resembles the 50-140 Sharps. This caliber is a favorite of well-known African professional hunter (PH) Mark Sullivan.

500 Nitro-Express (3″, 3¼″) Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
570 SP	FL	2150	5850	Factory smokeless load

577/500 No. 2 BP Express



Historical Notes The 577/500 No. 2 Express is another blackpowder cartridge. It was introduced sometime before 1879. It resembles the 577/500 Magnum Nitro Express, but has a shorter case and is not interchangeable. There were a number of different cartridges bearing the 577/500 designation, though thankfully not as many as with the 500/450. This one has a 3-inch case, and there was a version an eighth of an inch longer. Both were loaded with black and nitro for black, and the longer version became a full nitro load. Bullet weight in this caliber varied from 300 grains up to 570, with corresponding variances in blackpowder charge, ranging from 130 to about 160 grains. At one time, it was loaded in Germany as the 12.7mm British No. 2.

General Comments The 577/500 No. 2 Express was popular in India for shooting thin-skinned game such as tiger. The blackpowder and nitro for black versions were not popular in Africa as they were not powerful enough for general use there. Bullet diameter is nearly the same as the old 50-caliber Sharps cartridges and Lyman moulds in various weights will work for cast bullets. Keep smokeless loads on the light side as these old rifles don't take kindly to high pressures.

500 No.2 Express (577/500) Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
300 lead	FL	1870	2340	Factory load
340 lead	FL	1925	2800	Factory blackpowder load

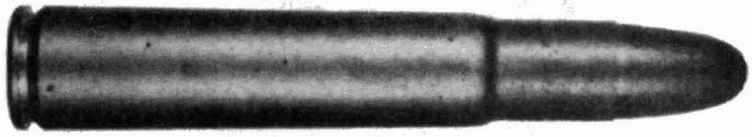
577/500 3 1/8" Nitro Express

Historical Notes This evolved from a blackpowder cartridge based on the 577 case necked to 50 caliber. It looks like, but is not the same as, the shorter 577/500 No. 2 Express, being about an eighth-inch longer. It enjoyed moderate popularity. The full nitro load utilized cordite with a 570-grain cupro-nickel bullet.
General Comments This caliber was more popular in India than Africa. It would be more useful for general big game hunting than any of the more powerful "elephant" cartridges of the same caliber. It would be adequate for deer, bear, elk or moose at moderate ranges and would be fine for woods hunting. The old 45-70 military round is considered capable of killing any American game at short range, and it only develops 2000 ft.-lbs. of muzzle energy. The 577/500 is a good deal more potent than that.

577/500 Magnum Nitro Express Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
440 lead	Axite 58			Nitro for blackpowder
570 FMJ	Cordite			Nitro factory load

505 Gibbs (505 Rimless)



Historical Notes The 505 Gibbs was introduced in 1911 as a proprietary cartridge by Gibbs for use in Mauser-type bolt-action magazine rifles. Rifles in 505 Gibbs were imported by American dealers and used to a limited extent here. A few custom-built rifles for the 505 were also turned out by American gunmakers. Most of these big-bore nitro cartridges were developed around 1910 and this one was still available until quite recently. Bullets and brass are still available and a few Ruger M77 Expresses have been rebarreled to this round.
General Comments When the first of the 505 rifles showed up in the U.S., there were all kind of stories floating around about the horrendous recoil. Several individuals were alleged to have suffered broken shoulders or collarbones as the result of firing them. This nonsense made "heroes" out of those who fired these guns and survived, but hardly contributed to the popularity of the cartridge. The English must have more sturdy frames than we because none of them appear to have fractured anything. The 505 is slightly less powerful than the 500 Jeffery, but both have an edge over the 458 Winchester. The 505 Gibbs is considered adequate for anything in Africa and has a good reputation against elephant, buffalo and lion.

505 Rimless Magnum (Gibbs) Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
525 SP	FL	2300	6190	Factory load

500 Jeffery

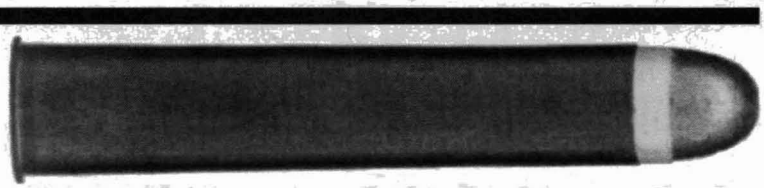
Historical Notes The 500 Jeffery was a proprietary cartridge developed by Schuler in Germany for bolt-action rifles. It was also adopted by Jeffery for his bolt-action magazine rifles based on the Mauser action. It has a rebated, or undercut, rim of smaller diameter than the base to fit the standard-diameter Mauser bolt face. In Germany, the same cartridge was loaded as the 12.7x70mm Schuler and also chambered in Mauser-type rifles.
General Comments The 500 Jeffery is similar to the 505 Gibbs, but it has a shorter case and is loaded to higher velocity and energy. The 500 Jeffery was designed to provide the man who preferred the repeating rifle with the same killing power as some of the popular rimmed double rifle cartridges. The 500 Jeffery is the most powerful cartridge used in any of the British magazine rifles. The 500 Jeffery is considered adequate for large or dangerous African game under any condition. It is also quite accurate, and a good shot who can handle the recoil can get 100-yard groups of 2 inches. Most shooters claim the apparent recoil of 500 Jeffery magazine rifles is less than that of similar-caliber double rifles.

500 Rimless Jeffery Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
535 SP	FL	2400	6800	British factory load

577 Snider (14.7 mm) See Chapter 7.

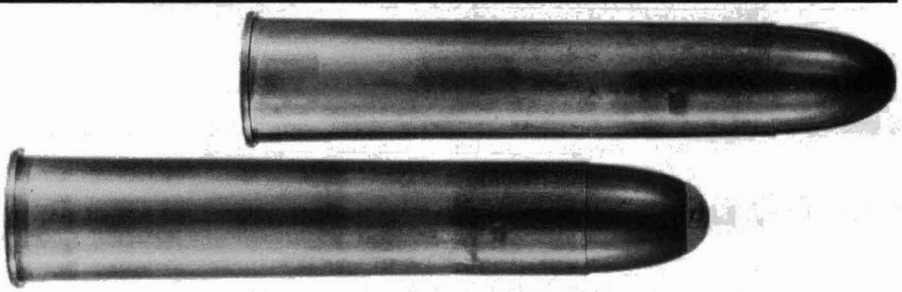
577 BP Express 2½", 2¾", 3" and 3¼"



Historical Notes The 577 Expresses began in about 1870 with the 2½-inch version. Its predecessors were, of course, the 577 Snider variants which date from 1866. Numerous shorter coiled brass and drawn brass 577-bore cartridges were developed, but the best were the Expresses, specifically those which lasted long enough to become nitro cartridges. The shortest of these is the 2¾-inch version. Bore size evolved into .585-inch diameter, and the best Express bullets weighed about 520-650 grains. The charge was 135 to 190 grains of black.

General Comments All of these were for use on the heavier non-dangerous game, though as happens, some hunters used them against tigers and lions with varying success. There was a great variety of bullets available, and success was directly tied into utilizing the proper bullet.

577 Nitro Express 2¾", 3" & 3¼"



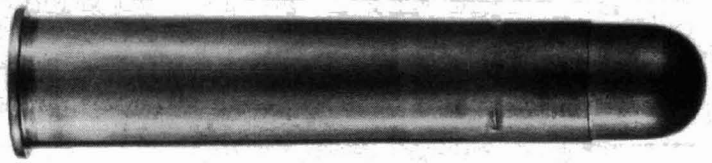
Historical Notes These were all originally blackpowder cartridges, but when loaded with cordite and proper bullets became some of the best real stoppers for dangerous game. All three originated around the turn of the century. The short case and the 3¼-inch shell were overshadowed by the 3-inch version.

General Comments The 577 enjoyed a great reputation as an elephant killer and was a standard caliber found in any battery of African rifles. It was popular with professional ivory hunters for close cover work. Many claim it is superior to the 600 Nitro because it gave greater penetration. Rifles for the 577 could be made a few pounds lighter than the 600-caliber guns, which also contributed to its popularity. Cartridges of this size were usually for emergency use under difficult conditions. Most hunters used lighter rifles of smaller caliber for ordinary shooting, but had the big 577 as a backup. Rifles for the 577 weighed 13 pounds or more, and that's a lot of weight if you have to carry it very far at the ready. Gunbearers usually carried the heavy guns until needed, but not because the British were lazy. An exhausted man just can't handle a rifle of such heft and weight in a pinch.

577 Nitro Express Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
750 SP, FMJ	FL	2050	7010	Factory load

600 Nitro Express (2.8" and 3")



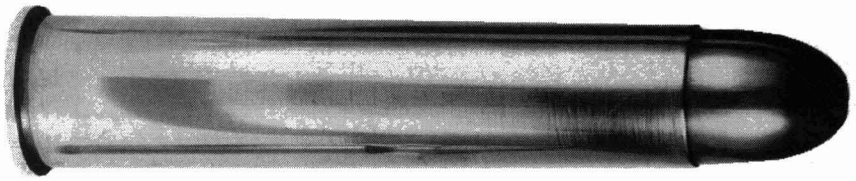
Historical Notes The 600 in either length was the largest and most powerful of the English cordite elephant cartridges until 1988. These were introduced by Jeffery before 1901. The 2.8-inch version came out in 1899. The 600 is of original design and is not based on any earlier blackpowder cartridge. It was used in single shot and double rifles. Despite its reputation, only a small number of guns have been made in this caliber. In the early 1990s, Heym of Germany introduced the Magnum Express bolt-action rifle in this caliber. Components for reloading are available from Barnes, Huntington, Old Western Scrounger, Bertram, and Woodleigh.

General Comments At one time the 600 Nitro Express was the most powerful commercial rifle cartridge in the world, but now the 700 Nitro Express overshadows it. The 600 was designed to deliver the maximum possible stopping power against elephant under the most difficult and dangerous conditions. Even professional ivory hunters considered it overpowered for anything but emergency use. It is said that a head shot on an elephant that missed the brain would still knock him down for a considerable length of time. John Taylor says up to 30 minutes. Rifles for the 600 usually weighed 16 pounds or more. There were at least three loadings for the cartridge—at 2050, 1950 and 1850 fps. It is necessary to use the load the rifle is regulated for or the two barrels won't shoot to the same point of impact. The 2.8-inch version of 1899 may have only been a developmental stage of this outstanding big cartridge.

600 Nitro-Express Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
900 SP, FMJ	Cordite	120	2050	8400	Jeffery factory load
900 SP, FMJ	Cordite	110, 100	1950, 1850	7600, 6840	Standard factory load

700 Nitro Express



Historical Notes The 700 Nitro Express is a new cartridge, an original design, not based on altering the caliber or configuration of an already existing cartridge. It was developed in 1988 by Jim Bell, of Bell Basic Brass (formerly Brass Extrusion Laboratories, Ltd.), and William Feldstein of Beverly Hills, California. It was chambered in a limited number of double rifles made by Holland & Holland. It came about because Mr. Feldstein wanted H&H to build him a 600 Nitro Express. They refused because they had already completed their official last 600 some years ago and were not interested in reviving the caliber. Bell and Feldstein then decided to approach H&H on the possibility of building a series of rifles in a new caliber, something completely different from anything previous. Since they were looking for a big-bore cartridge, there was really only one way to go, and that was up. Thus the 700 Nitro Express was born. According to Jim Bell, the 700 is based on scaling up the old 600 Nitro using a totally new case, not only of larger diameter but also a full 1/2-inch longer. The bullet is a true .700-inch diameter and weighs 1000 grains. It is planned to sell a series of cased cartridges for collectors. Rifles are very, very expensive.

General Comments A 700-caliber bullet weighing 1000 grains, with a muzzle velocity of 2000 fps generates a muzzle energy of 8900 fpe. This is certainly the most powerful sporting cartridge in the world. The Taylor Knockout Value is 200. It will, of course, be more than adequate for any game animal found anywhere on this planet. For those who insist on the biggest, this is it. The 700 H&H double rifles for this cartridge are very lively and handy, not at all cumbersome. They are fully usable, if costly, tools.

700 Nitro Express Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
1000 SP, FMJ	FL	2000	8900	Factory load

Gauge Rifles

WHAT I HAVE called the gauge-rifles are from 12- to 4-bores, though a few 2-bores have appeared. These are rifles of full weight and power, rifled through and through, and originally were blackpowder cartridge guns intended for use against large and dangerous game.

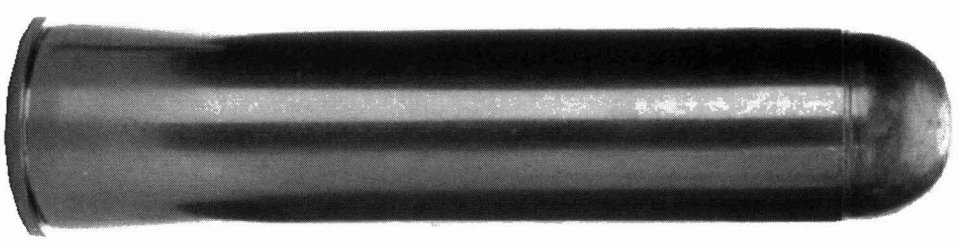
4-Bore

The bore designation indicates the number of bore-size lead balls to the pound, hence the 4-bore would nominally accept a round ball that weighed a quarter pound, or 1750 grains. In actuality, the brass-case 4-bore was loaded with a round ball of about 1250 grains weight, or with a blunt or conical bullet that weighed about 1880 grains. The usual power charge was 12 to 14 drams (325 to 380 grains) of blackpowder. Muzzle velocity was from 1300 to 1500 fps. Some 4-bore cartridges were loaded with up to 70 grains of cordite.

The 4-bore saw some use in Africa before the turn of the century, and in India for tiger shooting as recently as 1920. Typical 4-bore rifles weigh from 20 to 25 pounds. There is still quite a bit of interest in them, and at least one outfit is making new double and single shot 4-bore rifles today. Variances in brass length were from about 3 1/2 inches up to the 4 1/4-inch version pictured here.

8-Bore

The 8-bore was more popular than the 4 because rifles for it could be built lighter. Typical 8-bores weigh about 15 to 16 pounds, hence were much handier and easier to use. Performance was not far behind that of the 4-bore either. Typical loads are a 1250-grain conical bullet at about 1500 fps, or a spherical ball of 860 grains at 1650 fps. Case length is from 3 to 3 1/2 inches. The powder charge was about 10 to 12 drams (270 to 325 grains) of blackpowder.



Gauge Rifles

There was also a Paradox-type 8-bore cartridge that had lighter loadings. The Paradox was a Holland & Holland invention, which featured rifling in the choke area of its otherwise smooth barrels. These were also sometimes known as ball and shot guns, though some makers used that name for smoothbores that had no rifling in the chokes. Numerous makers turned out variations on this theme, and gave them highly individual names. Eight-bore Paradoxes were a bit lighter than fully rifled guns and were thus handier still. The 8-bore Paradox was more of a big game weapon, while the 10-and 12-bore Paradoxes were more like heavily-loaded shotguns, and used only occasionally for big game.

10-Bore

Ten-bore rifles were also taken against dangerous game, and were, like the bigger ones, also loaded with detonating shells and/or lead-covered steel bullets for maximum penetration and performance. Here again the Paradoxes were popular and efficient, and a common load used a 700-grain ball in front of a 5 dram charge for 1300 fps. The full rifle load would give over 1600 fps to the same ball or about 1500 fps to a somewhat heavier conical.

12-Bore

The 12-bore rifle saw lots of service against big game, but this size cartridge was probably most commonly seen as a Paradox load, either round ball or conical. In this guise it was quite popular. The 12-bore Paradox worked well on medium-size game and was useful with shot loads for filling the pot with birds and small game. Most 12-bore Paradox-types weighed from 7 to 8 pounds. In a fully rifled arm the weight would be over 10 pounds and the load significantly more powerful. Case length for fully rifled arms goes from 1.8 inches up to $2^{3}/_{4}$ inches. The 1.8-inch cartridge is pictured here with a fully rifled $10^{1}/_{4}$-pound double 12-bore in the writer's collection, made by James Erskine in approximately 1865-1870. The cartridge fires a 540-grain hardened lead round ball.

The gauge-rifles were either single shot or double rifles. These evolved from muzzle-loading firearms of similar bore size, and while the rapid-fire capability of these early breech-loaders must have been a boon to the early explorers and hunters, it was no panacea.

The usual lead bullet's performance was such that it wasn't a good idea to take head shots on elephant. The skull of that beast consists of honeycombed cellular bone, and a lead ball could not be counted on to penetrate that, much less stay on course and find the brain. Shots to the head that missed the brain had little or no effect on the elephant, so the usual and much surer target was the body. A 4-bore ball through the heart would kill the elephant, but apparently not very quickly, as may be determined from the writings of many early African hunters.

The gauge-guns have a fascination matched by few other British or other sporting firearms. Their cartridges are interesting and greatly varied, well worthy of study, collecting or, if we are lucky enough to find a suitable rifle, shooting.

The 8-bore was probably the best of the dangerous game gauge rifles. Its conical bullet (above) weighs 1250 grains. At left is a 12-bore double rifle by Erksine for the 1.8-inch cartridge. The bar-action locks are non-rebounding, and the firing pins are sprung. It features steel barrels with Henry rifling, and shoots extremely well. Circa 1865.

BRITISH SPORTING RIFLE CARTRIDGES

Current and Obsolete—Blackpowder and Smokeless

Dimensional Data

Cartridge	Case type	Bullet dia.	Neck dia.	Shoulder dia.	Base dia.	Rim dia.	Case length	Ctge length	Berdan Primer Size (in.)	Kynoch Primer no.
297/230 Morris Short	A	.225	.240	.274	.294	.347	0.58	0.89	.177	69
297/230 Morris Long	A	.225	.240	.274	.295	.345	0.80	1.1	.177	69
297/230 Morris Extra Long	A	.223	.240	.274	.296	.248	1.125	1.45		
240 Magnum Flanged	A	.245	.274	.402	.448	.513	2.50	3.25	.217	81
240 Magnum Rimless (240 Apex)	E	.245	.274	.403	.450	.467	2.49	3.21	.217	81
242 Rimless	C	.253	.281	.405	.465	.465	2.38	3.20	.217	59
244 Magnum (H&H)	E	.244	.263	.445	.508	.532	2.78	3.58	.217	60
246 Purdey	A	.253	.283	.401	.474	.544	2.32	3.03		
297/250 Rook	A	.250	.267	.294	.295	.343	0.82	1.1	.177	69
255 Rook	A	.255	.274	.328	.344	.401	1.17	1.43	.162	
256 Gibbs Magnum	E	.265	.298	.427	.473	.476	2.17	3.04		
26 Rimless BSA	C	.267	.306	.445	.513	.530	2.39	3.24	.217	59
275 Rigby (7x57)	C	.284	.324	.428	.474	.475	2.24	3.07	.217	
275 Belted Magnum	E	.284	.325	.454	.513	.532	2.50	3.42	.217	81
275 Flanged Magnum	A	.284	.318	.450	.510	.582	2.50	3.26	.217	
275 No. 2 Magnum (7mm Rigby Mag.)	A	.284	.315	.406	.456	.524	2.49	3.24	.241	34
280 Flanged (280 Lancaster)	A	.287	.316	.423	.535	.607	2.60	3.62	.217	60
280 Ross	G	.287	.317	.404	.534	.556	2.59	3.50	.217	59
280 Jeffery (33/280 Jeffery)	C	.288	.317	.504	.542	.538	2.50	3.45	.217	59
300 (295) Rook	B	.300	.317	—	.319	.369	1.17	1.42	.177	69
300 Sherwood	B	.300	.318	—	.320	.370	1.54	2.02	.177	69
300 Belted Magnum (300 H&H)	E	.308	.338	.447	.513	.530	2.85	3.60	.217	60
30 Flanged Magnum (30 Super)	A	.308	.338	.450	.517	.572	2.93	3.69		
303 British	A	.312	.340	.401	.460	.540	2.21	3.09		
375/303 Westley Richards	A	.311	.343	.390	.457	.505	2.50	3.36		
303 Magnum	C	.312	.345	.462	.530	.557	2.35	3.25		
310 Cadet	B	.324	.320	—	.353	.405	1.12	1.72	.177	69
318 Rimless Nitro Express	C	.330	.358	.445	.465	.465	2.39	3.40	.217	81
333 Jeffery Rimless	C	.333	.359	.496	.540	.538	2.48	3.48	.217	59
333 Jeffery Flanged	A	.333	.356	.484	.544	.625	2.50	3.49	.317	
33 BSA (33 Belted)	E	.338	.369	.453	.534	.534	2.40	3.10	.217	59
400/350 Rigby	A	.358	.380	.415	.470	.520	2.75	3.60	.241	34
350 Rigby Magnum	C	.358	.380	.443	.519	.525	2.75	3.60	.241	34
350 No. 2 Rigby	A	.358	.380	.415	.470	.520	2.75	3.60	.241	34
360 No. 5 Rook	B	.362	.375	—	.380	.432	1.05	1.45		
360 Express (2¼″)	B	.365	.384	—	.430	.480	2.25	3.00	.241	34
360 Nitro (2¼″)	B	.365	.384	—	.430	.480	2.25	2.80	.241	34
400/360 Nitro Exp. (2¾″)	A	.358	.375	.437	.470	.590	2.75	3.59	.241	
360 No. 2 Nitro-Express	A	.367	.393	.517	.539	.631	3.00	3.85	.254	40
375 Flanged Nitro (2½″)	B	.375	.397	—	.456	.523	2.50	3.10	.217	34
400/375 Belted Nitro Express (H&H)	E	.375	.397	.435	.470	.466	2.50	3.00	.217	
375 Rimless NE (9.5x57) 369 Purdey	A	.375	.398	.475	.543	.616	2.69	3.60	.254	40
375 Flanged Magnum	A	.375	.404	.450	.515	.572	2.94	3.80	.217	40
375 Belted Magnum	E	.375	.404	.440	.464	.530	2.85	3.60	.217	60
380 Short	B	.375	.379	—	.380	.430	.600	1.11	—	—
380 Long (Rifle)	B	.375	.379	—	.380	.430	.965	1.33	.177	69
400 Purdey (3″)	B	.405	.427	—	.469	.516	3.00	3.60	.241	34
450/400 (2⅜″)	A	.407	.427	.456	.545	.616	2.38	2.95	—	—
450/400 Nitro Express (3¼″)	A	.405	.432	.502	.544	.615	3.25	3.85	.254	40
400 Jeffery (450/400 3″)	A	.410	.434	.518	.545	.613	3.00	3.75	.254	40
404 Jeffery (404 Rimless)	C	.422	.450	.520	.544	.537	2.87	3.53	.217	81
416 Rigby	C	.416	.445	.539	.589	.589	2.90	3.72	—	
425 Westley Richards	I	.435	.456	.540	.543	.467	2.64	3.30	—	
500/450 No. 2 Musket	A	.458	.486	.535	.576	.658	2.36	2.90		
500/450 No. 1 Express	A	.458	.485	.530	.577	.660	2.75	3.38	.241	31A
450 Nitro Express (3¼″)	B	.458	.479	—	.545	.624	3.25	4.11	.254	40
500/450 Magnum Express*	A	.458	.479	.500	.570	.644	3.25	3.91	.254	40
450 No. 2 Nitro Express (3½″)	A	.458	.477	.518	.564	.650	3.50	4.42	.254	40
450 Rigby	B	.458	.475	.539	.589	.589	2.90	3.80	—	—
500/465 Nitro Express	A	.466	.488	.524	.573	.650	3.25	3.89	.254	40
470 Nitro Express	A	.475	.500	.528	.572	.646	3.25	4.00	.254	40

BRITISH SPORTING RIFLE CARTRIDGES

(Continued)

Cartridge	Case type	Bullet dia.	Neck dia.	Shoulder dia.	Base dia.	Rim dia.	Case length	Ctge length	Berdan Primer Size (in.)	Kynoch Primer no.
475 Nitro Express (3¼″)	B	.483	.502	—	.545	.621	3.25	4.00	.254	40
475 No.2 Nitro and Jeffery	A	.489	.510	.547	.576	.666	3.50	4.33	.254	40
476 Nitro Express (W-R)	A	.476	.508	.530	.570	.643	3.00	3.77	.254	40
500 Express (3″)	B	.510	.535	—	.580	.660	3.01	3.39	.251	31A
500 Nitro (3″)	B	.510	.535	—	.580	.660	3.00	3.80	.251	31A
577/500 No. 2 Express	A	.507	.538	.560	.641	.726	2.83	3.40	.251	31A
577/500 3⅛″ Nitro Express	A	.508	.526	.585	.645	.717	3.13	3.74	.251	31A
505 Gibbs	C	.505	.530	.588	.635	.635	3.15	3.85	.254	40
500 Jeffery	I	.510	.535	.615	.620	.575	2.75	3.47	.254	40
577 Nitro Express (3″)	B	.584	.608	—	.660	.748	3.00	3.70	.254	40
600 Nitro Express	B	.620	.648	—	.697	.805	3.00	3.68	.254	40
700 Nitro Express	B	.700	.728	—	.780	.890	3.50	4.20	—	—

A-Rimmed, necked; B-Rimmed, straight; C-Rimless, necked; E-Rimless, belted;
G-Semi-rimmed, bottlenecked; I-Rimmless, rebated (rim smaller than head).
Unless otherwise noted, all dimensions are in inches.
*The 500/450 Magnum Express and 500/450 x 3¼″ NE have the same dimensions

Exterior Ballistic Data for British Centerfire Rifle Cartridges

Cartridge	Bullet weight (grs.)	Powder weight (grs.)	Velocity (ft./sec.) Muzzle	100yd.	200yd.	Energy (ft./lb.) Muzzle	100yd.	200yd.	Drop (in.)[1] 100yd.	200yd.
297/230 Morris Short[2]	37L	5 BP	875	720		63	43		15.0	
297/230 Morris Long[2]	37L	55 BP	1200	920	760	120	70	48	15.0	71.0
240 Magnum Flanged	100CP	38½ NC	2800	2570	2355	1740	1470	1230	2.3	10.0
240 Magnum Rimless	100CP	40½ NC	2900	2665	2445	1870	1580	1330	2.2	9.2
242 Rimless Nitro Exp.	100CP	42 NC	3000	2740	2490	1970	1635	1355	2.0	8.6
244 H&H Magnum (Belted)	100CP	74 NC	3500	3230	2970	2725	2320	1980	1.6	5.1
246 Purdey	100	40								
297/250 Rook	56L	8 BP	1150	940	805	165	110	80	15.5	70.0
255 Jeffery Rook	65	9 BP								
256 (6.5mm) Mannlicher	160SN	36 NC	2350	2045	1765	1960	1490	1110	3.4	15.5
256 Gibbs Magnum	145	35C	2300	2000	1725	1880	1420	1060	3.6	16.0
275 Rigby (7x57)	173SN	40C	2300	2015	1765	2040	1560	1200	3.9	16.0
275 No. 2 Magnum	140CP	43 NC	2900	2705	2515	2620	2280	1970	2.2	9.0
275 H&H Magnum (Belted)	160CP	52 NC	2700	2505	2320	2600	2230	1920	2.5	10.5
275 H&H Magnum Flanged	160CP	49 NC	2650	2450		2184	1867			
280 Flanged Magnum Nitro Exp.	160HP	52 NC	2600	2300	2020	2400	1880	1450	2.8	12.0
280 Ross Rimless Nitro	160HP	54 NC	2700	2395	2110	2600	2040	1580	2.6	11.5
280 Jeffery (33/280)	140CP	57 NC	3000	2870	2735	2800	2555	2390	2.1	10.0
300 (295) Rook	80L	4½ CH	1100	915	785	215	150	110	16.5	75.0
300 Sherwood	140L	8½ CH	1400	1195	1060	610	445	350	9.9	44.0
300 H&H Magnum	180SN	55 C	2750	2430	2130	3020	2360	1815	2.8	12.5
30 Super Flanged H&H	180SN	50 C	2575	2309		2653	2131			
30 Purdey Flanged Nitro	150SN	42NC	2700	2385	2090	2430	1900	1460	2.6	11.5
303 British (Mark 6)	215S	31 C	2050	1855	1670	2010	1650	1330	4.4	19.0
303 British (Mark 7)	174S	37 C	2450	2250	2055	2320	1960	1640	3.0	13.0
303 British	150 CP	38 C	2700	2465	2240	2440	2030	1680	2.5	11.0
375/303 W-R (303 Axite)	225	41 AX								
303 Magnum	175 SN	53 NC								
310 Cadet	120L	6 CH	1200	1010	890	385	270	210	14.0	62.0
318 Westley Richards	250SN	52 NC	2400	2040	1715	3200	2320	1640	3.3	15.0
333 Jeffery	300SN	65 NC	2200	1950	1720	3230	2540	1980	3.9	17.0
33 BSA	165	60 NC								
400/350 Rigby	310SN	43 NC	2150	1900		3180	2480		4.7	20.0
350 Rigby Magnum Rimless	225SN	65 NC	2625	2307		3440	2657			
350 No. 2 Rigby Flanged	225SN	55 NC	2600			3400				
360 No. 5 Rook	134	15 BP								
360 Nitro Exp. 2¼	300SN	30 C	1650	1490	1355	1820	1480	1210	6.9	29.0
360 2¼" Nitro for Black	190 CT	22 C	1650	1285	1070	1150	700	485	7.6	36.0
400/360 Purdey Flanged	300SN	40 C	1950	1776		2537	2102			
400/360 Westley Richards	314SN	41 C	1900	1724		2520	2072			
360 No. 2 Nitro Exp.	320 SN	55 C	2200	1999		3442	2845			
369 Purdey Nitro Exp.	270SN	65 NC	2500	2135	1800	3760	2740	1950	3.1	14.0
375 Flanged Nitro Exp.	270SN	40 C	2000	1735	1405	2400	1810	1190	4.9	22.0
375 Rimless Nitro (9.5x57 MS)	270SN	43 C	2100	1870		2640	2100			
400/375 Belted	270	43 C								
375 Flanged Magnum Nitro	235CP	61 C	2800	2495	2215	4100	3260	2560	2.4	10.5
375 Flanged Magnum Nitro	270SN	59 C	2600	2280	1980	4060	3120	2360	2.8	12.5
375 Flanged Magnum Nitro	300SN	56 C	2400	2105	1825	3850	2960	2220	3.3	14.5
375 Belted H&H Magnum	270SN	61 C	2850	2325	2020	4220	3250	2450	2.9	12.0
375 Belted H&H Magnum	300SN	60 C	2500	2200	1915	4170	3230	2450	3.0	13.5
380 Long Rifle	124	4RN								
400 Purdey 3"	230	47 C								
450/400 (2⅜") Nitro Express	400	43 C								
450/400 3" (400 Jeffery) Nitro Exp.	400SN	60 C	2100	1845	1610	3920	3030	2310	4.3	19.0
450/400 3¼" Nitro Exp.	400SN	60 C	2150	1890	1650	4110	3180	2420	4.1	18.0
450/400 (3¼") BPE	270	110 BP								
404 Jeffery	400SN	60 C	2125	1885	1670	4020	3160	2480	4.2	18.0
416 Rigby	410SN	69 C	2371	2110		5100				
425 Westley Richards	410SN	65 C	2350			5010				
500/450 No. 1 Musket	450	70 BP								
500/450 No. 2 Musket	540	90 BP								
450 3¼ BPE	365L	120 BP	1700	1510		2240	1570			
450 3¼ Nitro for B.P.	365CT	52 C	2100	1809		3578	2655			
450 3¼ Nitro Exp.	480SN	70 C	2150	1900	1665	4930	3860	2960	4.1	18.0
500/450 (3¼) BPE	365	140 BP								
500/450 (3¼) Nitro for BP	365	60C								
500/450 (3¼") Nitro Exp.	480SN	75 C	2175	1987		5050	4220			
450 Rigby	480									
450 No. 2 Nitro Exp.	480SN	80 C	2175	1904		5050	3900			
577/450 Martini-Henry	480L	85 Blk	1350	1210	1110	1950	1560	1320	10.0	44.0
577/450 Martini-Henry Nitro for Black	480L	48 C	1350	1210	1110	1950	1560	1320	10.0	44.0
500/465 H&H Nitro Exp.	480SN	75 C	2150	1830	1620	4930	3580	2800	4.1	18.5
470 Nitro Exp.	500SN	75 C	2150	1890	1650	5140	3980	3030	4.1	18.0
475 3¼ Nitro Exp.	480SN	75 C	2175	2000	1830	5040	4260	3580	4.2	18.0
475 No. 2 Nitro Exp.	480SN	85 C	2200	1925	1680	5170	3960	3020	3.9	17.0
475 No. 2 Jeffery	500SN	85 C	2150	1880	1635	5140	3930	2970	4.1	18.0
476 Nitro Exp.	520SN	75 C	2100	1925	1760	5085	4295	3585	4.6	20.0
500 Blackpowder Exp.	440CT	142 Blk	1925	1585		2800	1900			
500 Nitro for B.P. Exp.	440CT	55 C	1900	1570	1290	3530	2410	1630	5.5	25.0
500 Nitro Exp.	570SN	80 C	2150	1890	1650	5850	4530	3450	4.1	18.0
577/500 No. 2 BPE	380	130 BP								
577/500 (3⅛) Nitro Express	570									
505 Gibbs	525SN	92 C	2300			6180				
500 Jeffery	535SN	95 C	2400			6800				
577 Snider	480L	70 Blk	1250	1055	940	1670	1190	940	13.0	57.0
577 (3") BPE	570	167 BP								
577 (3") Nitro for Black	570	75 C								
577 3" Nitro Exp.	750SN	100 C	2050	1795	1570	7010	5380	4110	4.5	20.0
600 Nitro Exp.	900S	110 C	1950	1650	1390	7600	5450	3870	5.1	23.0
700 Nitro Exp.	1000S	180	2000	1700	1430	8900	6419	4542	5.5	24.0

ABBREVIATIONS

AX—Axite
BP or Blk—Blackpowder
C—Cordite
CN—Cadet Neonite
CP—Copper Point
CT—Copper Tube
L—Lead
NC—Nitro-Cellulose
RN—Revolver Neonite
S—Solid (Jacketed)
SN—Softnose

NOTE: [1]Drop is computed from horizontal line of departure for the bullet.

Chapter 9

EUROPEAN SPORTING RIFLE CARTRIDGES

(Current and Obsolete—Blackpowder and Smokeless)

EUROPEAN sporting cartridges are, at least nowadays, better known than those of British origin. European armsmakers are well represented by a world-wide distributing system and they advertise what they make. Their products are also manufactured for a mass market at a price that places them within economic reach of hunters who could not possibly afford a fine British double gun.

The Mauser and Mannlicher turnbolt systems have been the backbone of European sporting rifle manufacture since the 1890s, long before American companies adopted the type. Because they are intended for the same type of rifle, there is great similarity between many modern European and American cartridge designs. We have borrowed freely from each other and it is often difficult to tell who originated what. Continental gunmakers have also produced very fine handcrafted double rifles and combination guns as good as anything turned out by the British. Unfortunately, there has always been a certain prejudice against double rifles not made in Britain. This resulted because some cheap rifles of this type were turned out on the continent that simply did not measure up to the required high standards. The Austrians and Germans, on the other hand, developed the drilling or combination gun—the over/under rifle-shotgun—to a greater extent than anyone else. These are multi-purpose firearms that feature various combinations of rifled tubes and shot barrels. When it comes to a truly all-round gun, nothing is superior to a good combination gun.

Sporting arms have been manufactured all over Europe, including Russia, and guns from the latter country are, today, less rare outside the Soviet bloc than they once were. The Japanese have, for many years, been making superb firearms, many of them now being sold by their own marketing arms here in the U.S. Some of our old line companies with a tradition as American as Yankee Doodle have been, for years, selling guns under their own names that are actually made in Europe or Japan.

European sporting ammunition originates mostly in Italy, Austria, Germany, Finland, Sweden, and Britain. The first successful smokeless powder was developed by the French chemist, Vieille, in 1885 and adapted to the 8mm Lebel military cartridge. Commercial manufacture of ammunition started in Germany during 1856 when Heinrich Utendoerffer founded a plant to make percussion caps and later primers. By 1871 he was turning out Berdan-primed centerfire cartridge cases for the Bavarian Werder rifle. This enterprise later grew into the great Rheinisch- Westfäfllishe- Sprengstoff-AG, or RWS, as we know it today. Early cartridges or cases made by the firm have "H. Utendoerffer" stamped into the head, sometimes with raised letters. The non-mercuric, non-corrosive primer was developed by RWS in the 1920s under the trade name "Sinoxid." Deutsche Waffen und Munitionsfabriken (DWM) is another important German firm that is, unfortunately, no longer in the commercial ammo business. Hirtenberger-Patronenfabrik, located near Vienna, Austria, was one of the world's largest munitions makers until destroyed during WWII. Organized in 1860 by the Mandl brothers, it has been razed several times by fire and acts of war. The company has started production again and has once more become an important source of sporting ammunition. Norma Projektilfabrik manufactures sporting ammunition and components in Sweden. Its products have been exported to the U.S. since shortly after the end of WWII. Norma makes the Weatherby line of brass cases and also more popular American and European calibers. The firm of G. Roth manufactured a large variety of sporting ammunition, but did not survive WWII. Lapua of Finland exports to the U.S. as does Fiocchi of Italy and Eley of Britain.

European cartridges, with few exceptions, have a metric caliber designation, usually expressed in millimeters. One millimeter equals .03937- inch, or 1-inch equals 25.4 millimeters. Metric cartridge designation is really quite simple, once you understand it. The first figure is the caliber, the second the case length. An R indicates a rimmed

case, its absence a rimless one. The designer's or manufacturer's name may be tacked on the end. Some confusion surrounds two different 8mm cartridges. The original 8mm (7.92) German military cartridge adopted in 1888 had a .318-inch diameter bullet. So did 8mm sporting rounds of the same period. However, in 1905 the cartridge was altered to use a .323-inch diameter bullet by the German Army, and shortly thereafter 8mm sporting calibers also reflected the change. The old diameter is indicated by a J (actually the old German letter form for "I," and standing for "Infanterie") and the new one by an S. For example, the 8x57J has a .318-inch bullet and the 8x57S (or JS) the .323-inch bullet. If there is an R in it any place it indicates a rimmed shell. It won't hurt anything but accuracy to use the .318-inch bullet in a .323-inch bore, but it might blow up the gun to do the opposite. The proper caliber is always on the box and usually the cartridge head. Read the label! Modern rifles are practically all chambered for the S (.323-inch) caliber. Europeans used single shot and combination guns that extract better with a rimmed case, so they have a rimmed version of almost all popular rimless cartridges. Ballistics and case dimensions are usually—but not always—identical.

European arms and ammunition firms seized upon many American and British cartridges over the years, but they never took to the British belted-type case as we did. The 22 WCF (5.6x35R), 22 Savage HP (5.6x52R), 25-35 (6.5x52R) and 30-06 (7.62x63) are popular in Europe and listed in late catalogs. The 30-30 WCF is also popular, but they don't currently load it. Cartridges of 6mm- and 7mm-caliber were highly developed in Europe long before they became popular here. The 8mm is to the European what the 30-caliber is to the American, and consequently they have a large variety of cartridges in this caliber, some of advanced design. The 8x68S, for example, is a magnum round more powerful than the 300 Weatherby or the 300 Winchester Magnum.

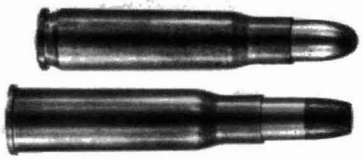
German Mauser system bolt-action rifles once competed with the more expensive British rifles for African hunting. They developed some pretty potent cartridges for dangerous game, but currently use American or British magnum cartridges. They've revived few of their African calibers since the War.

European centerfire ammunition of modern production by RWS, Norma, Hirtenberger, IMI, Fiocchi, Lapua, and Sako are designed for Boxer primers. RWS still offers nine different types of Berdan primers as well as Boxer types to satisfy the needs of reloaders. Ammunition for obsolete caliber rifles is a problem, but available metric or American brass in some instances can often be reformed to work satisfactorily.

European hunting is quite different from what we are used to, with regard to both game and method. They don't have really dangerous game, although the wild boar can be a rough customer under certain conditions. Conservation is highly developed and the shooting of game very selective. Weeding out old or undesirable animals is as important as collecting a trophy. In most countries one must pass a rigid course in gun handling and hunting knowledge before being eligible for a permit or license. The German test is especially difficult. Also in Europe there is no wide-open hunting. One must get permission or make advance arrangements and a guide of some sort is usually required. Several varieties of deer are hunted, ranging in size from a 40-pound or so roebuck to the hirsch or red stag, almost as large as an American elk. The chamois, a prime trophy, is present in the higher mountainous areas. Small game is also hunted, mostly hare, and there is good bird shooting. They do not indulge in formal varmint hunting, although I understand pest shooting has developed some following. Along open fields, long shots are not unusual, but great velocity and flat trajectory are not as important as in some areas of western North America. Great knockdown and killing power is not required for European hunting, and their cartridges reflect this. The more popular hunting calibers develop from around 2000 fpe to not much over 2500 fpe, while the trend in the U.S. is toward energy in excess of 3000 fpe. The Germans once did a great deal of social target shooting, and many older cartridges originated for this. The schuetzen, or free rifle, arrived here with German immigrants and was highly popular off and on from about 1850 to 1920—its heyday the 1890-1910 period. Many of our cartridges and bolt-action rifles reflect European ideas and design.

Although more information is available on European cartridges than British, the same problem exists in attempting to establish the exact dates of introduction. The author sent letters to the principal European manufacturers requesting such information, but in many instances records no longer existed. Old catalogs and books were of considerable assistance and, if nothing else, a general period has been indicated. We know that most blackpowder cartridges originated in the 1870s and '80s and early smokeless numbers after 1885. Some cartridges were designed for a specific rifle, and knowing the date the rifle was introduced gives a pretty good idea of when the cartridge originated. Individual gunmakers or small companies operated during fixed dates and their designs can often be approximately dated on that basis. Again, if the reader has specific information of this nature and finds what he believes to be an error in dating, let us know. This way, corrections or new data can be included at a future time.

5.6x33mm Rook
5.6x33Rmm Rook



Historical Notes These two cartridges are identical except one is rimless, the other rimmed. They date back to around 1900 or earlier and were originally loaded with blackpowder. Both have been obsolete since about 1936. Like the British, the Germans had a series of rook (a form of crow), or parlor cartridges, for short-range target practice or small game shooting. These were listed in catalogs as for Tesching Gewehre, i.e., small game or rook rifles. Although popular in Europe, they were not used to any extent elsewhere.

General Comments When Winchester introduced the 22 WCF in 1885, it not only replaced most other 22 centerfires in the U.S., but also in Europe. The 5.6x33 is of similar performance and was probably made obsolete by the 22 WCF. Both are strictly small game or target cartridges. The Winchester round is still loaded in Europe, where it is known as the 5.6x35R Vierling. The 5.6x33 was also listed as the 5.7x33. These are said to be for single shot rifles, but must have also been used in repeating rifles. In the rimless version? The rimless 5.6x33 bears some resemblance to certain modern wildcat 22 rounds based on necking-down the 30 U.S. carbine.

5.6x33mm Rook, 5.6x33Rmm Rook Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
60 Lead	2400 5	*1600	*343	Lyman #225462GC
65 Lead	FL	*1500	*327	

*Velocity and energy approximate only.

5.6x35Rmm Vierling
22 Winchester Centerfire

Historical Notes This is the European, or metric designation, for the 22 Winchester Centerfire introduced in 1885 and picked up by European gunmakers a year or so later. It was loaded to much higher velocity there than in the U.S., thus providing the inspiration for the 22 Hornet, which is based on the same case. Single shot, combination and repeating rifles of European manufacture have been chambered for the 5.6x35R Vierling.

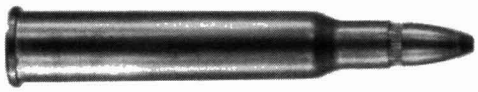
General Comments The 5.6x35R (22 WCF) is a popular small game and target round in Europe. Although originally a blackpowder number, the Germans adapted it to smokeless powder and stepped up the velocity long before we did. As loaded in Europe, it is a good 100- to 150-yard small game or target cartridge. The 5.6x35R Vierling can easily be formed from 22 Hornet cases.

5.6x35Rmm Vierling (22 Winchester Center Fire) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
48 SP	2400 8	2120	480	Lyman #225414
39 SP	FL	1940	325	RWS factory load
39 SP	FL	2630	600	RWS factory load
46 SP	FL	2030	418	RWS factory load3

5.6x35Rmm/22 Hornet See Chapter 2.

5.6x50mm Magnum
5.6x50Rmm Magnum



Historical Notes Most authorities agree that the 5.6x50mm Magnum was developed by DWM in cooperation with Friedrick W. Heym, a noted German gunmaker, and was introduced in 1968 or 1969. It is an offshoot of the 5.6x47R, which is basically a rimmed version of the 222 Remington Magnum, dating back to about 1967. However, the 5.6x50mm case is .118-inch longer than the 222 Remington Magnum and has greater powder capacity, resulting in a higher muzzle velocity. The rimmed version was intended for use in single shot, combination guns and drillings, the rimless cartridge for bolt-action rifles. Neither is very well known or used to any extent in the U.S.

General Comments In Germany, the 5.6x50mm was used for deer hunting and was loaded with a bullet designed for that purpose. In the U.S. it would be primarily a varmint cartridge. Where more power than the 222 or 223 Remington is desired, most Americans would opt for the 22-250 Remington or the 220 Swift because both rifles and ammunition are available here on an over-the-counter basis. Loading dies for the 5.6x50mm are available from RCBS, Forster/Bonanza, and Lyman. RWS and Hirtenberger still offer 5.6x50mm Magnum ammunition.

5.6x50mm Magnum, 5.6x50Rmm Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
50 SP	IMR 3031	28.5	3400	1284	Hornady
50 SP	W748	29.5	3500	1360	Hornady
55 SP	IMR 4064	27.5	3300	1330	Hornady
55 SP	W748	28.5	3300	1330	Hornady
60 SP	IMR 4064	27.0	3200	1360	Hornady
50 SP	FL		3590	1430	Factory load—5.6x50mm
50 SP	FL		3510	1365	Factory load—5.6x50mm
55 SP	FL		3280	1310	Factory load—5.6x50Rmm

5.6x52Rmm/22 Savage H-P See Chapter 3.

5.6x57mm RWS
5.6x57Rmm RWS

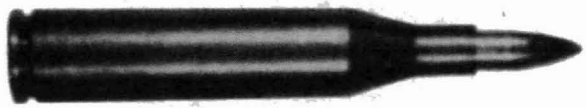
Historical Notes The 5.6x57mm was introduced by RWS about 1964 as a cartridge for hunting deer and chamois. Germany has a law that requires a minimum remaining energy level at 200 meters in order for a cartridge to be legal for taking these animals. The 5.6x57mm was designed with this in mind. It is also loaded with a properly-designed bullet for these larger animals. There is also a rimmed version.

General Comments The 5.6x57mm is in about the same class as the 220 Swift and as loaded in Europe would probably do very well for American deer or antelope. However, it would be classed as a varmint cartridge here. It is a good cartridge, but the difficulty of finding ammunition would rule out any great popularity in this country. The twist used in rifles of this caliber is 1 in 10 inches as opposed to the standard 1 in 12 to 1 in 14 inches used by U.S. gunmakers. The cartridge also has an unusually thick neck which allows the use of 22 rimfire adapter units, but presents problems to the handloader. It is manufactured by RWS and by Hirtenberger. Factory ballistics of both the 5.6x57 and 5.6x57R are identical.

5.6x57mm, 5.6x57Rmm RWS Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
50 SP	IMR 4320	40.0	3900	1689	Hornady
55 SP	W760	42.5	3800	1764	Hornady
55 SP	IMR 4350	41	3700	1672	Hornady
55 SP	IMR 4320	39	3790	1758	Hornady
60 SP	IMR 4320	38.5	3700	1824	Hornady
74 SP	RL-22	43.0	3400	1890	
55 SP	FL		3510	1505	Hirtenberger factory load
74 SP	FL		3410	1910	RWS factory load

5.6x61mm Vom Hofe Super Express
5.6x61Rmm Vom Hofe Super Express



Historical Notes These two calibers were introduced in 1937 by E.A. Vom Hofe for his line of German-made Mauser-action express rifles. Some were exported to the U.S. between the wars. They were re-introduced by Stoeger Arms Corp. in 1962. The new rifles were based on the Swedish Husqvarna-Mauser action. Both the rimless and rimmed version were listed in late DWM catalogs. Dimensions and ballistics are identical; they differ only in the rim.

General Comments The 5.6x61 Vom Hofe came out 2 years after the Winchester 220 Swift. It is one of the very few ultra-velocity 22 cartridges developed in Europe. Bullet diameter is identical to the 22 Savage Hi-Power but the standard bullet is 10 percent heavier. The 22 Savage has remained popular in Europe and is still loaded there. Velocity is close to the 220 Swift, and with its 77-grain bullet, the 5.6 is much more effective on deer-size animals. By American standards it would he considered a long-range varmint cartridge, but in Europe it is looked on as a proper caliber for deer or boar. If the bullet is designed for the job, there is no reason why it wouldn't be entirely effective for use in open country. The heavier bullet should also have superior wind bucking ability at long range. The 5.6 bears some resemblance to the 228 Ackley Magnum, which is made from the necked-down, shortened 30-06 case. Although neither caliber is now loaded in Europe, new empty brass is available from Old Western Scrounger and from Huntington's Sportsman Supply. Bullets are available from both sources and from Hornady.

5.6x61mm, 5.6x61Rmm Vom Hofe Super Express Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
70 SP	IMR 4895	37	2800	1215	RWS
77 SP	H870	61	3460	2050	RWS
87 SP	IMR 4350	52	3310	2110	RWS
77 SP	FL		3708	2350	Obsolete RWS factory load (very optimistic)
77 SP	FL		3480	2070	Obsolete RWS factory load

6x29.5Rmm Stahl

Historical Notes This is a small, 6mm, rimmed cartridge for single shot and combination guns that dates back prior to 1900. It was originally a blackpowder number for guns made by B. Stahl of Suhl, Germany. It has been obsolete for a long time and is largely a collector's item.

General Comments This cartridge resembles the 25-20 WCF, but has a smaller diameter lead bullet. It is entirely a small game, plinking or target round. Ammunition could probably be made from 25-20 brass, although the rim would have to be turned down to proper diameter. Factory ballistics are unknown, but should be similar to the 25-20-86 blackpowder load.

6x29.5Rmm Stahl Loading Data

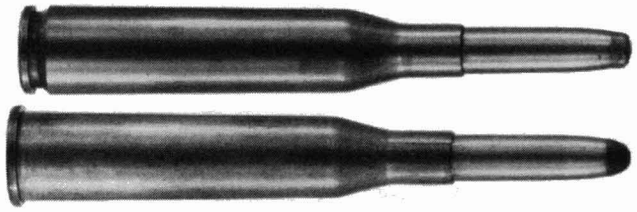
Bullet (grs.)	Powder/grs.		MV	ME	Source
85 Lead	2400	7	1460	405	Lyman #245496

6x57mm Mauser

Historical Notes This is a little-known German cartridge that dates back to around 1895. Physical measurements indicate it is the 6.5x57 Mauser necked-down to 6mm. The 6.5, in turn, was based on the 1893 7x57 Mauser necked-down. Now this is a very interesting situation because it means the 6x57 is practically identical to the modern 244 Remington. The two differ only by a minor variation in the shoulder angle. The 244 Remington is the 257 Roberts necked down to 6mm (244) with the shoulder angle increased from 20 degrees, 45 minutes to 26 degrees. The commercial 257 Roberts was originated by necking-down the original 7x57 Mauser without other notable changes. By a long and devious process, different individuals and companies arrived at practically the same point, but at different times. It just goes to prove that there is very little new under the sun. For all practical purposes, the 244 Remington originated, or existed, before the turn of the century!

General Comments Records of ballistics or what specific rifle the 6x57 was used in are lacking. However, two bullet weights were available a 120-grain softpoint and a 123-grain hollowpoint. Considering the time and powders available, the muzzle velocity was probably in the vicinity of 2600 fps. This would be a fine deer, antelope or black bear cartridge. Standard ballistics are not known and no loading data duplicating the origianl loads has been developed.

6x58mm Forster
6x58Rmm Forster



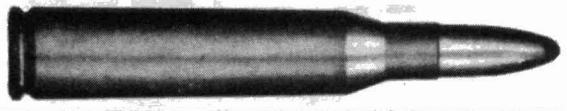
Historical Notes These two cartridges are identical except that one is rimless and the other rimmed. They were introduced about 1904 and have been obsolete for a good many years. Physical measurement indicates this round is based on the 6.5x58 Mauser necked-down. It is listed as for the Forster (forester) stalking rifle. It apparently was used in both bolt-action and single or combination guns.

General Comments The rimless version of the 6x58 closely resembles the 244 Remington, although they differ in shoulder angle and length of the neck. Available ballistics list a 127-grain bullet, but at one time a 119-grain and a 123-grain were also available. Performance is a little below the 243 Winchester, but with modern powders and a strong bolt action one could undoubtedly equal the 243 or the 244 in any given bullet weight. This would be a good deer-class or possibly elk cartridge. Ammunition could be made by necking-down 6.5x58 cases for the rimless version, but the rimmed type would be a problem.

6x58mm Forster, 6x58Rmm Forster Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
105 SP	IMR 4320	35	2750	1762	
108 Lead	IMR 3031	24	2200	1165	Lyman #245499GC
127 SP	FL		2788	2176	Factory load

244 Halger Magnum



Historical Notes Although this cartridge has an English caliber designation, it is a 6mm magnum that originated in Germany. It was introduced in the 1920s by Halger Arms Co. of Hamburg.* The originators were named Halbe and Gerlich, and the Halger was formed by combining the first three letters of each name. The case is rimless (actually no more than the 6.5x57 case) for use in Mauser bolt rifles, but there were some rimmed cases also made.

General Comments The velocity of the 244 Halger is impressive, at least on paper. However, the Halger line of cartridges turned out to be somewhat overrated when tested here. Regardless, this would still be a highly-effective cartridge even if velocity was a couple of hundred fps below that claimed. An 87-grain bullet would be mostly for varmint shooting, but heavier bullets could be handloaded for deer or larger animals. In size and general performance, it is similar to the wildcat 6mm Krag, the old 30-40 Krag military cartridge necked-down. Bullet diameter is .243-inch so any 6mm bullet would be suitable for handloading with proper data.

*See "Halger and His Rifles" by Phil Sharpe (*Gun Digest*, 7th ed.).

244 Halger Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
90 SP	IMR 4350	47	3270	2142	
105 SP	IMR 4350	44	3020	2130	
87 SP	FL		3770	2745	German factory load (optimistic)

6x62mm Freres
6x62Rmm Freres

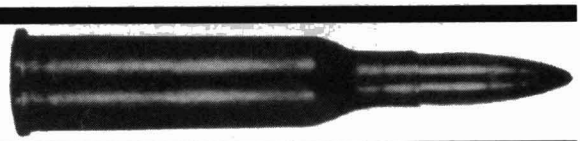
Historical Notes This is a recent German development by Metallwerk Elisenhutte GmBH (MEN). While it appears to be based on the 30-06, in fact the base diameter is greater and the 6x62 cannot be made from 30-06 brass. The 6x62 is the first new 6mm cartridge developed in Europe for many years. It is almost unknown in the U.S.

General Comments What we have here is a super or magnum 6mm suitable for all types of small and medium game at long range. The 6x62mm offers more performance than the 243 Win. or 6mm Rem. and requires a long action to accommodate its length. For U.S. hunting conditions, the 100-grain SP bullet load should be selected.

6x62mm Freres Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
85 SP	FL	3460	2260	MEN factory load
100 SP	FL	3313	2442	MEN factory load

6.5x53Rmm Russian



General Comments This is a Soviet designed rimmed sporting cartridge used mostly in Finland based on the 7.62x54Rmm Russian cartridge necked-down to 6.5mm (.264-inch). A 150-158-grain bullet was used. The original purpose of this cartridge was for 300-meter and biathlon competition. It is no longer in production.

6.5x40Rmm

General Comments An obsolete cartridge for single shot and combination guns, the 6.5x40R case has considerable body taper. The Germans used a number of cartridges in varying calibers and lengths with a case of similar design. They were all blackpowder cartridges, and while one or two made the transition to smokeless powder, most were discontinued after WWI or by the end of the 1920s. Standard ballistic data is unavailable.

6.5x40Rmm Loading Data

Bullet (grs.)	Powder/grs.		MV	ME	Source
100 SP	2400	5	1200	324	Lyman #245498GC

6.5x27Rmm

General Comments A short, rimmed, bottlenecked cartridge that looks like the 25-20 WCF, the 6.5x27R is fatter and shorter. Performance is practically the same as with the 86-grain loading of the 25-20. The 6.5x27R was listed as the kal., 6.5mm Einzelladerbüchse which literally means caliber 6.5 single-loading gun.* It was used mostly in low-priced single shot guns, but apparently also in some combination guns. It dates back to the 1890s or earlier and has been obsolete for a long time.

*Actually, what is meant is a cartridge that is "single loaded" by the shooter, using powder charges contained in paper envelopes or closed tubes. RWS for one, offered these for the 8.15x46R cartridge (in the 1934 period), loaded with a variety of powders and in a choice of weights.

6.5x27Rmm Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
86 SP	2400	7	1425	394	25-20 bullet
86 SP	IMR 4227	9	1500	434	25-20 bullet
82 SP	FL		1570	465	Factory load

6.5x52Rmm (25-35 Winchester)

General Comments The same as the 25-35 WCF, this load was used in European single shot and combination guns. It is not listed in the latest RWS catalogs although it has been popular in Germany for many years. European loading was practically identical to that used by U.S. ammunition companies.

6.5x52Rmm (25-35 Winchester) Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
117 SP	FL	2230	1285	RWS factory load

6.5x48Rmm Sauer

General Comments An obsolete blackpowder cartridge developed for use in Sauer-made single shot and combination guns. Because some samples have jacketed softpoint bullets, it must have also been furnished with smokeless powder. It is entirely a target or small game number.

6.5x48Rmm Sauer Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
120 lead	IMR 4198	12	1260	428	Lyman #266455GC
126 lead	FL		1155	378	Blackpowder factory load

6.5x54mm MS
6.5x54R MS

See Chapter 7.

6.5x53Rmm Mannlicher

See Chapter 7.

6.5x53.5mm Daudeteau

General Comments A collector's item today, this semi-rimmed type was introduced originally as a military cartridge for the French Navy in 1895. It was used in the Daudeteau military bolt-action rifle but there was also commercial ammunition made. Rifles and ammunition are quite rare, and you are not likely to have one to hunt with. If you do, it would probably be satisfactory for anything up to deer. According to Sr. Aivaro Casal, this cartridge was adopted by Uruguay in 1895 and used until 1898.

6.5x53.5mm Daudeteau Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
150 SP	FL	40	2395	1922	Factory load

6.5x58Rmm Sauer

General Comments Longest of the rimmed, tapered 6.5 cartridges developed for the Sauer-made single shot and combination guns, also some Mauser repeating rifles. The others were the 6.5x40R and the 6.5x48R. All have the same type of tapered case. The 6.5x58R, the most popular, is not currently loaded or listed in recent RWS catalogs. It is a little less powerful than the 25-35 WCF and by American standards would be underpowered for deer-sized animals.

6.5x58Rmm Sauer Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
120 Lead	4198	15	1480	588	Lyman #266455GC
120 Lead	4895	21	1650	730	Lyman #266455GC
127 SP	3031	24	2100	1288	RWS bullet
127 SP	FL		2020	1140	Factory load

6.5x54mm Mauser

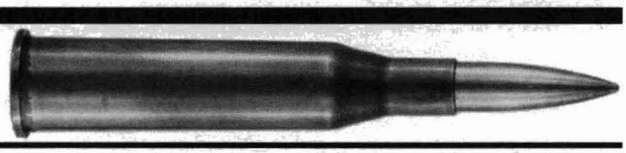
Historical Notes This is one of the shortest of the Mauser rimless necked cases and was introduced around 1900. It was chambered mostly in the K Model (Kurz) or short-action carbine. The deluxe type M sporter was also available in 6.5x54. The Mauser cartridge was gradually displaced by the more universally-popular 6.5x54 Mannlicher-Schoenauer. It was once listed in DWM catalogs.

General Comments In both appearance and performance, the 6.5x54 Mauser is similar to the Mannlicher round. They are suitable for the same general size and type of big game. Mauser rifles of this caliber were imported into the U.S. until WWII. The case has a shorter body of slightly larger diameter than the 6.5 Mannlicher. Ammunition can be made by reforming and trimming 308 Winchester or 300 Savage brass. One can use the same loading data as for 6.5 Mannlicher with very similar results, but maximum loads should be reduced 3 or 4 grains when using home-swaged cases. These will be heavier and have less capacity than the original.

6.5x54mm Mauser Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
120 SP	IMR4895	36	2500	1665	
119 SP	FL		2362	1468	DWM factory load

6.5x58Rmm Krag-Jorgensen



Historical Notes This Danish target cartridge was developed in 1933 by necking-down the 8mm Model 89 military round. It is used in single shot match rifles based on the Krag-Jorgensen action. Its use is confined almost entirely to Denmark.

General Comments The 6.5-caliber is popular in the Scandinavian countries for target and hunting use. This particular round was designed to adapt the local military rifle to that caliber without altering the action in any way. By retaining the same rimmed case only a new barrel is required. Rifles for this special cartridge are quite rare in the U.S. However, if you can find the now-obsolete Norma 8x58R Danish Krag cases with Boxer primers you can neck these down to make ammunition. This would make a good deer cartridge.

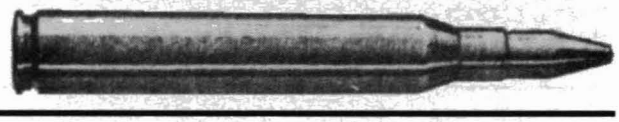
6.5x58Rmm Krag-Jorgensen Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
140 SP	IMR 4350	46	*2500	*1935	
139 SP	FL		*2500	*1930	Factory load

*Velocity and energy approximate only.

6.5x55mm Swedish See Chapter 2 and Chapter 7.

6.5 x 65Rmm RWS
6.5x65mm RWS



Historical Notes Developed by RWS about 1988, this is the first new European 6.5mm cartridge in many years. Basically it is a 6.5-06 based on the venerable 30-06 case. A rimmed version is offered for single shot and combination guns. RWS is the only manufacturer.

General Comments Ballistic performance of this modern 6.5mm is superior to most European 6.5mm cartridges and in the same class as the 6.5mm Rem. Magnum. It would be a good choice for small and medium game at long range. While the lighter weight bullets are popular for European hunting, American shooters should select the heavier bullet.

6.5x65mm, 6.5x65Rmm RWS Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
108 SP	FL	3460	2260	RWS factory load
127 SP	FL	3313	2442	RWS factory load

6.5x57mm Mauser
6.5x57Rmm Mauser

Historical Notes The 6.5x57 Mauser was developed about 1893-94 as a necked-down version of the 7x57 Mauser. Listed as a hunting cartridge, it was never adopted as an official military cartridge by any power. However, it undoubtedly influenced the design of many of the 6.5mm military cartridges such as the 6.5x55 Swedish and 6.5x68 Portuguese. The three have similar dimensions and performance, but are not the same and cannot be interchanged. The rimmed version is used mostly in combination guns. Both are listed in late RWS and Hirtenberger catalogs.

General Comments As a commercial cartridge, the 6.5x57 has not been widely used in the United States, although German-made rifles in this caliber have been imported. On the other hand, several virtually-identical wildcat numbers have enjoyed limited popularity. These are based on either necking-down the 7x57 case or necking-up the 257 Roberts case. The two cases are similar except for shoulder angle and length. The funny thing is that several individuals claim to have "invented" the wildcat version, not knowing that Paul Mauser beat them to it 100 years ago. There are a number of chamber configurations used in making up wildcat versions of the 6.5x57, and few, if any, will interchange. Immediately after WWII, a number of Japanese 6.5mm Arisaka military rifles were rechambered to handle various 6.5/257 or 6.5/7mm wildcat cartridges. However, this is a tricky thing that should be checked out by a gunsmith before actually doing any shooting. Better safe than sorry. It should be noted that the 6.5x57mm cases made from these by simply renecking will not headspace properly and will create a dangerous headspace condition.

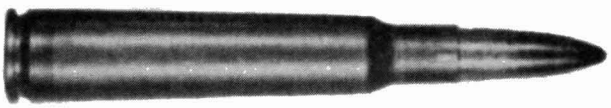
6.5x57mm Mauser, 6.5x57Rmm Mauser Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
129 SP	IMR 4350	44.5	2800	2246	Hornady
140 SP	IMR 4350	43.5	2700	2267	Hornady
160 SP	IMR 4350	41.5	2500	2221	Hornady
93 FMJ	FL		3320	2255	RWS factory load
96 FMJ	FL		3290	2290	Factory load
119 SP	FL		2821	2097	Factory load
123 SP	FL		2683	1967	Factory load
127 SP	FL		2850	2290	RWS factory load
154 SP	FL		2670	2435	RWS factory load
157 SP	FL		2450	2080	DWM factory load

6.5x58mm Portuguese See also Chapter 7.

General Comments The 6.5x58 Portuguese (used in the Portuguese Mauser-Vergueiro rifle) is often confused with the 6.5x57 Mauser. Performance is about the same, but they are not interchangeable and the 6.5x57 was never adopted as a military round by anyone. There is also a 6.5x58R Sauer and a 6.5x58R Krag-Jorgensen, all different.

6.5x61mm Mauser
6.5x61Rmm Mauser



Historical Notes Developed by DWM for various German-made Mauser action rifles the 6.5x61 was introduced in the 1930s. There is also a rimmed version for single shot and combination guns. It was only moderately popular and has not been revived so far.

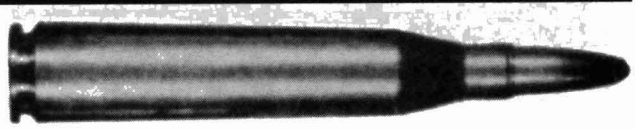
General Comments The 6.5x6l is very similar to the 256 Newton. According to the late Phil Sharpe,* it was developed after RWS had imported and tested a 256 Newton rifle. Performance is similar and 256 loading data could be used as a starting point for working up hand loads. The 6.5x61 would be adequate for most North American game under proper conditions.

*Op cit.

6.5x61mm, 6.5x51Rmm Mauser Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME
120 SP	4831	55	2860	2180
140 SP	4350	50	2640	2170
119 SP	FL		3090	2510
139 SP	FL		2906	2596
157 SP	FL		2749	2617

6.5x68mm Schuler
6.5x68Rmm



Historical Notes Developed by RWS about 1938-39, from necked-down 8x68S cases. It was originally chambered in German-made Mauser-action rifles. However, the Mannlicher-Schoenauer bolt action was imported by Stoeger in 6.5x68-caliber, and Charles Leavell of Sumter, South Carolina also brought in 6.5x68 and 8x68 rifles. At one time, the German-made Vom Hofe rifles were available for this round, and it is on occasion referred to as the 6.5mm Vom Hofe Express. It is listed in late RWS and Hirtenberger catalogs and a few American-made custom rifles have been made for it.

General Comments The 6.5x68 is the most powerful of the many European 6.5mm cartridges. In dimensions and performance it is similar to the 264 Winchester Magnum except the 264 has a belted case. On paper, the 6.5x68 boasts a higher velocity with the 93-grain bullet than the 264 with the 100-grain. It has an extremely flat trajectory, but with the light bullet this would be important mostly for long-range varmint shooting. Arguments as to which of the two is more powerful are rather academic because with the same bullet weight, chamber pressure and barrel length there really isn't much difference. It is largely a matter of personal choice and what rifle you prefer. Regardless, the 6.5x68 is a terrific ultra-velocity small-bore cartridge and would be a good all-round caliber for North American hunting. It is capable of cleanly killing anything from varmint to grizzly bear if the hunter does his part and uses the proper bullet.

6.5x68mm, 6.5x68Rmm Schuler Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
87 SP	H-4831	73.0	3700	2710	Hodgdon
120 SP	H-4831	68.0	3300	2980	Hodgdon
140 SP	H-4831	63.0	3000	2800	Hodgdon
93 SP	FL		3950	3180	RWS factory load (optimistic)
123 SP	FL		3450	3255	RWS factory load (optimistic)
140 SP	FL		2920	2651	Hirtenberger factory load

7x33mm Sako
7x33 Finnish

Historical Notes This cartridge was the result of a project to make use of idle 9x19mm Luger case manufacturing equipment by adapting it to make the longest case possible. The new case turned out to be 33mm without major modifications. Necked to the popular 7mm bore, this resulted in a fine bird hunting cartridge for the, then new, Model of 1946 short-action Sako bolt-action rifle.

General Comments Ballistically this cartridge has little to offer. The moderate velocity and lightweight bullet restrict its use to small game at close ranges. It is well suited to pelt hunting. Ballistics are similar to the 30 Carbine.

7x33mm Sako (7x33 Finnish) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
78 SP	N-110	16.3	2350	960	Sako
78 SP	FL		2400*	998*	Factory load
*Estimated					

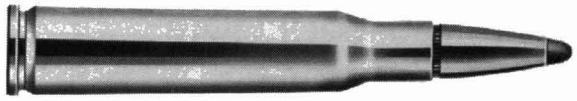
7x72Rmm

Historical Notes A popular, straight, tapered case for single shot and combination guns, this load was last listed in the 1960 RWS catalog, however it's not currently available. Date of origin not determined, but it is also shown in RWS manuals of circa 1934. Seldom used in the U.S. except for an occasional combination gun brought back from Europe. In terms of energy or power, it is in the 30-30 class and would not be satisfactory for anything larger than deer at short to moderate range. Bullet diameter is standard and one can use any American-made .284-inch bullets for handloading. This round has accasionally been loaded as demand dictates.

7x72Rmm Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
139 SP	IMR 4198	23	1850		
139 SP	IMR 4198	28	2300	1640	
160 SP	IMR 4895	27	1810	1168	
139 SP	FL		2440	1835	Factory load

7x57mm & 7x57Rmm Mauser



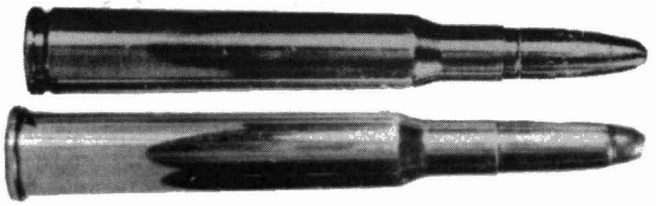
General Comments An extremely popular sporting round over much of the world. European loadings are much more diverse and useful than those provided by American companies. RWS ammunition is available in the larger cities of the U.S. and many parts of the world.

See Chapter 2 for U.S. and other load data; see Chapter 7 for military load information, and consult the RWS/DWM ballistic tables for data.

7x57mm, 7x57Rmm Mauser Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
123 SP	FL	2955	2390	RWS factory load
139 SP	FL	2625	2125	RWS factory load
154 SP	FL	2690	2473	RWS factory load
177 SP	FL	2460	2385	RWS factory load

7x64mm Brenneke and 7x65Rmm Brenneke



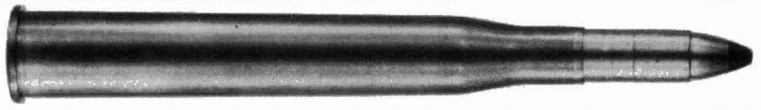
Historical Notes Developed by Wilhelm Brenneke in 1917 and used in various Mauser-action sporting rifles. Ammunition is listed in the current RWS, Norma, Federal and Remington catalogs. Brenneke never fabricated ammunition because he was a designer and gunmaker, and this task was left to the companies equipped to turn out commercial ammo. There is a near-identical rimmed version, listed as the 7x65R, used in single shot or combination firearms.

General Comments Those who think everything new and worthwhile always originates as the result of good old Yankee ingenuity better take a close look at this cartridge. The 7x64 Brenneke is virtually identical to the 280 Remington or the wildcat 7mm-06 and has been around for over 76 years. The base diameter of the 7x64 is a little smaller than the 280 so they won't actually interchange, but differences are slight. Visibly the only way an expert can tell them apart without reading the head markings is by the brass texture or the German-type bullet. The 7x64 Brenneke is adequate for any North American big game with the proper bullet. In its original form it was loaded with a special bullet designed by Brenneke called the Brenneke Torpedo. Quite a large variety of bullet types are offered in each weight to adapt the cartridge to practically any game or shooting situation.

7x64mm Brenneke, 7x65Rmm Brenneke Loading Data and Factory Ballistics

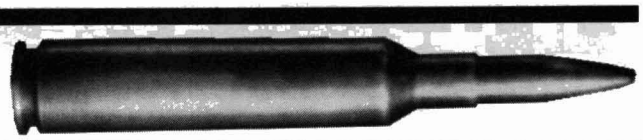
Bullet (grs.)	Powder/grs.		MV	ME	Source
139 SP	IMR 4350	54.5	3000	2810	Hornady (7x65R)
154 SP	IMR 4350	52.5	2900	2877	Hornady (7x65R)
175 SP	IMR 4350	50.5	2700	2833	Hornady (7x65R)
139 SP	FL		2955	2690	Factory load
139	FL		2806	2430	Patronen (Hungarian)
154 SP	FL		2822	2772	Norma factory load
162 SP	FL		2890	3000	RWS factory load
170	FL		2625	2600	Patronen (Hungarian)
173 SP	FL		2790	2990	Factory load

7x75Rmm Vom Hofe Super Express



Historical Notes This big cartridge was introduced by Vom Hofe about 1939, and is currently loaded by the Walter Gehmann Co. in Germany. The 7x75R is quite potent, in the same general class as the 7mm Remington Magnum. It is more than adequate for North American game. Brass is imported by Old Western Scrounger.

7mmx66 Vom Hofe Super Express



Historical Notes This is a rimless 7mm magnum developed for the post WWII Vom Hofe rifles built on the Swedish Husqvarna-Mauser action. These rifles were first advertised in the U.S. by Stoeger in 1962, but the 7mm Super Express cartridge was introduced in Germany about 1956. What is apparently the same cartridge has also been listed as the 7x66 Vom Hofe and also as the 7.6x66 Vom Hofe. It was once loaded by DWM. E.A. Vom Hofe has been dead for some years and the operation was re-activated by Walter Gehmann, once a world champion rifle shot, although the Vom Hofe name was retained. Gehmann operates a large gun and sport shop in Karlsruhe, with a branch in Stuttgart. The cartridge he offered differed somewhat, ballistically and in form, from the pre-war type. The case is 66mm long, the rim measures .507-inch, the head is .544-inch and the shoulder mikes .504-inch. Thus it will be seen that the rim diameter is of the type smaller than the head, a la the 284 Winchester. The shoulder form is unusual, being of modified venturi-style.

General Comments Ballistics claimed for the 7mm Super Express are quite impressive. With the 170-grain bullet it beats out the 175-grain load of the 7mm Remington Magnum by almost 300 fps and the 7mm Weatherby Magnum by 164. Not even some of the oversized wildcat 7mm magnum cartridges claim such performance. It makes one wonder what barrel length was used for the velocity tests. American cartridges are usually chronographed from 24- or 26-inch barrels, but in Europe they often used a 30-inch barrel. Regardless, the 7mm Vom Hofe Super Express is as good as any of the other 7mm magnum types. It would be an excellent all-round caliber for North American hunting. It would also do for most non-dangerous African game. It would be at its best for plains or mountain hunting or anytime long shots entered the picture. Case capacity is similar to the 7mm Remington and Weatherby Magnums.

7x66mm Vom Hofe Super Express Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
130 SP	IMR 4350	68	3350	3250	
175 SP	IMR 4350	60	2900	3280	
120 SP	FL		3520	3340	Gehmann factory load
123 SP	FL		3640	3630	Factory load
140 SP	FL		3356	3540	Gehmann factory load
169 SP	FL		3300	4090	Factory load (very optimistic)
170 SP	FL		3052	3540	Gehmann factory load

7x73mm Vom Hofe (Belted)

Historical Notes Developed by E.A. Vom Hofe and his partner Schnienmann in 1931, this cartridge is unusual in that it has a belted case, something German designers normally avoided. Original rifles were based on the Mauser 98 action and made by the firm of Hoffmann in Berlin. After 1936 Vom Hofe made rifles in his own name. The 7x73 was not as popular as other of the Vom Hofe cartridges and manufacture was not resumed after World War II.

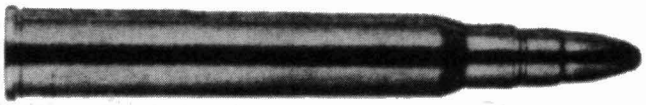
General Comments The 7x73 belted delivered the same ballistics as the smaller and shorter 7mm Super Express rimless introduced later. Dimensions of the 7x73 case are close to the 300 H&H Magnum, but the Vom Hofe has a larger base and belt diameter (about .013-inch greater). It is at least possible that the 7x73 was originally developed by necking-down the full-length 300 H&H case. Some American wildcats, such as the 7mm Mashburn (Long) were made much the same way. Velocity must have been taken in a 30-inch barrel because similar U.S. cartridges (usually chronographed in 24- to 26-inch barrels) don't achieve such velocities with the same weight bullet.

The 7x73 is scarce and practically unknown in the U.S. It would be entirely adequate for North American big game. In power it has a slight edge over the 7mm Weatherby Magnum.

7x73mm Vom Hofe (Belted) Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
170 SP	FL	3290	4120	Factory load (very optimistic)

30R Blaser



Historical Notes Blaser Rifle Works and RWS cooperated in developing this new round in 1990. Being rimmed, it is intended for use in single shot and combination guns. RWS is the only manufacturer. Note the nomenclature is a combination of European and U.S. practices.

General Comments Ballistically this new cartridge fills the slot between the 30-06 and the 300 H&H Magnum. It is suitable for all types of large North American game. Bullet diameter is .308-inch. Bullet weights of 150 to 180 grains work best.

30R Blaser Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
150 SP	RL-22	68.0	3069	3110	RWS
180 SP	RL-22	64.0	2870	3290	RWS
220 SP	RL-22	58.0	2481	3008	RWS
250 SP	RL-22	57.0	2335	3026	RWS
150 SP	FL		3085	3165	RWS factory load
180 SP	FL		2820	3190	RWS factory load

7.62x39mm Soviet

Historical Notes The 7.62x39mm has been the official Russian military cartridge since the end of WWII, although it was actually introduced in 1943. The Russians have a new 22-caliber version similar in performance to the 5.56mm NATO (223 Remington), but nevertheless, the 7.62mm remains the most widely-adopted military cartridge in the world today. Its appearance here as a sporting cartridge is due mostly to two factors—the Ruger Mini-Thirty semi-auto rifle and the Ruger M77 bolt-action rifle chamber the 7.62x39mm as do a host of imported semi-auto rifles. Sporting-type ammunition with softpoint bullets is generally available from several importers and from American ammunition companies. Ruger began chambering the cartridge in 1987. In addition, I understand that some metallic silhouette shooters are playing around with it. The reader will also find additional information in Chapter 7.

General Comments The 7.62x39 cartridge has only a limited sporting potential for North American hunting. Bullet weight varies from 122 to 125 grains and initial velocity from approximately 2250 fps to 2350 fps, depending on what rifle it is fired in. It is not as powerful as the 30-30 but is effective for deer-size animals in close cover. In addition, none of the 7.62x39mm semi-auto rifles I have tested will do better than 3½- to 4-inch groups at 100 yards, most don't do that well. This eliminates the 7.62x39 as a long-range varmint cartridge. Of course, a good bolt-action or single shot rifle will do much better, and the ballistics could also be stepped up somewhat, but it still wouldn't be much of a varmint cartridge beyond 125 yards or so.

Military ammunition for the 7.62x39mm has a bullet diameter of .310- to .311-inch, which matches the groove diameter of imported rifles. However, the Ruger Mini-Thirty has a .3085-inch bore, but I understand it is all right to shoot military ammunition in it. Imported military ammunition is often Berdan primed with steel cases and corrosive primers. However, IMI and American manufacturers provide noncorrosive brass case, Boxer-primed ammunition in both military and sporting types.

7.62x39mm Soviet Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
123 SP	RL-7	26.5	2400	1574	Hornady
123 SP	H-322	28.5	2300	1445	Hornady
125 SP	IMR 4227	23	2250	1406	Sierra
125 SP	H-4198	25.5	2200	1344	Sierra
130 HP	IMR 4198	25	2300	1527	Speer
150 SP	IMR 4198	22	2100	1469	Hornady
123 SP	FL		2300	1445	Federal factory load
123 SP	FL		2365	1527	Winchester factory load
125 SP	FL		2365	1552	Remington factory load

8x48Rmm Sauer

General Comments This obsolete blackpowder cartridge was used in single shot and combination guns. It is shown in post-WWII RWS catalogs as a discontinued number. It was popular in its day and rifles of this caliber are common. In power it is similar to the 32-40 WCF and would qualify as a deer cartridge for short-range shooting.

8x48Rmm Sauer Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
155 Lead	IMR 4198	18	1500	780	Lyman #316475GC
196 SP	FL		1665	1215	DWM factory load

8x51mm Mauser
8x51Rmm Mauser

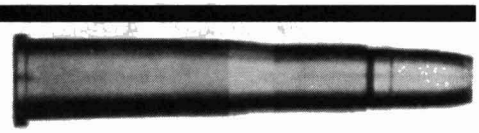
Historical Notes An 8mm round designed for the K-Model, or short-action, Mauser rifles. The rimmed version is identical, but made for single shot or combination guns. Both were introduced in 1888. The rimless cartridge is a shortened version of the German 8x57mm military round developed the same year. It was fairly popular, but has been replaced by the 8x56 Mannlicher-Schoenauer.

General Comments The 8x51 Mauser reached its peak popularity before WWI. It was a favorite in Germany for short-action rifles and carbines. Mauser Type A, K and M sporters were imported into the U.S. in this caliber to a limited extent. Ammunition in shooting quantities is almost impossible to find. In power the 8x51 is a 30-30-class cartridge and would be good for anything up to deer-size animals. For reloading, .318-inch bullets should be used.

8x51mm Mauser, 8x51Rmm Mauser Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
125 SP	IMR 4198	30	2370	1560	
150 SP	IMR 4064	41	2350	1840	
157 SP	FL		2155	1627	Factory load
158 SP	FL		2380	1990	Factory load
196 SP	FL		2099	1887	Factory load

8.15x46Rmm



Historical Notes An old, but popular target cartridge which was also used for hunting to some extent. Exact date of introduction is not established, but it dates back to the period between 1890 and 1900. Single shot, combination guns and repeating rifles were chambered for the round. It is listed in current RWS catalogs. Modern loads have jacketed bullets, usually flat-nose softpoints, but at one time lead bullets were commonly used. A variety of diameters were factory offered, designed to fit different rifles. According to Fred Datig, it was developed by Frohn of Suhl, Germany. For years it was the cartridge for 200-meter off-hand target shooting in Germany and Austria.

General Comments The 8.15x46R was practically unknown in the U.S. until after WWII when returning GIs brought back various rifles of this caliber (mostly single shots). Older rifles are intended for low pressure so one should be careful when handloading and stick to moderate loads if there is any doubt. Ammunition can be made from resized or fire-formed 32-40 brass. In power, the 8.15x46R is comparable to the 32-40. Thus it is a little underpowered for deer-sized animals but would be fine for any small to medium game. Brass is available from RWS and is imported by Old Western Scrounger.

8.15x46Rmm Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
151 SP	IMR 4895	30.0	1900	1240	
190 Lead	IMR 3031	23.0	1500	956	Lyman #338237
151 SP	FL		1805	1090	RWS factory load

8x42Rmm

Historical Notes Introduced in 1888, this is a shortened version of the 8x51R Mauser round. It is listed as a hunting cartridge and was used primarily in single shot or combination guns. It has been obsolete for many years.

General Comments The need for a less powerful version of the 8x51R must have been rather limited because the 8x42R was not nearly as popular as the longer cartridge. In power the 8x42R is in the same class as the 32-40 WCF and would just about qualify as a deer cartridge. It would be best for small to medium game at moderate ranges.

8x42Rmm Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
175 lead	IMR 4227	22	1580	975	Lyman #319295GC
157 SP	FL		1780	1110	Factory load

8x57Rmm 360

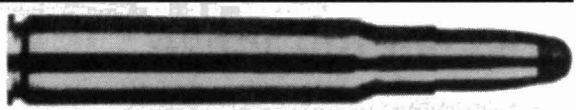
Historical Notes Based on the 9.3x72R case, this old German cartridge is a copy of the British 360 Nitro Express No.2. Loaded first with blackpowder and later with smokeless, a fair number of combination guns will be found chambered for this round. Bore diameter is .318-inch.

General Comments Due to the low breech pressure, ballistic performance of the 8x57R is only moderate. It is suitable for all types of small and medium game at close range but falls off badly at medium ranges. This caliber is now obsolete. For handloading, use only .318 diameter bullets.

8x57Rmm 360 Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
196 SP	RL-19	37.5	1893	1561	RWS
196 SP	IMR 3031	26.0	1560	1059	RWS
196 SP	IMR 4350	37.0	1820	1441	RWS
196 SP	FL		1800*	1410*	Factory load
*Estimated					

8x57Jmm Mauser



Historical Notes Original 8x57 cartridge adopted in 1888 along with the Model 88 Commission rifle by the German Army. Many sporting rifles were subsequently chambered for this caliber. Ammunition is still being manufactured by RWS in Germany. Bullet diameter is .318-inch. In 1904, the S patrone with a .323-inch diameter bullet was adopted to replace the I patrone.

General Comments The later 8x57JS uses a .323-inch diameter bullet and is loaded to higher pressures. Never fire 8x57JS ammunition in rifles chambered for 8x57J ammunition. American manufacturers offer only the 8x57JS load, but it is deliberately loaded down to be safe to fire in 8x57Jmm chambers. The 8x57J would be adequate for any large North American game at medium ranges. Use only .318-inch diameter bullets. This cartridge is now universally called the 8x57Jmm and has caused much historical confusion. The German capital I in the German word Infantry was mistaken by interpreters as a capital J.

8x57Jmm Mauser Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
150 SP	IMR 3031	47.0	2800	2611	RWS
170 SP	IMR 3031	45.0	2600	2552	RWS
196 SP	RL-1550	46.0	2225	2145	RWS
196 SP	FL		2391	2488	Factory load
198 SP	FL		2647	3075	Factory load

8x71mm Peterlongo

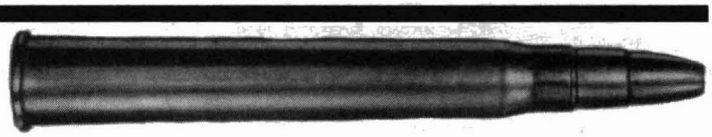
General Comments Johann Peterlongo was an Austrian gunmaker and designer in Innsbruck. While his products are virtually unknown in the U.S., he had a certain following in Europe. He turned out combination guns and other sporting arms of high quality. He designed 8mm and 9mm cartridges based on a long rimless case of necked type. They are of interest mostly to collectors today. The Peterlongo cartridges were loaded by G. Roth and Hirtenberger-Patronenfabrik.

8x71mm Peterlongo Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
200 SP	FL	*2650	*3132	Factory load
154	FL	2854	2785	1932 Catalog (German)

*Velocity and energy approx. only.

8x75mm 8x75Rmm



Historical Notes These two cartridges are listed together because one is a rimmed version of the other. They were introduced around 1910 and are based on the older 9.3x74R case necked-down. They were intended to provide a powerful 8mm for African use. The rimless version was for bolt-action express rifles, the rimmed for combination guns or single shots.

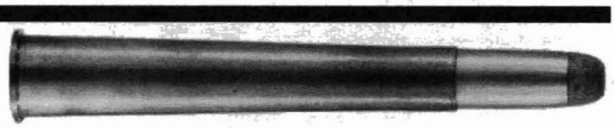
General Comments At the turn of the century, and until start of WWI, there was considerable competition between German and British gunmakers for the African gun trade. The Germans made good repeating rifles at moderate prices and gained sales by underselling the British. However, the British seemed to always keep one jump ahead in the matter of popular cartridge design. The Germans were constantly trying to come up with something as good as what the British had to offer. The 8x75 is one of a number of German efforts to produce an express cartridge of this caliber. Two bullet diameters were used, the earlier .318-inch and the .323-inch, or S size. The large diameter bullet should not be used in the smaller bore. Many 8mm cartridges come in two different bullet diameters. One must be very careful about this because the large diameter S round is often loaded to higher velocity and pressure. The 8x75 is in about the same class as the 300 H&H Magnum and is powerful enough for any North American big game.

8x75mm and 8x75Rmm Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
180 SP	RL-22	71	2791	3115	RWS
200 SP	RL-22	68	2713	3270	RWS
196 SP	FL		2715	3230	Factory loading for .318″ bore rifles
198 SP	FL		3050	4120	Factory loading for S- bore rifles

WARNING! Many J-bore (.318-inch) rifles still exist and will fire S bore (.323-inch) cartridges, creating dangerous pressures. When in doubt, check bore diameter CAREFULLY!

8x58Rmm Sauer



General Comments This obsolete blackpowder cartridge was once used in single shot and combination guns. A popular Stutzen cartridge in its day, it's long obsolete. It differs from the 8x48R only in length. This cartridge is based on the 9.3x72R case and offers similar performance to the 8x57R 360.Power is about the same as the 32-40 WCF, and it could be used for deer at short range. For reloading use only .318-inch diameter bullets.

8x58Rmm Sauer Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
196 SP	IMR 4064	34	1942	1642	
196 SP	RL-19	39	1877	1533	RWS
196 SP	FL		1690	1248	Factory load

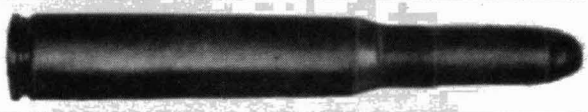
8x54mm Krag-Jorgensen

Historical Notes A cartridge based on the necked-up 6.5x55mm Swedish-Norwegian military round, the purpose of this caliber was to provide an 8mm cartridge that would operate in the 6.5mm Krag-Jorgensen bolt-action rifle used by Norway. By retaining the original case, this could be done by rebarreling alone with no alteration of the action or magazine. The 8x54 was used for target shooting and hunting and is seldom encountered outside the Scandinavian countries. It is of practically the same power as the 8x58R Danish Krag military round. It could be used for almost any North American big game. It is no longer in production and ammunition in this caliber has become a collector's item. For handloading, use bullets of .323-inch diameter.

8x54mm Krag-Jorgensen Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
150 SP	IMR 3031	52	2850	2718	
196 SP	IMR 4895	47	2370	2560	
196 SP	FL		2295	2300	Factory load

8x56mm Mannlicher-Schoenauer



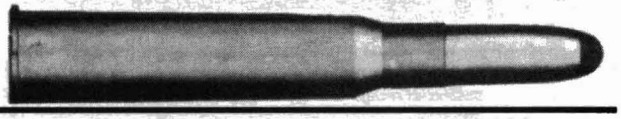
Historical Notes Introduced about 1908 for various Mannlicher-Schoenauer rifles and carbines, the 8x56 became quite popular and was picked up by other European gunmakers. It was also manufactured for a short time by American ammunition companies, but no U.S. commercial sporting rifles were chambered for it.

General Comments The 8x56 Mannlicher has seen only limited use in the U.S., although popular in Europe. Ballistically, it is little more powerful than the 35 Remington. Both shoot approximately the same weight bullet at similar velocity. By American standards it would be a good woods cartridge for deer or black bear. While it is a good cartridge, it doesn't offer better performance than available American calibers. Western Cartridge Company discontinued it about 1938. Bullets of .323-inch diameter are used for handloading. This cartridge should not be confused with the 8x56mm Hungarian.

8x56mm Mannlicher-Schoenauer Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
170 SP	IMR 4895	44	2260	1935	
200 SP	IMR 3031	40	2050	1875	
200 SP	FL		2165	1920	Western factory load
200 SP	FL		2200	2150	Eley-Kynoch factory load
202 SP	FL		2170	2105	RWS factory load

8x57mmJRS Mauser



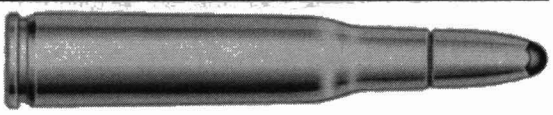
Historical Notes This is the rimmed version of the 8x57JS German military round for use in single shot and combination guns. Introduced in 1888 with the .318-inch "J" bullet, it was adapted in 1905 to the larger S-type, or .323-inch diameter bullet corresponding to a similar change in the military round. Popular in Europe and listed in the latest RWS and Hirtenberger catalog, it is seldom seen in the U.S.

General Comments The 8x57JRS gives the same performance as the Rimless 8x57mmJS Mauser familiar to American shooters. It is in the same class as the 30-06 and would do for any North American big game. RWS and Hirtenberger cases and ammunition with American Boxer primers are available, but other European brand cases are made for the Berdan primer. Be sure you use the proper bullet diameter for your particular gun. RWS cartridges for the .323-inch, or S-caliber, have a blackened primer and a cannelured bullet. Bullet diameters are clearly marked on the box. The S-caliber is available in heavier loading and higher velocity than the .318-inch-caliber.

8x57mm JRS Mauser Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
170 SP	IMR 4895	49	2650	2660	8x57JR (.318″ bullet)
196 SP	IMR 4064	45	2440	2600	
225 SP	IMR 4350	50	2230	2498	
170 SP	FL		2591	2535	8x57JRS (.323″ bullet); Hirtenberger factory load
178 SP	FL		2380	2230	8x57JR (.318″ bullet); factory load
196 SP	FL		2312	2327	8x57JRS (.323″ bullet); Hirtenberger factory load
227 SP	FL		2130	2290	8x57JR (.318″ bullet); factory load

8x57mmJS Mauser

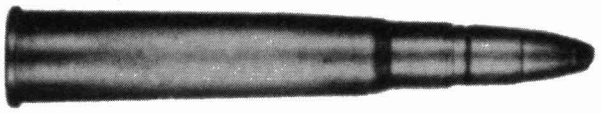


Historical Notes Information on the 8x57 is given in Chapters 2 and 7. As a military round, the 8mm Mauser is another casualty of WWII, replaced by the 30-06 and the 7.62x51mm NATO round in the West and by the Russian M-43 or 7.62x39mm in the East. As a sporting round, the 8mm Mauser is still popular and many rifles of this caliber are around. European sporting loads put it in the same class as the 30-06, fully capable of handling any game or situation the 30-06 can. American manufacturers load this caliber to lower velocity and pressure than European makers. Bullet diameter is .323-inch.

8x57mm JS Mauser Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
150 SP	IMR 4064	50	2800	2612	Sierra, Hornady
170 SP	H-380	49	2500	2360	Hodgdon, Hornady
200 SP	H-205	55	2500	2776	Speer
220 SP	IMR 4064	39	2200	2365	Sierra, Barnes
250 SP	RL-15	42	2250	2811	Barnes
165 SP	FL		2854	2985	Norma factory load
170 SP	FL		2657	2666	Hirtenberger factory load
198 SP	FL		2732	3282	RWS factory load (optimistic)

8x60mm Mauser
8x60RS Magnum
8x60S Magnum
8x60 JR Magnum

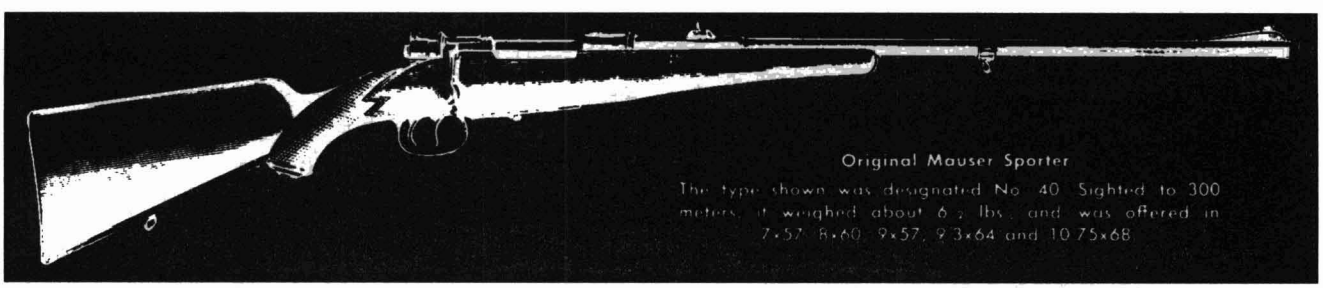


Historical Notes The 8x60 (S and RS) was introduced soon after WWI to replace the 8x57JS in sporting rifles. German civilians, immediately following the war, were forbidden to own rifles in the military caliber, yet many did! Converting them to 8x60S was a simple chamber-lengthening job, not costly, and many were so-altered, thus could be legally licensed. A few years later, the 8x60 was offered in the old bullet diameter (.318-inch) as well, probably to add performance to older 8x57J sporting rifles via the same easy conversion.

General Comments The 8x60mm comes in a confusing variety of types and loads. Both the rimless and rimmed case are available for the .318-inch and S (.323-inch) diameter bullets. There is a standard and a magnum loading and also one called the Magnum-Bombe. Case dimensions are the same, but there is a difference in bullet weight and velocity. In the standard load, the 8x60 is almost identical to the 30-06 in power, but the magnum loading brings it up to the 300 H&H Magnum performance level. It has sufficient power for North American big game and could be used for anything the 30-06 can handle. On heavy game such as moose, elk or grizzly bear, it would have an edge over the 30-06 if you used the maximum loads available. It is a popular round in Europe and has been used to some extent in Africa, although most African hunters don't consider it any better than the 300 H&H. It is still loaded by RWS.

8x60mm, 8x60S Magnum, 8x60RS Magnum, 8x60JR Mauser Loading Data and Factory Ballistics

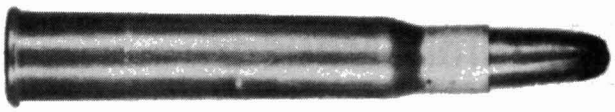
Bullet (grs.)	Powder/grs.		MV	ME	Source
159 SP	IMR 3031	48	2820	2805	
196 SP	IMR 4895	49	2570	2875	
159 SP	FL		2820	2805	Norma factory load(s)
187 SP	FL		2810	3275	RWS factory load(s)
196 SP	FL		2580	2890	RWS factory load



Original Mauser Sporter

The type shown was designated No. 40. Sighted to 300 meters, it weighed about 6½ lbs. and was offered in 7×57, 8×60, 9×57, 9.3×64 and 10.75×68.

8x64mm Brenneke
8x65Rmm Brenneke



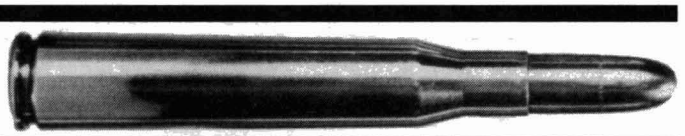
Historical Notes The two cartridges were developed by Wilhelm Brenneke about 1912 for Mauser rifles and combination guns. Originally, loaded ammunition was furnished only by DWM, but RWS made empty cases for Brenneke. Mauser-system Brenneke rifles are again available for the 8x64S caliber, made in Berlin by the original W. Brenneke firm. The 8x64 cartridge is based on the 9.3x62 case while the 8x65R is based on the 9.3x74R case.

General Comments Like most other 8mm cartridges, the 8x64 and 8x65R are loaded in both the .318-inch J- and the S-, or .323-inch, caliber. Modern rifles are always chambered for the S-type bullet. This is a constant source of confusion to Americans who own or are interested in 8mm rifles. It is also the principal reason the 8mm-caliber is not popular here because even the sporting goods dealers don't want to bother with the two bullet diameters and the difficulty it causes the average customer. The 8x64S is very similar to the wildcat 8mm/06 and has plenty of punch for North American big game.

8x64mm Brenneke, 8x65Rmm Brenneke Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
150 SP	IMR 4350	60	2770	2560	
170 SP	IMR 4064	52	2710	2760	
225 SP	IMR 4831	61	2400	2900	
225 SP	IMR 4350	57	2450	2955	
154 SP	FL		2952	2986	Factory load
185 SP	FL		2890	3420	Factory load
227 SP	FL		2578	3347	Factory load

8x68Smm Magnum



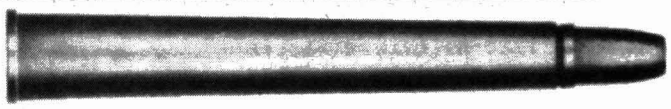
Historical Notes First loaded by RWS in 1938-39 it is still listed in their latest catalogs as well as Hirtenberger catalogs. This is one of the most modern and powerful of the 8mm cartridges.

General Comments The 8x68S is in the same class as the 338 Winchester Magnum, although it has a slightly smaller diameter bullet of less weight. It is powerful enough for the largest and toughest North American big game and would be superior to the 300 H&H Magnum for African hunting. Some authorities compare it to the 300 Weatherby or the 300 Winchester Magnum, but the 8x68S has an edge over both. It is one 8mm that is furnished only in a single bullet size, the S, or .323-inch. The case dimensions are similar to the belted 300 Magnums, but the 8x68S is a rimless cartridge with no belt. It has not been used in the U.S. very widely to date, but would be popular if more hunters were familiar with it. It is one of the best European cartridges for all-round use in North America. Performance is almost identical to the 8mm Remington Magnum.

8x68Smm Magnum Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
125 SP	W760	81	3500	3401	Hornady
150 SP	W760	76	3300	3628	Hornady
150 SP	IMR 4350	73.5	3200	3412	Hornady
170 SP	IMR 4831	75.5	3100	3629	Hornady
170 SP	IMR 4350	72	3100	3629	Hornady
200 SP	RL-22	78	2971	3920	RWS (optimistic)
220 SP	IMR 4831	67	2700	3562	Hornady
187 SP	FL		3180	4195	Factory load (optimistic)
196 SP	FL		2985	3879	Hirtenberger factory load (optimistic)
200 SP	FL		2985	3958	Hirtenberger factory load (optimistic)

8x72Rmm Sauer



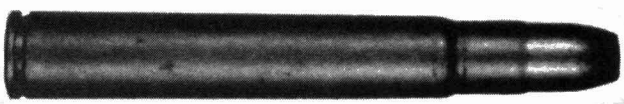
Historical Notes A straight, rimmed case developed by Sauer & Sohn for use in combination guns, the 8x72R is sometimes listed as the 8x72R S&S. Date of introduction is not established, but the old DWM case No. 574 would indicate sometime around 1910. It is currently obsolete.

General Comments The 8x72R was derived from the older 9.3x72R because the principal difference between the two is caliber. The 8x72R is not necked-down, but tapered down to the smaller caliber. Late RWS catalogs list it as a discontinued number. In power, it compares more or less with the 35 Remington, although there is no resemblance in appearance. The 8x72R would be useful mostly for woods hunting of deer-size animals. For reloading, bullets of .323-inch diameter should be used.

8x72Rmm Sauer Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
150 SP	RL-15	45.0	2334	1815	RWS
170 SP	RL-15	43.0	2240	1810	RWS
210 Lead	IMR 4198	28	1850	1602	Lyman #323471GC
225 SP	IMR 3031	38	1910	1830	
227 SP	FL		1900	1825	Factory load

9x71mm Peterlongo

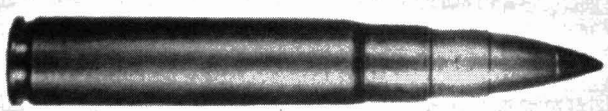


Historical Notes This obsolete cartridge was developed by the Austrian gunmaker Johann Peterlongo of Innsbruck. His rifles have not been made for a good many years and his products are all but unknown in the U.S. except to cartridge collectors. There is also an 8x71 Peterlongo cartridge based on this same case. A 227-grain softpoint, round-nose bullet was used in this cartridge, but factory ballistics and reloading data are unavailable.

9x71mm Peterlongo Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
184	FL	2575	2710	German 1932 Catalog

9x56mm Mannlicher-Schoenauer



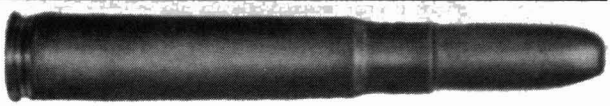
Historical Notes The 9x56 Mannlicher-Schoenauer was one of the early cartridges for the Austrian-made Mannlicher-Schoenauer sporting rifle. The rifle was introduced in 1900 and most of the original cartridges for it were developed between 1900 and 1910. Catalog reference indicates the 9x56 was added to the line of available calibers about 1905. Remington loaded this round until the late 1930s. Modern Mannlicher-Schoenauer sporting rifles were once chambered for the 9x56. The 9x56 is no longer loaded in Europe.

General Comments The 9x56 developed a moderate following, but most hunters preferred the more powerful 9x57 Mauser. The 8x56 Mannlicher is still loaded, and one can make 9x56 ammunition by expanding the neck of the smaller caliber brass. The 9x56 is a notch or two above the 35 Remington, but largely a short-range woods cartridge for deer or possibly elk. It was never very popular in the U.S. because it had little to offer beyond available American calibers. However, it is a perfectly good cartridge if you don't hunt anything larger than deer and are willing to put up with the difficulty of trying to find the now obsolete ammunition. For reloading, use .356-inch diameter bullets.

9x56mm Mannlicher-Schoenauer Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
200 SP	IMR 3031	40	2110	1980	
205 SP	FL		2114	2234	Factory load
245 SP	FL		2100	2400	Eley-Kynoch factory load
280 SP	FL		1850	2128	Remington factory load

9x57mm Mauser
9x57Rmm Mauser



Historical Notes Shortly after the 8x57 Mauser military round was introduced in 1888, an entire family of cartridges was developed on this case length by necking it both up and down. The rimless cases were used in bolt-action repeating rifles and a rimmed version was usually made available for combination or single shot guns. The 9x57R is the identical rimmed twin of the above cartridge. This was a popular round used all over the world and the old Remington Model 30 and Winchester Model 54 bolt-action rifles were available in 9x57-caliber. Most American ammunition companies loaded it until 1936-38. It is now obsolete both in Europe and the U.S.

General Comments The 9x57mm Mauser is in the same class as the 358 Winchester and would be suitable for all North American big game under most hunting conditions, although it is not a long-range cartridge. African hunters liked it as a meat getter, but considered it too light for dangerous game. Velocity is moderate, but with the proper bullet it penetrates well on thin-skinned animals. Bullet diameter is .356-inch, but .357- to .358-inch bullets can be swaged down and used.

9x57mm, 9x57Rmm Mauser Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
245 Lead	IMR 3031	38	1950	2075	Lyman #358318GC
250 SP	IMR 3031	44	2260	2980	
280 SP	IMR 3031	43	2030	2570	
280 SP	IMR 4064	46	2045	2610	
205 SP	FL		2423	2682	Factory load
245 SP	FL		2150	2520	Eley-Kynoch factory load
275 SP	FL		1850	2090	Remington factory load
281 SP	FL		1920	2285	RWS factory load

9x70Rmm Mauser

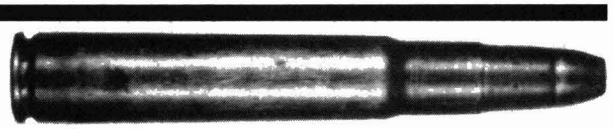
Historical Notes This is the same cartridge as the British 400/360 Westley Richards Nitro Express and has been obsolete for many years. It originated around 1900 and was picked up by German gunmakers for Mauser-action and other rifles intended for the African trade. It was gradually replaced by the 9.3x74R.

General Comments The Germans used a different loading than the British with a lighter bullet at higher velocity. The German load can be fired in British rifles but is unsatisfactory because the barrels are not regulated for it. The 375 H&H Magnum retired the bulk of the cartridges in this class, and they are used mostly in old rifles. The 9x70R would do for any North American big game, but was not satisfactory as an all-round caliber in Africa. This is *not* the same as the 360 No. 2 Nitro. Loading data unavailable.

9x70Rmm Mauser Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
217 SP	FL	2477	2970	German factory load
314 SP	FL	1900	2520	British factory load

9x63mm



Historical Notes At one time there was a family of metric cartridges based on the rimless 63mm case length. However, all these German or Austrian innovations are currently obsolete. Most of them were introduced after 1905 but little information is available on them.

General Comments The 9x63 cartridge is interesting because it is based on the same case length as the 30-06 and is therefore very similar to the 35 Whelen. It has a slightly longer body length and more abrupt shoulder angle than the American round, but other than that there is little difference. Each delivered practically identical ballistics. The 9x63 would be a good one for the heavier varieties of North American big game and many African species also. Standard .357- to .358-inch bullets can he used for handloading. Factory ammunition used a 231-grain bullet.

9x63mm Loading Data and Factory Ballistics

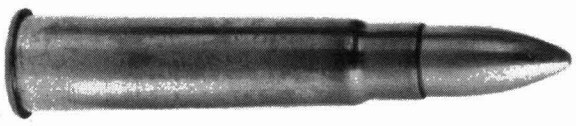
Bullet (grs.)	Powder/grs.		MV	ME	Source
231 SP	4320	57	2510	3240	
250 SP	4320	56	2390	3180	
231 SP	FL		2550*	3336*	Factory load

*Estimated

9.3x72Rmm Sauer

Historical Notes The 9.3x72R Sauer is an obsolete cartridge developed by Sauer & Sohn for single shot, double and combination guns. It is on occasion confused with the 9.3x74R straight case, but the S&S round has a slight bottleneck. Rifles in this caliber are scarce, and it is largely a collector's cartridge. It was loaded with a 186-grain bullet. Standard ballistics and loading data not available, however ballistic performance was similar to the 9.3x72R cartridge.

9.3x53mm Swiss
9.3x53Rmm Swiss

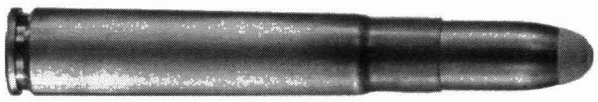


Historical Notes Two cartridges popular in Switzerland for target shooting. Rifles of this caliber are rare in the U.S. and the cartridge is of interest mostly to collectors. Factory ballistics place the two cartridges in the same class as the 35 Remington. They would do for any game up to and including deer at short to medium range. They were introduced in the mid-1920s, possibly 1925. These calibers use .365-inch diameter bullets.

9.3x53mm Swiss,9.3x53Rmm Swiss Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
200 SP	FL	2000	1780	9.3x53mm Swiss factory load
200 SP	FL	2054	1960	9.3x53Rmm Swiss factory load

9.3x57mm Mauser



Historical Notes This is a rimless, necked case and is another of the cartridges based on the 8x57 Mauser expanded to take larger diameter bullets. It dates back to 1900 or earlier and was used in both Mauser and Mannlicher sporting rifles. Except for the larger diameter bullet, it is nearly identical to the 9x57mm. The 9.3x57 is not listed in the current RWS catalog, but Norma makes brass cases and loaded ammunition. Apparently no rifles are currently made for the round. There is a 9.3x57R that is not the rimmed version of the above because it has a straight case.

General Comments The 9.3x57 is in the same class as the old 35 WCF or the newer 358 Winchester. It would do for any North American big game at short to moderate ranges. It would be good for hunting in brush or heavily-wooded areas. It may also be listed as the 9.2 Mauser and is often confused with the 9x57 Mauser because they differ only in bullet diameter. To further complicate matters, there is a 9.5x57 Mannlicher which looks similar, but is not.

9.3x57mm Mauser Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
232 SP	IMR 3031	47	2330	2785	
286 SP	IMR 3031	43	2070	2705	
286 SP	FL		2065	2714	Norma factory load

9.3x65R Collath

General Comments This is one of a series of obsolete cartridges developed by the European gunsmith whose name appears with the cartridge. He was active in the early 1900s and well known in Europe, but his developments are recognized in the U.S. only by cartridge collectors. This is a rimmed, bottlenecked case with a long body and short neck. It was loaded with a 193-grain flat-nose, softpoint bullet. Standard ballistics are unknown.

9.3x74Rmm

Historical Notes The 9.3x74R is a popular German cartridge for single shot, double and combination guns. It originated in the early 1900s in answer to the 400/360 Nitro Express, which British gunmakers developed in various versions. It is quite similar to, but slightly longer than, the 400/360 Westley Richards, also loaded and chambered in various rifles by the Germans. The 9.3x74R is listed in the current RWS and Norma catalog. Austrian and German combination guns are still available in this caliber, as are barrels for Thompson/Center rifles from SSK Industries.

General Comments A popular round for heavy game, the 9.3x74R is on par with the 375 Flanged Magnum Nitro Express. It gained a good reputation in Africa for general use against most game, including elephant. It would be more than adequate for North American big game. An over/under combination gun of 9.3x74R caliber and a 12- or 16-gauge shot barrel would be a terrific outfit for the world-wide, one-gun hunter. There isn't much of anything, large or small, that it couldn't handle. For reloading, .365-inch diameter bullets should be used.

9.3x74Rmm Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
250 SP	H-380	60.0	2400	3198	Barnes
270 SP	IMR 4895	55	2300	3172	Speer
286 SP	IMR 4064	55	2300	3360	Barnes
232 SP	FL		2630	3535	Norma factory load
258 SP	FL		2460	3465	RWS factory load
285 SP	FL		2280	3290	RWS factory load
286 SP	FL		2360	3530	Norma factory load

9.3x62mm Mauser

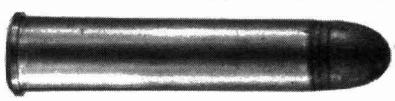
Historical Notes Developed about 1905 by Otto Bock of Berlin, a well-known gunmaker, this caliber was introduced to give the farmers and hunters in the then-German colonies in Africa an adequate cartridge. It was soon used in Europe on wild boar and red deer. Mauser sporters were sold in the U.S. in this caliber until 1940. It is listed in late RWS and Norma catalogs. Browning and other rifles are available in Europe for this cartridge and Steyr-Mannlicher rifles are currently so chambered.

General Comments The 9.3x62 is a powerful big game cartridge with a good reputation in Africa and Asia. It is sufficiently powerful for any North American big game and would be a good number for Alaskan bear. At one time it was one of the most widely-used, general-purpose medium bores in Africa. This was due partly to good performance and partly to the fine, moderately-priced bolt action rifles that chambered it. Cases can be formed from 30-06 brass.

9.3x62mm Mauser Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
250 SP	IMR 4350	63	2606	3754	Barnes (optimistic)
270 SP	IMR 4350	64	2550	3899	Speer (optimistic)
286 SP	H-414	57	2500	3970	Barnes (optimistic)
232 SP	FL		2624	3548	Norma factory load
256 SP	FL		2560	3726	RWS factory load (optimistic)
286 SP	FL		2360	3544	Norma factory load
293 SP	FL		2430	3842	RWS factory load (optimistic)

9.1x40Rmm

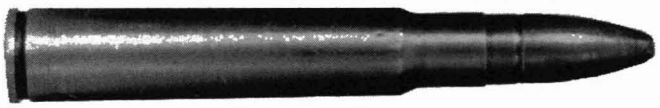


Historical Notes This is an obsolete cartridge for target and small game shooting that was popular in the early 1900s. It was of blackpowder origin and so probably originated before 1900. It would be OK for small to medium game, but is underpowered for anything else. Loading data not available.

9.1x40R Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
140 lead	FL	1800	1014	Factory load

9.3x64mm Brenneke



Historical Notes This is the largest and most powerful of the various Brenneke cartridges. Wilhelm Brenneke was one of the best known of the German cartridge designers and many of his ideas were commercial successes. He developed the popular and effective Brenneke-Torpedo bullets.* His career began in the late 1890s, but most of his modern cartridges were perfected in the period around 1910. He was a contemporary of Charles Newton in the development of high-velocity cartridges. There are marked similarities between the Brenneke and Newton cartridges, but it is probably a case of parallel development rather than any influence of one by the other. Brenneke was born in 1864 and died in 1951. The 9.3x64 is still loaded by RWS. German-made, Mauser-system bolt-action rifles are still available for the 7.8 and 9.3 Brenneke cartridges.

General Comments The 9.3x64 is ample for any North American big game. John Taylor rates it right along with the 375 H&H Magnum as an excellent all-round caliber for African hunting. Rifles and ammunition were unavailable for a number of years because of World War II. Now that this caliber is in production again, its use may increase. Not well known in the U.S., it would probably be more of a success here if better publicized.

*For an account of Brenneke's life and developments, see the 14th edition of *Gun Digest*.

9.3x64mm Brenneke Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
286 SP	IMR 4350	76.0	2725	4716	RWS
270 SP	RL-15	67.0	2820	4768	RWS
293 SP	IMR 4350	65.0	2629	4563	RWS
247 SP	FL		2760	4178	RWS factory load
285 SP	FL		2690	4580	RWS factory load
293 SP	FL		2570	4298	RWS factory load

9.5x47Rmm

Historical Notes The 9.5x47R is an obsolete, blackpowder target cartridge that dates back to the 1880s. The Germans used a number of bottlenecked cartridges of 46mm to 47mm in length. They are all very similar and differ mainly in the diameter bullet used, which varied from 9 to 11mm. The 9.5x47R (old DWM case No. 23) appears interchangeable with the 9.5x47R Martini (old DWM case No. 179), although there are slight differences in body diameter.

General Comments The ballistics of these old target cartridges are similar and one wonders over the great variety. There must have been 40 or more of them at one time, with only slight differences in case length, shape or capacity. There would be little to gain in listing them individually because most are rare collector's gems and rifles for them practically nonexistent. Ballistics are in the class of the 40-60 or 44-40 Winchester and any of them would be small- to medium-game numbers by today's standards.

9.5x57mm Mannlicher-Schoenauer/9.5x56 MS

Historical Notes Introduced in 1910 for the Mannlicher-Schoenauer rifle and carbine, it is also listed as the 9.5x56, 9.5x56.7, and the 375 Nitro Express Rimless. Old Eley-Kynoch catalogs listed it as the 9.5mm Mannlicher-Schoenauer. It is not listed in current RWS catalogs, and no modern European rifles are being chambered for it.

General Comments The 9.5 Mannlicher was popular for a number of years with those who liked the light, handy Mannlicher sporting rifles. It did not have a good reputation in Africa for heavy or dangerous game, but was liked by many as a meat getter and performed well on thin-skinned, non-dangerous game. It is seldom seen in the U.S. A good brush or woods cartridge for almost any North American big game, it is in the same general class as the 358 Winchester, but has a heavier, larger diameter bullet.

9.5x57mm Mannlicher-Schoenauer Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
270 SP	IMR 3031	44	2150	2780	
286 SP	IMR 3031	42	2040	2638	
270 SP	FL		2150	2780	Eley-Kynoch factory load
272 SP	FL		2148	2791	Factory load

9.5x73mm Miller-Greiss Magnum

Historical Notes A special and relatively little-known cartridge developed for or by Miller and Greiss, two gunsmiths of Munich, Germany, this cartridge is based on the necked-down 404 Jeffery case. Rifles of this caliber were built on the Mauser bolt action. Date of introduction is not known, but would have been some time between 1910 and the early 1920s. The 9.5x73 represents another German effort to bring out a cartridge competitive with the British 375 H&H Magnum. This one makes it ballistically, but never got close in popularity. Both rifles and cartridges are quite scarce and are now collector's items.

9.5x73mm Miller-Greiss Magnum Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
271 SP	FL	2670	4310	DWM factory load

9.3x72R, 9.3x48R 9.3x57R, 9.3x70R 9.3x80R, 9.3x82R

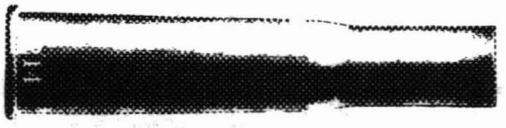
Historical Notes These six cartridges are lumped together because the only real difference between them is case length. They all date back to the 1890 period, and all were originally blackpowder cartridges. Most of them were still loaded until the start of WWII, but only the 9.3x72R survived the war and is listed in late RWS catalogs. All are of straight, rimmed type and were used in single shot and combination guns.

General Comments Old catalogs show the same bullet as suitable for all or most of these cartridges. Despite the difference in case length, there really isn't much difference in ballistics or power. All are primarily medium-game cartridges fully adequate only for deer or similar animals. They can best be compared to the 38-55, although this old American cartridge has a slight edge over most of the various straight-cased 9.3s. Few modern guns are being made in any of these calibers.

9.3x72R, 9.3x48R, 9.3x57R, 9.3x70R, 9.3x80R, 9.3x82R Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
160 SP	FL	1650	973	Factory load
190 SP	FL	1700	1225	Factory load
300 SP	FL	1650	1820	Factory load
193 SP	FL	2020	1750	RWS factory load
193 SP	FL	1640	1155	Factory load

10.25x69Rmm Hunting-Express



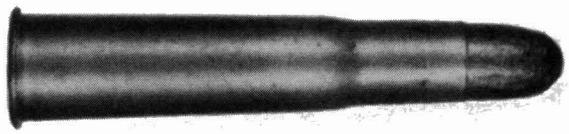
Historical Notes An obsolete blackpowder cartridge that dates back to the 1880-90 period, it was used mostly in single shot and double rifles. The Germans had several cartridges of from 400- to 405-caliber that were similar to British rounds in the same class. They also loaded and chambered the various length British 450/400 cartridges popular around the turn of the century. The 10.25x69R is an intermediate-length version between the 450/400 2⅜-inch and 3-inch. Rifles of this caliber are currently quite scarce.

General Comments Cartridges of this caliber and class were developed primarily for the African gun trade. In power they are similar to the 375 H&H Magnum if loaded with smokeless powder to maximum performance. The 10.25 would probably do for most African game and is certainly ample for North American big game at moderate ranges. Old blackpowder loads are not as effective as later smokeless ones. These cartridges are all obsolete and better left to collectors. Bullet diameter is .404-inch.

10.25x69Rmm Hunting-Express Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
235 SP	FL	2100	2310	Factory smokeless load

10.3x60Rmm Swiss

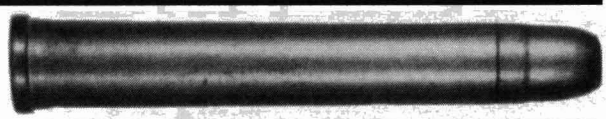


Historical Notes A Swiss target cartridge originally for single shot, Martini-action rifles, the 10.3x60R is nothing more than the Swiss version of the obsolete British 450/400 (2$^{3}/_{8}$-inch) Blackpowder Express. Some Swiss-loaded ammunition is so marked on the box. Some modern bolt-action rifles have been made in Switzerland in this caliber. The British loaded a 255-grain lead bullet, but the Swiss use heavier bullets of softpoint or full-jacketed type and smokeless powder. The Swiss loading is in about the same class as the 405 Winchester and would do for any North American big game at short to medium range. This caliber is still popular in Switzerland and guns and ammunition in this caliber are still being manufactured in Switzerland and in Germany by RWS. In at least one Swiss canton the 10.3x60R is the only lawful caliber for big game hunting. Bullet diameter is .415-inch.

10.3x60Rmm Swiss Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
253 SP	RL-15	66.0	2432	3324	RWS
330 SP	FL		2070	3143	RWS and Swiss factory loading

10.3x65Rmm Baenziger



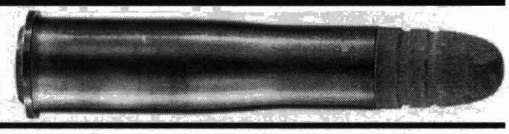
Historical Notes This was at one time a popular European target cartridge, particularly in Switzerland. It is now obsolete, but the Swiss manufactured it until after the end of WWII. Swiss Martini-action single shot rifles were made for the 10.3x65R. This cartridge is actually the brass 2.5-inch 410 (10.35mm or 36-gauge) shotgun shell loaded with a lead or softpoint bullet. However, the rim is a bit thicker than the average 410 shotshell. DWM case No. 164 is listed in the 1904 catalog under schrotflinten, or shotguns. Ammunition can be made from brass 410 cases, although the rim usually has to be built up to the proper thickness. A brass washer is the easiest solution to this. The equally hard to find 405 Winchester case can also be used if trimmed to the right length and the rim turned down. New brass cases from Bertram Bullet Co. are being imported by Huntington. Lyman #412263 (290-grain) cast bullets can be sized and used. Power is about the same as the 44 Magnum revolver cartridge fired in a rifle so it would make a fairly satisfactory short-range deer number.

There is also a 10.3x65R Swiss target cartridge (old DWM case No. 237A) that is practically identical to the above except for a thin rim. This one has been obsolete for a good many years. Cases are currently made by Bartram Bullet Co.

10.3x65Rmm Baenziger Loading Data and Factory Ballistics

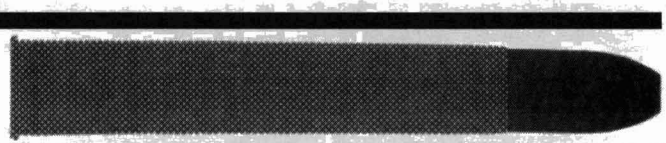
Bullet (grs.)	Powder/grs.		MV	ME	Source
290 Lead	3031	43	1625	1705	Lyman #412263
285 SP	FL		1785	1940	Factory load

10.5x47Rmm



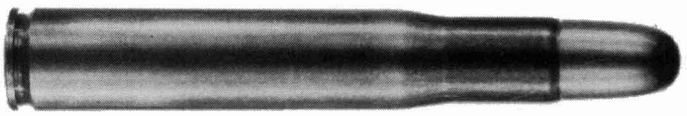
Historical Notes One of a series of obsolete blackpowder target cartridges of varying caliber based on a 47mm bottlenecked case that all date back to the 1880s and '90s differing only in caliber. Some of them originated with the Austrian gunsmith Stahl. Bullet weight varied according to caliber. The 10.5x47R used bullets of from 260 to 298 grains. Factory ballistics and handloading data not available.

10.75x65Rmm Collath



Historical Notes The largest of the Collath-developed cartridges, this one has a straight, rimmed case. It was loaded with a 205-grain softpoint bullet, but the author could find no specific data on the ballistics. The Collath cartridges are collector's items and rifles for them are uncommon. See the 9.3 Collath for additional information. Case dimensions are similar to the 405 Winchester.

10.75x73mm (404 Rimless Nitro Express, 404 Jeffery)



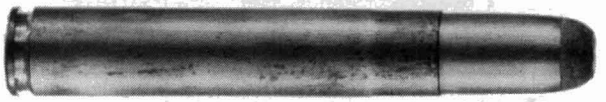
Historical Notes This is the metric designation for the 404 Jeffery or 404 Rimless Nitro Express. One of the most popular rounds used in Africa, the 404/10.75x73 is now back in production at RWS. The new RWS loads are assembled with Australian-made Woodleigh bullets with bonded cores and clad steel jackets. Ruger now offers the bolt-action M77 and the No.1 single shot in this caliber.

General Comments Overall length is the same as the popular 375 H&H Magnum so rifles with magnum length actions are suitable for this cartridge. Some say it is too powerful for North American game, but as Elmer Keith used to say, "too much gun always beats the alternative." Bullets for handloading are offered by Barnes and Woodleigh.

10.75x73mm (404 Rimless Nitro Express, 404 Jeffery) Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
347 SP	RL-15	80.0	2335	4200	RWS
400 SP	RL-15	75.5	2220	4379	RWS
400 SP-FMJ	FL		2315	4761	RWS factory load

10.75x57mm (Mannlicher)



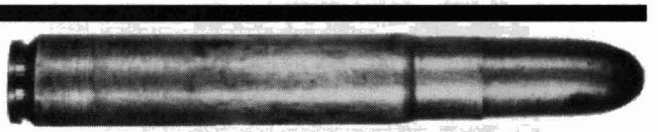
Historical Notes This obsolete, rimless cartridge is based on the 57mm case length. It dates back to around 1900 or possibly earlier. Ammunition was once made by G. Roth and RWS. It was chambered in sporting rifles based on the Model 88 German military bolt action and also in later Model 98 Mauser rifles. Some authorities say it originated as a Mannlicher cartridge.

General Comments The 10.75x57 has such a slight shoulder one has to look closely to realize is has one at all. The fact that it was not popular or widely used may have been due in part to headspace trouble such as that encountered with the wildcat 400 Whelen. The Whelen cartridge was made by necking-up 30-06 cases to take 405 Winchester bullets. It had a short life and never got much beyond the experimental stage. The 10.75x57 would be powerful enough for North American big game and most non-dangerous African game. Rifles for the cartridge are rare. Loading data is not available.

10.75x57mm (Mannlicher) Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
350 SP	FL	1950	2960	Factory load

10.75x63mm Mauser



Historical Notes Although generally referred to in literature as a Mauser cartridge, some authorities say this is a Mannlicher development. It was introduced about 1910 and has been obsolete for a number of years. It is not listed in post-WWII German or British catalogs. Except for length, it has practically the same dimensions as the longer 10.75x68. Most samples were made by RWS, but the old DWM case No. 515 (listed as the 10.75x62) is probably the same cartridge. There was also a 10.75x62 straight case, whereas the one listed here is necked. It was loaded with a 347- or 350-grain bullet at about 2100 fps, but exact ballistics are lacking. It would probably be a little more powerful than the 405 Winchester, but ballistics data are lacking.

10.75x68mm Mauser

Historical Notes The 10.75x68 was a Mauser development and is so listed in German ammunition catalogs. It was introduced in the early 1920s and is still listed in the current RWS catalog. Pre-WWII Mauser magnum-action Type A sporting rifles were chambered for this round and exported to the United States. Post-war Browning and Dumoulin bolt-action rifles were available for this caliber in Europe. Kynoch of England once made the 10.75x68 cartridge.

General Comments A popular big game cartridge with many African and Indian hunters. The 10.75x68 has been used on all kinds of dangerous game including elephant. However, professional ivory hunters did not consider it satisfactory for elephant. This was apparently due to the bullet design. The softpoint bullet couldn't be depended on to hold together and so did not always penetrate properly. In power it is below the British 404 Rimless Nitro Express and about on par with the 375 H&H Magnum. However, it is not considered as good a general purpose cartridge as the 375 H&H. There is no question of it being perfectly adequate for North American big game. Bullet diameter is .424-inch. Ammunition is available from Old Western Scrounger.

10.75x68mm Mauser Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
347 SP	IMR 3031	59	2250	3900	
347 SP	FL		2200	3740	Eley-Kynoch factory load
347 SP	FL		2230	3830	RWS factory load

11.2x60mm Schuler
11.2x60mm Mauser

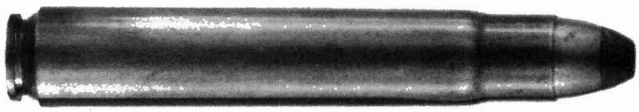
Historical Notes This cartridge is also listed as the 11.15x59.8 Schuler. It is nothing more than a rimless, smokeless powder version of the popular German 11mm Model 71 Mauser military round. The case has a rebated rim of smaller diameter than the body to fit the standard 98 Mauser bolt face. It appears to have been introduced right after the end of WWI, but may be older. Rifles for the 11.2x60 were exported to the U.S. in the early 1920s, but it was not popular here. It is obsolete and late German ammunition and gun catalogs do not list it.

General Comments The general popularity of the 11mm Mauser military round was responsible for development of the rimless version. The original cartridge could not be stepped up very much in performance because the Models 71 and 71/84 were blackpowder rifles. The rimless 11.2x60 could be fired in the stronger 98 action. Although it is a considerable improvement over the old blackpowder 11mm military round, it didn't catch on in Africa. Most hunters there considered the bullet design unreliable for maximum penetration and of poor sectional density. In power it is between the 405 Winchester and the 375 H&H Magnum. Bullet diameter is .440-inch.

11.2x60mm Schuler, 11.2x60 Mauser Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
332 SP	IMR 3031	60	2130	3360	
370 Lead	IMR 3031	45	1500	1855	Lyman #439186
332 SP	FL		2198	3575	Factory load

11.2x72mm Schuler
11.2x72mm Mauser



Historical Notes Rifles manufactured by H. Krieghoff of Suhl, Germany in this caliber were exported to the U.S. in the early 1920s. The cartridge appears to have been developed about that time, possibly between 1920-22. These Krieghoff-Schuler rifles were based on the Mauser Magnum action with a four-shot magazine. The case has a rebated rim smaller than the body diameter to fit the standard Mauser bolt face. The 11.2x72 was used only to a limited extent by American shooters. It is now obsolete and not listed in the German late catalogs.

General Comments The 11.2x72, often confused by gun writers with the shorter and less powerful 11.2x60, is a powerful round that equals the 458 Winchester Magnum or the 470 Nitro Express in terms of muzzle energy. One does not read much about its use in Africa, although it had a small but loyal following. For some reason the German designers never turned out the sturdy solid bullets demanded by the professional hunters where deep penetration was required. That was the main reason many fine German cartridges were not highly regarded for shooting heavy, thick-skinned African game. This cartridge is listed in the 1911 Alpha catalog.

11.2x72mm Schuler, 11.2x72mm Mauser Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
401 SP	IMR 4350	103	2360	4975	
401 SP	FL		2438	5300	Factory load

10.8x47Rmm Martini (Target)

Historical Notes An obsolete blackpowder cartridge for Martini-action, single shot target rifles. The 10.8x47 was loaded with a 386-grain paper patched bullet. Ballistics not known. There were a number of similar rounds used by target shooters during the period 1875 through the 1890s.

12.17x44Rmm Remington M67 (Norway & Sweden)

Historical Notes This is the centerfire version of the 12x42mm rimfire military cartridge. It was previously listed as a military cartridge, but was never adopted as such. It was used as sporting round in Norway and Sweden in Remington rolling block type rifles. It originated in 1867 and was loaded by Remington and also in Germany.

General Comments This is another large caliber blackpowder cartridge similar to the American 50-70. It would do for any North American big game. However, the cartridge is largely a collector's item and one is not apt to have these in shooting quantities. Bullet diameter is .502-inch.

12.17x44Rmm Remington M67 Loading Data and Factory Ballistics

Bullet (grs.)	Powder/grs.		MV	ME	Source
345 lead	Fg	76	1300	1298	Military load
360 lead	Fg	75	1290	1335	Lyman #509134
360 lead	IMR 4198	32	1340	1440	Lyman #509134
345 lead	FL		1300	1298	Factory load

12.5x70mm Schuler 500 Jeffery

Historical Notes This cartridge is the same as, and interchangeable with, the 500 Jeffery Rimless. Some authorities say it was an original Schuler development; others claim Jeffery introduced it. John Taylor says the ammunition was loaded only in Europe, and that would indicate Schuler originated it. Krieghoff-Schuler Magnum rifles chambered the round and were exported from the 1920s until WWII. The exact date of introduction is obscure.

General Comments Until introduction of the 460 Weatherby Magnum, this was the most powerful magazine rifle cartridge in existence. It was used very successfully in Africa on some game. For additional comment and information see the 500 Jeffery Rimless. Bullet diameter is .510-inch. Factory loads were made in both soft point and full metal jacket types. German FMJ bullets had weak jackets and did not perform well against heavy animals. In previous issues this cartridge was erroneously listed as the 12.7x70mm.

12.5x70mm (500 Jeffery) Schuler Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
535 SP	FL	2400	6800	Factory load

EUROPEAN SPORTING RIFLE CARTRIDGES

Current and Obsolete—Blackpowder and Smokeless

Dimensional Data

Cartridge	Case type	Bullet dia.	Neck dia.	Shoulder dia.	Base dia.	Rim dia.	Case length	Ctge. length	Berdan Primer dia.	RWS Primer no.	Old DWM case no.
5.6x33mm Rook	C/A	.222	.248	.318	.325	.326/.366	1.31	1.62/1.64	.177	1584	467/468
5.6x35Rmm Vierling (22 WCF)	A	.222	.241	.278	.300	.297	1.40	1.62	.177	1584	539
5.6x35Rmm (22 Hornet, see Chapter 2)											
5.6x50mm Magnum/ 5.6x50Rmm Mag.	C/A	.224	.254	.355	.375	.376/(?)	1 97	2.21	—	—	—
5.6x57mm RWS/ 5.6x57Rmm RWS	C/A	.224	.281	.436	.469	.470/(?)	2.24	2.54	—	—	—
5.6x61Rmm Vom Hofe	A	.227	.260	.470	.479	.533	2.39	3.13	.217	5603	431M
5.6x61mm Vom Hofe Sup. Exp.	C	.227	.259	.468	.476	.480	2.39	3.13	.217	5603	431P
5.6x52Rmm (22 Savage H.P.)	A	.228	.252	.360	.416	.500	2.05	2.51	.217	5603	545
6x29.5R Stahl	A	.243	.262	.301	.320	.370	1.16	1.44	.177	1584	—
6x57mm Mauser	C	.243	.284	.420	.475	.476	2.23	2.95	.217	5603	494
6x58Rmm Forster	A	.243	.284	.437	.471	.532	2.26	3.06	.217	5603	489A
6x58mm Forster	C	.243	.285	.437	.470	.468	2.26	3.08	.217	5603	489
244 (6mm) Halger Magnum	A	.243	.287	.435	.467	.519	2.25	3.04	.217	5603	—
6x62 Freres/6x62Rmm Freres	C/A	.243	.271	.451	.474	.470/(?)	2.42	3.13	.217	—	—
6.5x40Rmm	B	.250	.290	—	.396	.451	1.58	2.07	—	—	—
6.5x27Rmm	A	.257	.284	.348	.379	.428	1.06	1.54	.177	1584	476
6.5x52Rmm (25-35 WCF)	A	.257	.280	.355	.420	.500	2.04	2.53	.217	5603	519
6.3x53Rmm Finnish	A	.257	.286	.463	.486	.565	2.09	2.51	—	—	—
6.5x48Rmm Sauer	B	.260	.284	—	.433	.495	1.88	2.43	.217	5603	463A
6.5x54 Mannlicher-Schoenauer (6.5x54R)	C/A	.263	.287	.424	.447	.450/(?)	2.09	3.02	.217	5603	477
6.5x53.5mm Daudeteau	G	.263	.298	.466	.490	.524	2.09	3.02	—	—	475A
6.5x58R Sauer	B	.264	.291	—	.433	.501	2.30	3.08	.217	5603	463
6.5x54mm Mauser	C	.264	.289	.432	.468	.463	2.12	2.67	.217	5603	457A
6.5x58Rmm Krag-Jorgensen	A	.264	.300	.460	.500	.575	2.29	3.25	.217	5603	—
6.5x55mm Swedish	C	.264	.294	.420	.480	.480	2.28	3.22	.217	1680	431C
6.5x53Rmm Russian											
6.5x57mm Mauser/ 6.5x57R Mauser	C/A	.264	.292	.430	.471/.470	.474/.521	2.23/2.24	3.16/3.18	.217	5603	404A/(?)
6.5x58mm Mauser	C	.264	.293	.426	.468	.465	2.28	3.22	.217	5603	457
6.5x65mm RWS/ 6.5x65Rmm RWS	C/A	.264	.296	.430	.474/.475	.470/.531	2.56	3.15	—	—	—
6.5x58 Portuguese	C	.264	.293	.426	.465	.465	2.28	3.22	.217	5603	457
6.5x61mm Mauser/ 6.5x61R Mauser	C/A	.264	.297/.296	.452	.477	.479/.532	2.40	3.55	.217	5603	431L/431M
6.5x68mm Schuler/ 6.5x68Rmm Schuler	C/A	.265	.295	.481	.520	.510/(?)	2.66	3.27	.238	1698	—
7x33mm Finnish/Sako	C	.284	.307	.365	.388	.390	1.30	1.73	—	—	—
7x72Rmm	B	.284	.311	—	.425	.482	2.84	3.48	.217	5603	573
7x57mm/7x57R Mauser	C/A	.284	.320	.420	.470	.474/.521	2.23	3.06/3.07	.217	5603	380D/M93A
7x64mm Brenneke/ 7x65Rmm Brenneke	C/A	.284	.305/.308	.422	.463	.468/.521	2.51/2.53	3.21	.217	5603	557/557A
7x75Rmm Vom Hofe Sup. Exp.	A	.284	.318	.416	.468	.519	2.95	3.68	.217	—	—
7x66mm Vom Hofe Sup. Exp.	C	.284	.316	.485	.543	.510	2.58	3.25	.217	?	603
7x73mm Vom Hofe Belted	E	.284	.315	.483	.527	.533	2.87	3.88	.217	5603	575
30R Blaser	A	.308	.343	.441	.480	.531	2.68	3.80	—	—	—
7.62x39mm Soviet	C	.310	.340	.394	.443	.445	1.52	2.20	—	—	NA
8x48R Sauer	B	.316	.344	—	.432	.500	1.88	2.58	.254	1775	462A
8x51mm Mauser/ 8x51Rmm Mauser	C/A	.316	.344	.436	.467	.467/.515	1.98	2.67/2.68	.217	5603	366L/366L2
8.15x46Rmm	A	.316	.346	.378	.421	.484	1.82	2.28	.250	1794	455
8x42Rmm—M/88	A	.318	.347	.423	.468	.525	1.66	2.28	.217	5603	88D
8x57Rmm 360	A	.318	.333	.375	.427	.485	2.24	2.96	—	—	—
8x57mm Mauser	C	.318	.350	.435	.470	.473	2.24	3.17	—	—	—
8x71mm Peterlongo	C	.318	.349	.422	.462	.468	2.80	3.28	.216	2610	—
8x75mm/8x75Rmm	C/A	.318	.345	.411	.466	.467/.522	2.94	3.50/3.51	.217	5603	514A/514
8x58Rmm Sauer	B	.322	.345	—	.438	.499	2.28	3.00	.254	1775	462
8x56mm Mannlicher-Schoenauer	C	.323	.347	.424	.465	.470	2.21	3.04	.217	5603	528
8x54mm Krag-Jorgensen	C	.323	.351	.435	.478	.478	2.12	2.85	.199	1680	—
8.2x53Rmm Finnish											

EUROPEAN SPORTING RIFLE CARTRIDGES

(Continued)

Cartridge	Case type	Bullet dia.	Neck dia.	Shoulder dia.	Base dia.	Rim dia.	Case length	Ctge. length	Berdan Primer dia.	RWS Primer no.	Old DWM case no.
8x57JSmm/ 8x57JRSmm Mauser	C/A	.323	.350	.435	.470	.473/.526	2.24/2.25	3.17/3.55	—/.217	—/5603	—/366D1
8x60RS Magnum (also 8x60JR)	A	.323	.345	.432	.466	.524	2.36	3.20	.217	5603	542A
8x60S Mauser & 8x60S Magnum*	C	.323	.350	.431	.470	.468	2.34	3.11	.217	5603	542
8x64S Brenneke	C/A	.323	.348	.424/.421	.468/.464	.469/.520	2.51/2.56	3.32/3.65	.217	5603	558/558A
8x68Smm Magnum	C	.323	.354	.473	.522	.510	2.65	3.38	.238	1698	—
8x72Rmm Sauer	B	.324	.344	—	.429	.483	2.84	3.40	.254	1775	574
9x71mm Peterlongo	C	.350	.386	.420	.464	.466	2.80	3.26	.216	2610	783
9x56mm Mannlicher	C	.356	.378	.408	.464	.464	2.22	3.56	.217	5603	491E
9x57mm Mauser/ 9x57Rmm Mauser	C/A	.356	.380	.428/.424	.467	.468/.515	2.21	3.10/3.08	.217	5603	491A/491B
9x70Rmm Mauser	A	.357	.385	.418	.467	.525	2.76	3.37	—	—	474B
9x63mm	C	.357	.384	.427	.467	.468	2.48	3.28	.217	5603	491D
9.3x72Rmm Sauer	A	.365	.390	.422	.473	.518	2.83	3.34	.254	1775	—
9.3x80Rmm	B	.365	.386	—	.430	.485	3.14	3.50	.254	1775	77B
9.3x82Rmm	B	.365	.386	—	.430	.485	3.21	3.72	.254	1775	77C
9.3x53mm Swiss	C/A	.365	.389/.391	.453/.455	.492/.494	.491/.563	2.11	2.80/2.83	—	—	—
9.3x57mm Mauser	C	.365	.389	.428	.468	.469	2.24	3.23	.217	5603	491
9.3x74Rmm	A	.365	.387	.414	.465	.524	2.93	3.74	.217	5603	474A
9.3x62mm Mauser	C	.365	.388	.447	.473	.470	2.42	3.29	.217	5603	474
9.3x64mm Brenneke	C	.365	.391	.475	.504	.492	2.52	3.43	.217	5603	—
9.3x53Rmm Finnish											
9.3x65Rmm Collath	A	.367	.384	.420	.443	.508	2.56	3.01	—	—	—
9.3x53Rmm Hebler	A	.369	.398	.462	.484	.550	2.12	2.92	—	—	—
9.1x40Rmm	B	.374	.385	—	.404	.446	1.60	2.00	—	—	91
9.5x47Rmm	A	.375	.409	.497	.513	.583	1.85	2.37	.254	1775	23
9.5x57mm Mannlicher (9.5x56)	C	.375	.400	.460	.471	.473	2.25	2.94	.217	5603	531
9.5x73mm Miller-Greiss Magnum	C	.375	.402	.531	.543	.541	2.86	3.50	.217	5603	473
9.3x48Rmm	B	.376	.382	—	.433	.492	1.89	2.35	.254	1775	246
9.3x57Rmm	B	.376	.389	—	.428	.486	2.24	2.80	.254	1775	77E
9.3x70Rmm	B	.376	.387	—	.427	.482	2.75	3.45	.254	1775	77F
9.3x72Rmm	B	.376	.385	—	.427	.482	2.84	3.27	.254	1775	77D
10.25x69Rmm Hunting-Express	A	.404	.415	.480	.549	.630	2.72	3.17	.254	1775	214
10.3x60Rmm Swiss	A	.415	.440	.498	.547	.619	2.36	3.08	—	—	—
10.5x47Rmm	A	.419	.445	.496	.513	.591	1.85	2.40	.254	1775	29
10.75x73mm (404 Jeffery)	C	.421	.450	.520	.544	.537	2.86	3.53	.217	—	555
10.3x65Rmm Baenziger	B	.423	.431	—	.462	.505	2.56	3.15	—	—	164
10.75x65Rmm Collath	B	.424	.451	—	.487	.542	2.56	3.02	—	—	—
10.75x57mm Mannlicher	C	.424	.448	.465	.468	.468	2.24	3.05	—	—	—
10.75x63mm Mauser	I	.424	.447	.479	.493	.467	2.47	3.22	—	—	515 ?
10.75x68mm Mauser	C	.424	.445	.470	.492	.488	2.67	3.16	.217	5603	515A
11.2x60mm Schuler (Mauser)	I	.440	.465	.512	.512	.465	2.35	2.86	.217	5601	—
11.2x72mm Schuler (Mauser)	I	.440	.465	.510	.536	.469	2.80	3.85	.217	5601	—
10.8x47Rmm Martini Target	A	.441	.463	.512	.516	.591	1.75	2.23	.254	1775	146
12.17x44R Remington M67	B	.502	.544	—	.546	.624	1.73	2.13	?	?	?
12.50x70mm Schuler (500 Jeffery)	I	.510	.535	.615	.620	.578	2.94	3.50	.254	2703	—

A—Rimmed, bottlenecked B—Rimmed, straight C—Rimless, bottlenecked
E—Belted, bottlenecked G—Semi-rimmed, bottlenecked I—Rebated, rimless
*The 8x60, 8x64 Brenneke (and the rimmed versions) not listed above, are dimensionally the same as the 8x60S, etc., shown, except for bullet diameter of .318".
Unless otherwise noted, all dimensions are in inches.

Ballistics of RWS Sporting Ammunition*

Symbol	Cartridge	Bullet Type	Bullet Weight grains	Max. permissible breech pressure lbs./sq.in.	Barrel length inch.	Velocity ft./sec. Muzzle	Velocity 100 yds.	Velocity 200 yds.	Velocity 300 yds.	Energy ft. lbs. Muzzle	Energy 100 yds.	Energy 200 yds.	Energy 300 yds.	Time of flight sec. 100 yds.	Time of flight 200 yds.	Time of flight 300 yds.	Path of bullet above (+) or below (—) line of sight in inches — iron sights based on a sight height of 0.8" above line of bore: 50 yds.	75 yds.	100 yds.	150 yds.	200 yds.	300 yds.	Path of bullet above (+) or below (—) line of sight in inches — telescopic sights based on a sight height of 2" above line of bore: 50 yds.	75 yds.	100 yds.	150 yds.	200 yds.	300 yds.
126	6,5x54 M.-Sch.	H-Mantle Open Hollow Point	159	45 530	17,5	2370	2090	1880	1680	1915	1545	1250	995	.136	.288	.455	+ 0.6 + 1.4 + 2.3 + 4.6	+ 0.5 + 1.8 + 3.1 + 6.6	⊕ + 1.7 + 3.5 + 8.2	— 2.6 ● + 2.7 + 9.7	— 7.1 — 3.6 ⊕ + 9.3	—24.5 —19.3 —14.0 ⊕	0 + 0.6 + 1.4 + 3.7	+ 0.2 + 1.2 + 2.4 + 5.7	⊕ + 1.3 + 2.9 + 7.4	— 2.0 ● + 2.3 + 9.1	— 5.9 — 3.2 ⊕ + 8.9	—22.2 —18.2 —13.5 ⊕
137	6,5x68	Hollow Point Spitzer	123	54 100	27,5	3450	2990	2600	2230	3255	2455	1860	1395	.094	.201	.324	0 + 0.4 + 0.8 + 1.9	+ 0.2 + 0.6 + 1.3 + 3.0	⊕ + 0.7 + 1.5 + 3.9	—1.0 ⊕ + 1.3 + 4.8	— 3.1 — 1.8 ● + 4.7	—11.6 — 9.6 — 7.0 ⊕	— 0.6 — 0.5 — 0.1 + 0.9	— 0.2 0 + 0.6 + 2.2	⊕ + 0.3 + 0.9 + 3.1	— 0.4 ⊕ + 1.0 + 4.3	— 1.9 — 1.4 ● + 4.3	— 9.3 — 8.5 — 6.4 ⊕
205 205 R	7x57 7x57 R	D-Mantle	154	46 250 42 700	23,5 27,0	2640	2310	2010	1750	2390	1820	1390	1060	.121	.260	.419	+ 0.1 + 0.7 + 1.6 + 3.6	+ 0.2 + 1.2 + 2.4 + 5.4	⊕ + 1.3 + 3.0 + 7.0	— 2.0 ● + 2.6 + 8.5	— 6.1 — 3.4 ⊕ + 7.9	—20.9 —16.9 —11.8 ⊕	— 0.5 0 + 0.7 + 2.6	— 0.1 + 0.6 + 1.7 + 4.6	⊕ + 0.9 + 2.4 + 6.2	— 1.4 ● + 2.2 + 7.9	— 4.8 — 3.1 ● — 7.5	—18.5 —15.8 —11.2 ⊕
116 117 R	7x64 7x65 R	H-Mantle Copper Hollow Point	173	51 220 46 980	23,5 27,0	2780	2590	2420	2250	2965	2565	2235	1945	.112	.232	.360	+ 0.1 + 0.6 + 1.2 + 2.6	+ 0.2 + 0.9 + 1.8 + 3.9	⊕ + 0.9 + 2.2 + 5.0	— 1.5 ● + 1.8 + 6.0	— 4.3 — 2.4 ● + 5.6	—14.9 —12.0 — 8.4 ⊕	— 0.5 — 0.2 + 0.3 + 1.6	+ 0.1 + 0.3 + 1.1 + 3.0	⊕ + 0.6 + 1.6 + 4.2	— 0.8 ⊕ + 1.5 + 5.4	— 3.1 — 2.0 ● + 5.2	—12.5 —10.8 — 7.8 ⊕
30	8x56 M.-Sch.	Soft Point Round Nose Sharp Shoulder	202	35 570	19,5	2170	1890	1660	1470	2105	1595	1235	955	.148	.319	.512	+ 0.6 + 1.6 + 2.8 + 5.8	+ 0.6 + 2.0 + 3.9 + 8.3	● + 1.9 + 4.4 +10.3	— 2.8 ● + 3.7 +12.6	— 8.8 — 5.0 ⊕ +11.9	—30.9 —25.4 —17.7 ⊕	0 + 0.8 + 1.9 + 4.8	+ 0.2 + 1.4 + 3.1 + 7.4	⊕ + 1.5 + 3.8 + 9.5	— 2.3 ● + 3.5 +12.1	— 7.6 — 4.5 ⊕ +11.4	—28.6 —24.1 —17.1 ⊕
151	8x57 JS	H-Mantle Copper Hollow Point	187	46 960	23,5	2690	2450	2245	2055	3000	2495	2085	1755	.117	.245	.384	+ 0.3 + 0.9 + 1.5 + 3.1	+ 0.3 + 1.1 + 2.1 + 4.5	⊕ + 1.1 + 2.5 + 5.7	— 1.7 ● + 2.0 + 6.9	— 5.0 — 2.6 ● +16.1	—17.0 —13.5 — 9.5 ⊕	— 0.3 + 0.1 + 0.6 + 2.1	0 + 0.5 + 1.4 + 3.6	⊕ + 0.7 + 1.9 + 4.9	— 1.1 ⊕ + 1.7 + 6.1	— 3.8 — 2.2 ● + 5.9	—14.6 —12.3 — 8.9 ⊕
148	8x68 S	H-Mantle Copper Hollow Point	187	54 100	27,5	3280	2940	2660	2430	4460	3590	2930	2430	.097	.204	.322	+ 0.1 + 0.5 + 0.9 + 2.0	+ 0.1 + 0.6 + 1.3 + 3.0	⊕ + 0.6 + 1.5 + 3.7	— 0.9 ⊕ + 1.3 + 4.7	— 3.0 — 1.7 ● + 4.5	—11.3 — 9.3 — 6.7 ⊕	— 0.5 — 0.4 0 + 1.0	— 0.2 0 + 0.5 + 2.0	⊕ + 0.2 + 0.9 + 3.0	— 0.4 ⊕ + 1.0 + 4.1	— 1.9 — 1.3 ● + 4.1	— 8.9 — 8.2 — 6.1 ⊕
61	9,3x62	Soft Point Round Nose Sharp Shoulder Solid Jacket	285	41 250	27,0	2330	2040	1800	1600	3435	2645	2055	1650	.138	.295	.471	+ 0.5 + 1.2 + 2.3 + 4.2	+ 0.4 + 1.5 + 3.1 + 6.7	⊕ + 1.5 + 3.6 + 8.5	— 2.2 ● + 3.2 +10.5	— 7.1 — 4.2 ⊕ + 9.8	—25.3 —21.0 —14.6 ⊕	— 0.1 + 0.4 + 1.4 + 3.7	+ 0.1 + 0.9 + 2.3 + 5.8	⊕ + 1.1 + 3.0 + 7.6	— 1.6 ● + 2.9 + 9.9	— 5.9 — 3.8 ⊕ + 9.3	—23.0 —19.8 —14.0 ⊕
84	10,75x68	Soft Point Round Nose Sharp Shoulder Solid Jacket	347	41 250	27,5	2260	1910	1640	1440	3930	2800	2075	1620	.145	.316	511	+ 0.4 + 1.5 + 2.7 + 5.7	+ 0.5 + 2.0 + 3.8 + 8.4	● + 2.1 + 4.4 +11.0	— 3.1 ● + 3.5 +12.8	— 8.9 — 4.7 ⊕ +12.3	—32.0 —25.5 —18.4 ⊕	— 0.2 + 0.7 + 1.8 + 4.8	+ 0.2 + 1.5 + 3.1 + 7.5	⊕ + 1.7 + 3.9 + 9.8	— 2.6 ● + 3.2 +12.2	— 7.7 — 4.3 ⊕ +11.9	—29.4 —24.3 —17.8 ⊕

When the rifle is zeroed at a certain distance, the MID-RANGE TRAJECTORY is found in the column of the half-range.

⊕ Indicates distances at which gun is sighted in.

● Most recommended distance.

*A free 75-page ballistics catalog is available from RWS. Write to Dynamit Nabel, 105, Stonehurst Ct., Northvale, NJ 07647. All RWS ammo is non-corrosive and fully (Boxer primed) reloadable.

Chapter 10

AMERICAN RIMFIRE CARTRIDGES

(Current and Obsolete)

THE RIMFIRE CARTRIDGE differs from the centerfire in that the priming compound is contained in the rim. Ignition occurs when the firing pin crushes the rim. Rimfire cartridges are of historical as well as practical interest. Although only one of a number of ignition systems leading to the modern centerfire, the rimfire was the first truely successful system and is still alive and well, almost 150 years later. The common 22 rimfires had their origin with the Flobert BB Cap in 1845, which lead to the Smith & Wesson-developed 22 Short of 1857. The idea of rimfire ignition goes back to Roberts' French patent of 1831. This provided for the priming compound covering the entire head interior; the rimfire evolved by leaving the primer mix out of the center. After Smith & Wesson's First Model revolver in 22 Short caliber was introduced in 1857, development of rimfire arms and cartridges bloomed. The New Haven Arms Co. began manufacturing 44 Henry ammuntion in 1861, and 56-56 Spencer ammunition was made in quantity beginning about 1862, although the Spencer rifle design dates back to 1860. Both of these cartridges were used by Federal troops in the Civil War. The first successful metallic cartridge repeating arms were chambered for rimfire cartridges. By the end of the Civil War there were numerous rimfire calibers available.

A a great many rimfire cartridges have been developed for rifles and handguns here and in Europe. In the late 1800s something like 75 different rimfire cartridges had been loaded by American companies, but only about 42 were still around by 1900. The decline in the number of rimfire cartridges was due to the fact that many early ones were experimental and so had a very short life. These are of academic interest primarily to collectors. Space limitations rule out any effort to list all of them here. The criteria for their inclusion is that they were loaded by American companies and survived to the turn of the century. The more obscure numbers and those of British or Continental origin have been covered fairly well elsewhere. The more popular rimfires lasted well past the turn of the century and a few are still in use. The 22 Short rimfire is, in fact, the oldest American cartridge, having survived since 1857. It will probably still be around as long we own and shoot firearms. The decline in the number of rimfire cartridge types can be illustrated by a review of old catalogs. The 42 that existed in 1900 had been reduced to 32 by 1918. By the 1930s, the number was down to a mere 17. After World War II, the count was less than 10. At the present all rimfires listed in American ammunition catalogs are 22-caliber. Some older rimfires are still loaded in Europe and from time to time these are imported. Many of the cartridges listed here were available on an over-the-counter basis up through the 1920s. One or two of the obsolete rimfires would probably be useful to modern shooters, but it is unlikely ammuntion manufacturers will revive them. While many shooters would welcome a return of the 25 Stevens Long; this will never happen.

Rimfire cartridges have certain advantages as well as weaknesses when compared to centerfire. In smaller calibers the rimfire is cheaper to manufacture and within equivalent pressures just as good as the centerfire. One important disadvantage of the rimfire is that it isn't practical to reload. This was a big consideration with early buffalo hunters and pioneers of the Old West. It was also no small consideration among match shooters who developed top accuracy by loading their own. The rimfire will not stand up under the pressures of modern high-velocity centerfire loads. Solid head centerfires can be made much stronger. Large caliber rimfire cartridges cost nearly as much as similar centerfire rounds, so there is an economic point beyond which the rimfire just isn't worthwhile.

If any statements made before this give the impression the rimfire cartridge is about to become extinct, I'm sorry—nothing could be further from the truth. As late as 1959 Winchester introduced a new little number called the 22 Winchester Magnum Rimfire. This cartridge develops a higher muzzle velocity from a 6½-inch pistol barrel than previous rimfire loads fired from

a rifle! In fact, it outperforms many of the older 22 centerfires.

The 22 Long Rifle has become the most accurate and highly developed sporting cartridge in existence. Its popularity for match shooting and small game or varmint hunting remains undiminished—and is increasing if anything. There are dozens of makes, models and types of 22 rimfire arms currently manufactured and new models appear in a steady stream. The 22 Long Rifle has established a place so secure it will be with us as long as guns are made. Those designs that died out just didn't fill any particular need.

Modern rimfire cartridges are intended for target, plinking or small game hunting. The 22 Long Rifle does very well out to 75 yards on rabbit-sized animals and on coyote or fox with a well placed bullet. The 22 WMR will extend this range to 125 yards. The 22 Short is a good plinking round and is used in Olympic pistol competition. The high-velocity Long Rifle is a useful self-defense round. It will penetrate better than the 32 Smith & Wesson when fired from a handgun. The 22 WMR develops handgun energies nearly equal to the 38 Special.

It would surprise many to know how many deer are killed each year by poachers using the 22 Long Rifle. However, it is not to be considered a deer cartridge. There is reportedly a case of an elephant having been killed with a 22 Long Rifle, but that hardly qualifies it as an elephant cartridge either. Within their capabilities and limitations, modern rimfire cartridges are among the most useful we have.

5mm Remington Rimfire Magnum

Historical Notes The 5mm Remington Rimfire Magnum was announced in 1969, but not actually introduced until 1970. Only the Remington bolt-action Model 591 clip-loading and Model 592 tubular magazine repeating rifles were available for the round. It was not adopted by other ammunition manufacturers and is no longer loaded by Remington. For a time Thompson/Center furnished barrels for the Contender pistol in 5mm Remington. This is the only modern necked rimfire case; however, a number of the obsolete blackpowder rimfires were necked so it is not an entirely new development. Bullet diameter is .2045-inch with a weight of 38 grains and a muzzle velocity of 2100 fps. This is the highest velocity of any rimfire manufactured to date.

General Comments The 5mm Remington represented an interesting development that exceeds the performance of some of the early 22 centerfires. Its effective killing range on small varmint-type animals is only 25-50 yards greater than the 22 Winchester Magnum Rimfire. This is due to the better sectional density of the smaller diameter bullet combined with 150 fps higher initial velocity. Both are essentially varmint cartridges. With the hollowpoint-type bullet they ruin too much edible meat for small game shooting. However, the 22 WMR is available with a non-expanding full-jacketed bullet, or one could switch to the interchangeable 22 WRF for small game hunting. In summary, the 5mm Remington has the edge for varmint shooting, but the 22 WMR is more versatile where small game is a consideration. On the other hand, a good FMJ small game bullet for the 5mm Remington might have changed that analysis. The choice would be largely a matter of use and personal preference. Remington has long since discontinued the Model 591 and 592, and no rifles are currently made in 5mm RFM. Ammunition is no longer made by Remington. The 5mm RFM is another good idea that didn't catch on, although it had a lot to recommend it.

22 BB Cap

Historical Notes The rimfire 22 BB Cap, or Bulleted Breech Cap, is one of the oldest successful, self-contained cartridges. It originated in 1845 for the Flobert indoor target rifle. These guns were also known as saloon (salon) or parlor rifles and were quite popular through the turn of the century. A great many individuals and companies have made both rifles and pistols for the 22 BB Cap. This type of social, indoor shooting has become virtually extinct. American companies loaded the 22 BB Cap up to World War II, but discontinued it after the War. The original cartridge had only a priming charge and a 22-caliber lead round ball, but American ammunition contained a small charge of powder and a conical bullet in many makes. The original case was a tapered percussion cap without a well-defined rim. RWS (in Germany) is the only firm who loads the 22 BB Cap at the present time.

General Comments Many insist the 22 BB Cap is completely worthless, but this author does not agree. Rainy afternoons of target practice in the basement or garage will create a certain appreciation for this little pipsqueak. They are also handy for a preliminary sighting-in of 22 rimfire rifles or pistols. Modern loads have sufficient power to kill rats, mice, sparrows or other pests out to 40 yards or so. At close range, RWS BB Caps will penetrate an inch of soft pine. They could seriously injure or even kill a human being, so one should be careful with them. They are not toys. There is considerable variation in case length and dimensions between different makes. The CCI "Mini-Cap" loaded in 22 Short and Long Rifle cases duplicates performance of the older 22 BB and CB cap for indoor target practice.

22 CB Cap

Historical Notes The 22 CB Cap, or Conical Bullet Cap, is something of a cross between the 22 BB Cap and 22 Short. It has been manufactured in various sizes. In original form it was supposed to combine the 29-grain 22 Short bullet with the 22 BB Cap case and a light charge of blackpowder. In actual manufacture, some CB Cap cases have a length about halfway between the BB Cap and Short. It is not a transitional design leading to the 22 Short, but rather a more powerful version of the BB Cap. Earliest catalog reference appears to be about 1888, although it probably originated prior to this. American companies loaded it up to 1942, but it has been discontinued since the end of WWII. German RWS CB caps are the only brand presently available.

General Comments The 22 CB Cap managed to combine about all the disadvantages of the 22 BB Cap and Short into one generally useless cartridge. It was no more accurate than either of the other two and made enough noise to nullify the indoor virtues of the BB Cap. It also required almost as heavy a backstop as the Short and was just as dangerous indoors. In killing power it wasn't enough better than the BB Cap to make any real difference, although it might provide an additional 10 or 15 yards effective range. In recognition of this, almost everyone quit making it with few laments from the shooting public. The original charge was 1½ grains of blackpowder, but after 1920 smokelsss powder was used exclusively. CCI in Lewiston, Idaho, currently loads the 29-grain CB Cap bullet in the 22 Short and Long Rifle case at velocities of 727 to 830 fps. Remington offers their CBee which is a low-velocity round based on the 22 Short and Long case with a 30-grain bullet at a muzzle velocity of 700 fps. These loads are intended for indoor target practice, gallery or pest shooting.

22 Short

Historical Notes The 22 Short is the oldest American, commercial, self-contained, metallic cartridge. It has been in continuous production for over 136 years! It was introduced in 1857 for the Smith & Wesson First Model revolver and is still widely used all over the world. Although now popular as a short-range gallery or plinking round, the 22 Short was originally intended for self-defense. It is still used for Olympic match shooting and heavy target pistols are built specifically for it. Initial loading was a 29-grain bullet and 4 grains of fine blackpowder. After 1887 it was available with semi-smokeless powder and within a short time, smokeless powder. Remington introduced noncorrosive (Kleanbore) priming for their rimfire line in 1927 and the first high-velocity type in 1930. The 22 Short can be fired in any arm chambered for the Long Rifle, but most semi-auto guns won't function properly with the 22 Short. Since the end of WWII a number of small 22 Short pocket automatic pistols and revolvers have appeared on the market.

General Comments In high-velocity loading the Short is quite adequate for small game or bird hunting. However, killing power declines rapidly beyond 50 yards. Hunting should be confined to animals not over 2 pounds in weight. The 22 Short can be deceiving because it looks small and relatively harmless. When fired from a rifle it can penetrate 2 inches of soft pine and has an extreme range of almost 1 mile. It can seriously wound or kill a person right up to the limit of its range. Be careful! Make sure of your backstop before shooting any 22 rimfire. The hollowpoint bullet weighs 27 grains and has about 25 fps higher velocity than the solid anc is a particularly effective squirrel load. CCI is the only remaining manufacturer of the hollow point load. Although sales today are vastly overshadowed by the less expensive 22 Long Rifle, so many 22 Short cartridges were produced during this cartridge's first century of production that its total sales record is still decades from being eclipsed.

22 Long

Historical Notes The 22 Long is usually referred to as a combination of the Long Rifle case and the Short bullet. This isn't true because the 22 Long happens to be 16 years older than the Long Rifle. It is listed in the 1871 Great Western Gun Works catalog for the seven-shot Standard revolver. A few years later it was also listed in Remington and Stevens catalogs as a rifle caliber. The 22 Long Rifle wasn't on the market until 1887. The Long was originally a blackpowder number loaded with a 29-grain bullet and 5 grains of powder. Smokeless powder was available for a time in standard and high-velocity loads. At present only the high-velocity load is available. A shot load was also offered.

General Comments The original blackpowder loading of the 22 Long had a slightly higher velocity than the 22 Short or Long Rifle, but this was not true of later smokeless loads. The present high-velocity Long has a velocity between the Short and Long Rifle. The 22 Long is not as accurate as the Short or Long Rifle and has outlived any useful purpose it might have once had. I think the reason it hangs on is because a great many people still think it has a higher velocity and greater killing power than the Long Rifle. Old ideas, true or not, are difficult to change because people will not readily accept concepts in opposition to what they believe. In any event, the 22 Long is strictly a small game, short-range cartridge just a notch above the 22 Short. Only Remington and CCI still offer the 22 Long.

22 Long Rifle

Historical Notes Information available indicates the 22 Long Rifle was developed by the J. Stevens Arms & Tool Company in 1887. It is the 22 Long case with a 5-grain blackpowder charge and a 40-grain bullet instead of the original 29-grain. The Peters Cartridge Co. is supposed to have first manufactured it especially for Stevens. If this is true, then why does the 1888 Stevens catalog refer to a UMC 22 caliber Long rimfire rifle cartridge? This would be a gross ingratitude at best. This 1888 catalog lists their No. 1, 2, 9 and 10 model break-open rifles as available in the new caliber with increased rifling twist. The New Model Pocket or Bicycle rifle also chambered it. The 1888 Marlin-Ballard catalog recommends the new 22 Long "Rifle" cartridge for their No. 3 Gallery rifle as being more accurate than the common 22 Long or Extra Long.

At one time the 22 Long Rifle was available in black, semi-smokeless and smokeless powder loads. Remington introduced the first high-velocity type in 1930. Both the 40-grain solid and a 35-38-grain hollowpoint bullet have been available for many years. The original case was not crimped, a feature that did not appear until 1900. Space does not permit a discussion of the different loads and types of 22 Long Rifle cartridges or the rifles and handguns that chamber it. Suffice to say, it is the most accurate and highly developed of any rimfire cartridge ever.

General Comments The 22 Long Rifle is the most popular match cartridge in existence, and also the most widely used small game and varmint caliber. The high-velocity hollowpoint is the best field load and will do a good job on rabbit-sized animals out to 75 yards. Beyond that it is unreliable. The Long Rifle is a great favorite of poachers for killing game out of season with close-up head shots. The low report does not alarm or alert local game wardens. At close range, the high velocity load with the solid lead bullet will penetrate 6 inches of soft pine and has a maximum range of nearly two miles. Maximum range is achieved at the relatively low angle of between 25-30 degrees, so one must be very careful. Humans shot with the 22 Long Rifle often show little immediate distress, survive without complications for several days, then die very suddenly. This is mentioned because many individuals regard 22 rimfires as playthings, not powerful enough to be dangerous. Careless shooting with the 22 rimfire has probably led to the closure of more areas to hunting and caused more trouble than any other caliber. Use your head and be careful! There is also a 22 Long Rifle shot cartridge, loaded by most companies and useful mostly for rat or snake control.

22 Stinger, Spitfire, Viper, Yellow Jacket, Super-Max, Xpediter, Etc.

Historical Notes The 22 Stinger was the first of a series of developments aimed at improving the performance of the 22 Long Rifle. Introduced by CCI early in 1977, the concept was an immediate success and was quickly copied by Winchester with their Xpediter, by Remington with their Yellow Jacket and by Federal with their Spitfire. All of these cartridges are much the same and are based on reducing the weight of the hollowpoint bullet from 36 to around 30 grains and loading this into a case full of relatively slow burning powder. The result is a 30 percent increase in muzzle velocity and 25 percent increase in muzzle energy as compared to the standard 22 Long Rifle hollowpoint high-velocity loading. The overall loaded length of these rounds is the same as the regular 22 Long Rifle and so are all other dimensions except the case length. Some use a standard lenght 22 Long Rifle case and settle for a somewhat lower muzzle velocity and some use a longer length case to achieve maximum velocity. As a group, these are referred to as hyper-velocity 22s. Only Stinger, Yellow Jacket, and Viper are still in production.

General Comments The author has fired all of the increased velocity 22 Long Rifle cartridges, available at the time, in both rifles and handguns and at the same time compared the performance with the standard line of 22 rimfires as well as the 22 WMR. When fired into parafin blocks and soap bars, the hypervelocity hollowpoints demonstrate superior expansion and energy transfer as compared to the regular high-velocity hollowpoints.

Malfunctions can occur when firing the hypervelocity Long Rifles in auto pistols, and I don't think they are well suited to this type of handgun. However, they work fine in revolvers.

Field-testing does not demonstrate any great advantage of one over the other in shooting jackrabbits nor any great superiority over the 22 WMR or over the standard Long Rifle high-velocity hollowpoint. The hypervelocity cartridges do inflict greater tissue damage than the 22 LRHP. However, dead is dead and you can't accomplish anything beyond that.

These cartridges do provide increased velocity and energy for 22 rimfire rifles. They probably extend the effective range on varmints or small game by a few yards. These cartridges cost some 65 percent more than regular 22 Long Rifle HVHP, which is a negative factor. They certainly have a place in the 22 rimfire lineup, but their increased performance is most pronounced when they are fired from a rifle rather than a handgun. In some instances, particularly in short-barreled pistols and revolvers or any revolver with a large barrel-cylinder gap, these loads can generate much less energy than standard 22 Long Rifle high-velocity loads. The bullets actually exit the muzzle slower.

22 Hyper-Velocities Factory Ballistics

Bullet (grs.)	Powder/grs.	MV	ME	Source
29	FL, Win.	1680	182	Xpediter (obsolete)
32	FL, CCI	1640	191	Stinger
33	FL, Fed.	1500	164	Spitfire (obsolete)
33	FL, Rem.	1500	164	Yellowjacket
34	FL, Win.	1500	169	Super-Max. (obsolete)
36	FL, Fed.	1410	158	Spitfire (obsolete)
36	FL, Rem.	1410	158	Viper
36	FL, CCI	1425	162	CCI, HP+V

22 Extra Long

Historical Notes Introduced about 1880, it was used in Ballard, Remington, Stevens, Wesson and late (1916) versions of the 1902 and 1904 Winchester bolt-action 58 rifles, as well as S&W revolvers. It was listed in ammunition catalogs as late as 1935. It used the same 40-grain, outside-lubricated bullet that was later adapted to the 22 Long Rifle, but the longer case held more (6 grains) blackpowder. It was more powerful than the Long Rifle but not noted for great accuracy. Smokeless powder loads had nearly the same velocity as the modern Long Rifle loadings.

General Comments The 22 Extra Long will not chamber in arms made for the Long Rifle, but since the only dimensional difference is case length, the Short, Long or Long Rifle can be fired in the Extra Long chamber. In terms of killing power, the Extra Long is in the same class as the standard velocity Long Rifle. At one time the 22 Extra Long was advertised as a 200-yard target cartridge, but it certainly would not qualify for this by today's standards. The length of the case and overall length of the loaded cartridge made the Extra Long unsuitable to most repeating actions which is another reason it became obsolete. Never fire any high-velocity or hyper-velocity 22 cartridge in any bloackpowder gun.

22 Winchester Rimfire (WRF)

Historical Notes Introduced for the Winchester Model 1890 pump or slide-action rifle, the original Winchester loading had a flat-nosed bullet, while Remington used a round nosed type and called it the 22 Remington Special. The two are identical and interchangeable. Bullet can be either a 45-grain solid or 40-grain hollowpoint in standard or high-velocity loading. This cartridge uses a flat base, inside-lubricated bullet rather than the "heel" type of outside-lubricated bullet of the Short, Long, Long Rifle and Extra Long. The 22 WRF was chambered in various Remington, Stevens and Winchester single shot and repeating rifles and Colt revolvers. It is no longer loaded by the ammunition manufacturers, and no one makes rifles for it. However, in late 1986 Winchester made a special run of 22 WRF ammunition. This must have been aimed more at collectors than shooters.

General Comments The 22 WRF was the first notable improvement in the killing power of the various 22 rimfires. It is not as accurate as the Long Rifle, but in field use this is of no consequence. Out to 75 yards it will kill small animals more reliably than the Long Rifle. Although there is little difference in bullet diameter between the WRF and the standard 22 rimfires, the WRF has a larger case diameter to accept the full diameter bullet. It is much too large to fit the standard 22 Long Rifle chamber. The 22 Short or Long Rifle fits the WRF chamber quite loosely and will not fire or extract in many guns. When they do fire, the case often splits which allows particles to escape the action with possible danger to the shooter and bystanders, and accuracy is extremely poor. The 22 WRF can be safely fired in any gun chambered for the 22 Winchester Magnum Rimfire. Winchester produced one batch of these cartridges in 1995.

22 Winchester Magnum Rimfire (WMR)

Historical Notes The 22 Magnum Rimfire was introduced in 1959 by Winchester, but they didn't market a gun to shoot it until well into the following year. However, Ruger and Smith & Wesson advertised revolvers for the new round before the end of 1959 and Savage chambered their Model 24, a 22-410 over/under combination gun, for the Magnum Rimfire shortly thereafter. The discontinued slide-action Winchester Model 61 was the first rifle of their manufacture available for the new round. At present there is a wide variety of single shot and repeating rifles, pistols and revolvers of American and European manufacture available in 22 Magnum Rimfire caliber. Standard bullet is a jacketed 40 grain type although Federal introduced a 50 grain bullet in 1988 and CCI has recently introduced a hyper-velocity loading with a 30-grain bullet and Federal soon joined the "hyper-velocity" fray with their similar loading.

General Comments The 22 Winchester Magnum Rimfire is an elongated and more powerful version of the older 22 WRF. Case dimensions are the same except for length, and the WRF can be fired in any gun chambered for the Magnum Rimfire. It is not a safe practice to rechamber older guns for the new round. The 22 WRF is loaded with outside lubricated lead bullets while the 22 WMR is loaded with jacketed bullets. With a 40-grain thin-jacketed bullet at about 1900 fps, this is the most potent rimfire cartridge currently available. It is more powerful than the 22 Winchester Centerfire, forerunner of the 22 Hornet. Claimed ballistics in a 6-inch pistol barrel exceed any other rimfire fired from a rifle. Thus it is a very effective 125-yard varmint or small game cartridge, although overly destructive of animals intended for the pot unless solid bullets are used. CCI also loads a shot version.

22 Winchester Automatic

Historical Notes Used only in the Winchester Model 1903 semi-auto rifle it is no longer listed in the Winchester ammunition catalog. The rifle has been obsolete since 1932. This cartridge has a 45-grain inside-lubricated bullet and will not chamber in any standard 22 Long Rifle gun. It was designed at a time when black and semi-smokeless powder 22 rimfires were still loaded and popular. The purpose was to prevent the use of anything but smokeless powder ammunition in the semi-auto rifle so as not to foul the action. Blackpowder will gum up such actions and render them inoperable in short order. Remington brought out a similar cartridge for the same reason but the two are not interchangeable.

General Comments The 22 Winchester Automatic had little to offer over the standard Long Rifle except smokeless powder and the semi-auto rifle it was fired in. In killing power and range it is on a par with the 22 Long, even though it has a heavier bullet. The cartridge is now a collector's item.

22 Remington Automatic

Historical Notes This cartridge was developed for the Remington Model 16 autoloading rifle, actually introduced in 1914, and discontinued in 1928. Ammunition has not been loaded since the end of the World War II. The purpose of the cartridge was the same as the Winchester 22 Automatic—to prevent the use of action-gumming blackpowder ammunition in a semi-auto rifle. No other gun used this round and it is not interchangable with the 22 Winchester. This is an example of jealous rivalry if ever there was one.

General Comments This was another 22 Long-class cartridge. It had an inside-lubricated 45-grain bullet in solid or hollowpoint type, both of the same weight and ballistics. It was not as accurate or effective as the Long Rifle.

22 ILARCO 22 Short Magnum Rimfire

Historical Notes The 22 ILARCO Rimfire originated in 1987 and was manufactured in experimental quantities by Winchester for Illinois Arms Company. It is the 22 Winchester Magnum Rimfire shortened to the same loaded length as the 22 Long Rifle. It was chambered in the Illinois Arms Company's Model 180 auto/semi-auto rifle that features a 165-round drum-type magazine. The full auto version was available only to law enforcement agencies. The reason for the shorter cartridge was that the Model 180 was designed for the 22 Long Rifle and the action would not handle the longer 22 WMR. Illinois Arms Company was bought out by Feather Industries of Boulder, Colorado and the 22 ILARCO was to be discontinued. The cartridge is sometimes referred to as the 22 WMR Short.

General Comments Shortening the 22 WMR made sense even though there is some velocity loss. For one thing, the short case uses the same jacketed bullet as the parent cartridge and doesn't pick up dirt and debris the way sticky outside-lubricated 22 Long Rifle cartridges can. With a 165-round magazine and full auto fire, this is a matter of some importance. Also, the 22 WMR is too long to function in practically all current 22 semi-auto pistols, but many of these could be adapted to fire the 22 ILARCO. However, this cartridge never went into production and existing specimens are now collector's items.

22 ILARCO 22 Short Magnum Rimfire Loading Data

Bullet (grs.)	Powder/grs.	MV	ME	Source
40 FMJ	FL	135	160	Winchester Factory Load

25 Short

Historical Notes Originally this pistol cartridge was developed for the F.D. Bliss revolver and also known as the 25 Bacon & Bliss. It was chambered in other cheap handguns of the period. Date of introduction was around 1860 and both Remington and Winchester listed it in catalogs up to 1920. It's a collector's item now.

General Comments The 25 Short had a 43 grain outside-lubricated bullet and 5 grains of powder. Bullet diameter is actually .245- to .246-inch and it closely resembles the 22 Short. In power it is similar to the blackpowder 22 Long Rifle fired from a short pistol barrel. There is no record of any rifle having been chambered for the 25 Short. It should not be confused with the 25 Stevens Short.

25 Stevens Short

Historical Notes Introduced in 1902 this cartridge was intended as a shorter, cheaper and less powerful version of the 25 Stevens. Original loading used 4½ to 5 grains of blackpowder, but only smokeless powder was used when it was discontinued in 1942. Remington, Winchester and Stevens rifles used this round. It could be fired in any rifle chambered for the longer 25 Stevens.

General Comments The 25 Stevens Short was not nearly as effective a field cartridge as the longer version. However, it was somewhat cheaper and certainly as good or better than the 22 Short for small game at close range. More expensive than the 22 Long Rifle and no better for hunting purposes, it was never popular.

25 Stevens

Historical Notes Various dates can be found for the introduction of the 25 Stevens with most authorities agreeing on 1900. Reference in old books and catalogs would indicate an actual date of 1890, but this is not certain. In any event it was developed jointly by the J. Stevens Arms & Tool Co. and the Peters Cartridge Co. The Stevens "Crack Shot" #15 rifle came out in 1900, and one of its original calibers was the 25 Stevens. However, the Stevens "Favorite" rifle, manufactured from 1894 to 1935, may have been the first model available in this caliber. Both of these are under-lever single shots. Remington and Winchester also chambered rifles for the 25 Stevens. Original load was a 67-grain bullet and 10 to 11 grains of blackpowder. Semi-smokeless powder was also used, but smokeless was the only propellent offered when it was discontinued in 1942. Remington did preliminary work on an improved, high-velocity loading prior to WWII, but the project was dropped after the war. The improved round, called the 267 Remington Rimfire, was rumored to have had a muzzle velocity of 1400 fps with the 67-grain bullet.

General Comments The 25 Stevens had an excellent reputation on small game without ruining edible meat. Most complaints centered around the high cost of ammunition as compared to the 22 Long Rifle and the high trajectory which made hits beyond 60-70 yards difficult. For years, gun writers called for a high-velocity version, but the ammunition companies did not respond. With modern powder and a longer case, a velocity of 1600 to 1800 fps might be possible.

Rifles are no longer chambered for it, and ammunition isn't manufactured anymore, so it appears to be a dead number. Many who used the 25 Stevens were sorry to see it go, but with the 22 Magnum Rimfire there isn't much need for it. It had an inside-lubricated bullet and was available with solid and hollowpoint bullets.

30 Short

Historical Notes This old-timer originated in the early 1860s and was used mostly in low-priced handguns such as the Sharps four-barrel, the Standard revolver and various single shots. Colt New Line revolvers were also made in 30 Short and Long caliber. The 30 Short was listed in ammunition catalogs as late as 1919.

General Comments The 30 Short had a 50- to 58-grain lead bullet and 5 to 6 grains of blackpowder. Not a powerful round by any standard, its use was confined to pocket or house guns. It was not as good a cartridge as the 32 Short rimfire and one wonders why it survived for so long a time. It is now a collector's item.

30 Long

Historical Notes This rimfire was cataloged as early as 1873, but may have originated earlier. Adapted to Colt, Standard X.L. and Sharps handguns, it was also used in some single shot rifles. The 30 Short survived until 1920; the 30 Long disappeared before WWI.

General Comments The 30 Short and 30 Long were interchangeable in most guns. Bullet was actually .290- to .295-inch and of outside-lubricated type. Power of the 30 Long was about the same as the 32 Short rimfire.

32 Extra Short

Historical Notes This cartridge was made for the Remington magazine pistol and the Chicago Firearms Co.'s "Protector" palm pistol. The Remington pistol was manufactured from 1871 until 1888 and the odd palm pistol originated sometime in the 1880s. This fixes the date of introduction for the 32 Extra Short at 1871, though some authorities indicate a later date. The cartridge was listed in Remington catalogs until 1920. It was also known as the 32 Protector.

General Comments The 32 was a popular caliber for both handguns and rifles for many years. The 32 Extra Short was probably designed to increase the magazine capacity of the Remington-Rider magazine pistol. Since it held five short rounds, it would have held only three of the standard 32 Short rimfires. A longer pistol would have been unhandy and a reduced magazine capacity not competitive with the five- and seven-shot revolvers of the day. Sales departments have to consider all these angles. The Remington magazine pistol had a tubular magazine below the barrel and a "lever" that protruded slightly above the hammer. Lever and hammer were drawn back together which cocked the gun and extracted the empty shell. Release of the lever chambered a new round as it returned to the forward position. It was of limited popularity. Original load was 5 to 5½ grains of blackpowder with a 54- to 60-grain lead bullet.

32 Short

Historical Notes The 32 Short rimfire originated under a Smith & Wesson patent of 1860 and early cartridge boxes were so marked. It was first used in the Smith & Wesson New Model #1½, and #2 revolvers. It was later adapted to Colt revolvers and others with names such as Allen, Blue Jacket, Enterprise, Favorite, Whitney, X.L. and many, many others. It was also used in a variety of rifles including Remington, Stevens and Winchester. It was loaded and listed in some ammunition catalogs as late as 1972. Navy Arms had ammunition in this caliber made in Brazil in 1990. Ammunition in this caliber is now available from that source.

General Comments Rifles and pistols using the 32 Short rimfire were popular up to the early 1900s. Stevens single shot rifles were available in this caliber until 1936. There are tens of thousands of guns around for this cartridge. It actually was a good small game caliber out to 50 yards as it would kill cleanly with hits in the forward body area and not spoil meat. Accuracy is not outstanding, but adequate for field use. However, ammunition in this caliber costs more than the 22 Long Rifle which is a consideration in choosing a rimfire gun. The 32 rimfire is obsolete. Original load had an 80-grain bullet and 9 grains of blackpowder.

32 Long

Historical Notes The 32 Long was originally a revolver caliber, which was later used extensively in various rifles. It was introduced for the Smith & Wesson New Model #2 revolver in 1861. It was quickly picked up by other manufacturers and offered in such makes as the Allen, Enterprise, Favorite, Forehand & Wadsworth, Harrington & Richardson, Pioneer, Webley, X.L. and many others. The Colt New Line revolvers were available in this caliber also. Stevens single shot pistols and rifles featured it, as did Marlin, Ballard, Maynard, Remington and Winchester single shot rifles. It is no longer produced in the U.S. Navy Arms had ammunition in this caliber made in Brazil in 1990. Ammunition in this caliber is now available from that source.

General Comments The 32 Long rimfire has a heavier bullet and delivers more energy than the 32 Short although velocity is about the same. Original load had an outside-lubricated, 90-grain lead bullet with 12 to 13 grains of blackpowder. It was a good short-range small game number because, like other cartridges in the same class, it killed cleanly without ruining edible meat. However, it was not effective beyond 50 yards because of the relatively high trajectory making bullet placement difficult at long range. Single shot Stevens rifles of this caliber were made until 1936.

32 Long Rifle

Historical Notes This cartridge has an inside-lubricated bullet and a longer case than the regular 32 Long rimfire. It appears on cartridge lists from 1900 into the early 1920s. Both Remington and Winchester loaded it. Some say it was a smokeless powder improvement over the older 32 Long, but the 1918-19 Remington catalog lists it as available in blackpowder loading only. It has been obsolete for many years and is a collector's item.

General Comments Case length of the 32 Long Rifle is between that of the 32 Long and Extra Long rimfire; other dimensions are practically identical. It could be fired in any rifle chambered for the Extra Long and most rifles or revolvers made to handle the Long. The outside-lubricated bullet was messy to carry in the pocket or loose in a container. They picked up lint and dirt, greased and stained the pocket, etc. Inside-lubricated bullets are much cleaner to handle under any conditions which is the reason efforts were made to produce such versions of the outside-lubricated types. However, this required a smaller diameter bullet which gave unacceptable accuracy in the original barrel. That may have been why the 32 Long Rifle had a short life. No one seems to have made a gun specifically for it, or at least the author found no reference to such. Original load was an 81-82-grain lead bullet with 13 grains of blackpowder.

32 Extra Long

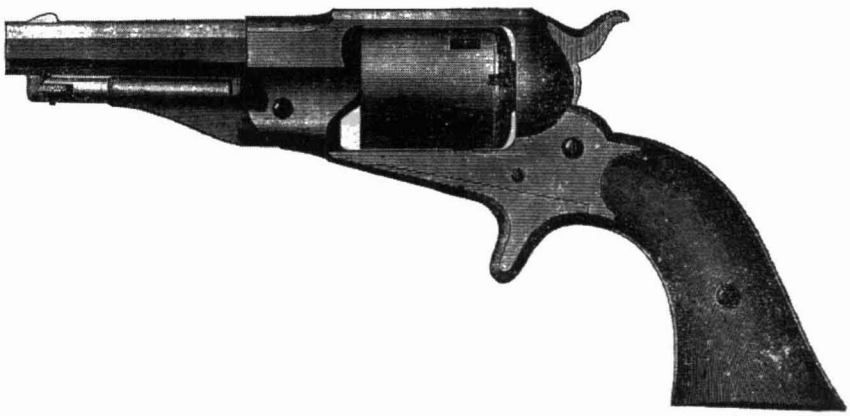
Historical Notes Exact date of introduction of this cartridge is obscure. It is listed in various catalogs of 1876 so it probably originated in the mid 1870s. Ballard, Remington, Stevens and Wesson single shot rifles chambered it. It does not appear in post WWI catalogs. Many gun companies charged extra for rifles chambered to shoot any of the extra long rim or centerfire cartridges. Some authorities place the date of introduction as 1866.

General Comments Original load for the 32 Extra Long rimfire was a 90-grain outside-lubricated lead bullet and 18 to 20 grains of blackpowder. The bullet is the same as that used in the ordinary 32 Long, but there were variations, depending on who manufactured the ammunition. The 32 Extra Long was not a very accurate cartridge and never established itself as a match round. For hunting it extends the effective range of the rimfire 32 out to perhaps 65-75 yards, but doesn't possess appreciably greater killing power than the 32 Long.

38 Short

Historical Notes When the Civil War ended in 1865, a number of rimfire cartridges had been developed and used successfully in battle. Most were large caliber rifle cartridges. After the war there was a demand for smaller caliber metallic cartridges for revolvers and sporting rifles. Both the 38 Short and Long rimfire date from this period. They are listed in the 1869 Folsom Bros. & Co. gun catalog. The Remington Model 1866 revolving rifle was available in 38 rimfire. In 1871 the Remington New Model revolver was advertised as available with an extra 38 rimfire cylinder. The 38 Short rimfire was listed in the 1876 J. Brown & Son catalog as for Ballard, Remington and Wesson rifles and Allen, Colt, Enterprise, Whitney, X.L. and other pistols. This is now an obsolete cartridge, but it was manufactured until 1940.

General Comments The 38 Short rimfire is in the same class as the centerfire 38 Short Colt. Original loading was a 130-grain lead bullet and 18 grains of blackpowder. Like most older rimfires, the bullet is outside-lubricated. Bullet diameter is .375-inch, the same as the ball fired in 36-caliber cap and ball revolvers. The 38 Short probably originated as a cartridge for breech-loading conversions of these old revolvers. Many catalogs listed the 38 Short as for pistols and revolvers, whereas the 38 Long is shown as a rifle type. The Rollin White patent covering the bored-through cylinder, held by Smith & Wesson, did not expire until 1869. This undoubtedly had an effect on the use of the rimfire 38 Short for revolvers.



38 Long

Historical Notes The rimfire 38 Long is another old-timer dating back to before 1865 and the end of the Civil War. The Remington-Beals single shot rifle was available in 38 Long from 1867 until it was discontinued in 1875. The Remington revolving rifle of 1866 was also made for it. It was used in Allen, Ballard, Remington, Stevens and Wesson rifles of later date and in Enterprise, Favorite, Forehand & Wadsworth and Colt revolvers. It was a popular rifle and pistol caliber up to the turn of the century. It was replaced by similar centerfire rounds. American companies stopped loading it in the late 1920s.

General Comments The rimfire 38 Long is in the same general class as the centerfire 38 Long Colt. Original load was a 150-grain outside-lubricated bullet and 18 grains of blackpowder. However, loads varied with different manufacturers from a 140- to 150-grain bullet and up to 21 grains of powder with the light bullet. In a rifle it was a good short-range small game load, but accuracy was only fair. No one has made rifles of this caliber since the end of WWI.

38 Extra Long

Historical Notes The rimfire 38 Extra Long appeared about 1870 and was chambered in Ballard, Howard, Remington, Robinson and F. Wesson single shot rifles. It was not a standard Ballard caliber, but a special order item which cost 50 cents extra. It was strictly a rifle caliber, being too long for most revolvers. Because of mediocre accuracy plus the development of similar centerfire cartridges, the 38 Extra Long rimfire did not have a long life. It was not carried in the 1918-19 Remington catalog but was listed in the 1916 Winchester catalog.

General Comments The 38 Extra Long is in a class well below the centerfire 38-40 WCF blackpowder loading. Original load was a 150-grain outside-lubricated bullet and 30-31 grains of blackpowder. However, some companies loaded lighter bullets down to 140 grains with slightly more powder. It was not a bad small to medium game cartridge out to about 80 yards or so. It was introduced at a time when the centerfire was emerging as the dominant type so it did not build up a following. The centerfire 38 Extra Long was developed by Ballard in 1855-56 and was preferred because it was reloadable.

41 Short (Derringer)

Historical Notes This is an old and once very popular rimfire because of the light, handy arms that chambered it. The 41 Short was introduced with the National Arms Co. breech-loading derringer in 1863. It was originally called the 41-100 rimfire. The National derringer was patented by Daniel Moore in 1861 and 1863. It was made by National from its introduction to 1870 when the company was purchased by Colt. From 1872 to 1890 this rotating barrel, single shot derringer was manufactured by Colt. They also adapted the 41 Short to the Thuer-patented or third model derringer and the House pistol or "Cloverleaf" cylinder model of 1871. Derringers made by Allen, Enterprise, Williamson, X.L. and others were also of 41 Short caliber. The Remington over/under or double derringer manufactured from 1866 to 1935 was the most famous and popular of the lot. Several low-priced pocket revolvers were also chambered for the 41 Short. It has been obsolete since WWII, but special lots of ammunition have been loaded since the war.

General Comments The 41 rimfire Short is so under-powered as to be worthless for anything but rats, mice or sparrows at short range. Fired from the average derringer at a tree or hard object 15 to 25 yards away, the bullet will often bounce back and land at your feet. Nevertheless, it was a popular self-defense cartridge and at point-blank range could inflict a severe wound or kill a human being. 41 derringer pistols were more of a threat or morale builder than anything else. Original load was a 130-grain outside lubricated lead bullet and 13 grains of blackpowder. Late loads used smokeless powder.

41 Long

Historical Notes This is a longer and slightly more powerful version of the 41 Short. It originated in 1873 and the Colt New Line revolvers appear to be the first to chamber it. The Enterprise #4, Favorite #4, Forehand & Wadsworth, Webley and other revolvers were available in this caliber. A few cheap, single shot rifles also chambered it. It has been obsolete since the 1920s.

General Comments The rimfire 41 Long is a better cartridge than the Short, but not by much. There was some variation in bullet weight and powder charge, but the original load used a 163-grain bullet and 13 to 15 grains of blackpowder. The centerfire 41 Short is an outgrowth of this cartridge. Guns chambered for the Long could also shoot the 41 Short rimfire. In power this cartridge is in about the same class as the 38 S&W centerfire in blackpowder loading.

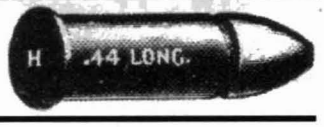
41 Swiss See Chapter 7 for the 10.4x38Rmm.

44 Short

Historical Notes The 44 Short was a handgun cartridge although it could be fired in arms chambered for the 44 Long rimfire. It is well established in old catalogs dating from 1870 and was chambered in popular pistols and revolvers, including those made by Allen, Forehand & Wadsworth and Remington. It is best noted as being the cartridge for the single shot Hammond "Bulldog" pistol made by the Connecticut Arms & Mfg. Company of Naubuc, Conn. This pistol is believed to have been marketed before the end of the Civil War, which would place the date of origin of the 44 Short at about 1864-65. It has been obsolete since the 1920s.

General Comments The rimfire 44 Short is a better handgun cartridge than the 41 Short or Long, but was not generally as popular. The type and variety of guns that chambered it were rather limited. Original load was a 200- or 210-grain outside-lubricated bullet and 15 to 17 grains of blackpowder. Velocity was low, but with the 200-grain bullet, short-range stopping power was fairly good. It is similar to the centerfire British 44 Webley cartridge in performance.

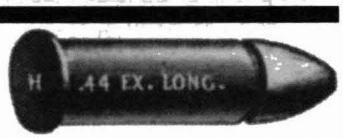
44 Long



Historical Notes The rimfire 44 Long originated with the Ethan Allen carbine patented in 1860 and manufactured by Allen & Wheelock of Worcester, Mass. It was later adapted to rifles made by Ballard, Howard, Remington, Robinson and F. Wesson. It was fairly popular but replaced by similar centerfire types. It became obsolete in the early 1920s.

General Comments With a 220-grain bullet and 28 grains of blackpowder, the 44 Long was a potent short-range cartridge for small game. The 44-40 WCF rapidly became the dominant 44-caliber cartridge after it was introduced in 1873. It could be reloaded and was available in repeating rifles and revolvers, important factors on the western frontier. Other 44 cartridges, particularly the rimfire, gradually declined in use and popularity. The 44 Long is not as powerful or as accurate as the 44-40.

44 Extra Long



Historical Notes This Ballard-developed cartridge is a longer, more powerful version of the rimfire 44 Long. Unfortunately, it was introduced about 1869 and soon the 44-40 Winchester was establishing a reputation in the West. It had a very short life and was obsolete by the 1880s. The exact date of introduction is vague, but probably between 1870-75. It is listed in the 1876 catalogs as adapted to Ballard, Remington and F. Wesson rifles.

General Comments The 44 Extra Long is not as good a general purpose cartridge as the 44-40 Winchester. For one thing it used an outside-lubricated bullet and in addition the overall length was too long for many repeating actions. It was loaded with a 218-grain bullet and 46 grains of blackpowder. It was not noted for great accuracy. In power it would be primarily a small game number. Effective range was not much over 75 yards or so.

44 Henry Flat

Historical Notes This old, historic cartridge is one of the milestones in the development of modern arms and ammunition. It was developed by B. Tyler Henry for the lever-action repeating rifle bearing his name, the forerunner of the Winchester rifle. The Henry rifle was manufactured by the New Haven Arms Co. from 1860 to 1866, at which time it was reorganized as the Winchester Repeating Arms Co. The 44 Henry cartridge was manufactured from 1860-61 to 1934. There are two versions of the cartridge. The early case was .815-inch long. Bullet and powder charge were the same. Colt revolvers were also made in 44 Henry caliber. The Henry rifle and cartridge saw limited use in the Civil War.

General Comments The 44 Henry, although quite successful, was not a powerful round. Barely adequate for deer and certainly no match for buffalo or grizzly bear, its principal advantage was in the 15-shot repeating rifle. This provided undreamed of firepower, something that could be decisive in combat. In recognition of this fact, Winchester brought out an improved rifle chambered for the 44-40 cartridge in 1873. From that date on, Winchester was in continuing competition with the makers of single shot rifles and their big powerful buffalo cartridges. The 44 Henry used a 200-grain bullet and 26-28 grains of blackpowder.

46 Short

Historical Notes The 46 Short rimfire is usually listed for the Remington Single Action Army revolver. However, the 1878 and 1891 Winchester catalogs both describe this cartridge as: "For Remington, Smith & Wesson and other Army revolvers." Both Remington and Winchester loaded this cartridge and it was carried in their catalogs up to World War I, but did not appear after the war. Date of introduction was circa 1870.

General Comments The 46 Short rimfire was listed in Remington catalogs as having a 227-grain bullet and 20 grains of blackpowder. Winchester loading was a 230-grain bullet and 26 grains of powder. As a revolver cartridge, it would have been less powerful than the 44-40. WCF.

46 Long

Historical Notes The 46 Long rimfire was listedin an advertisement by Schuler, Hartley & Graham's in 1864. It is listed in the 1887 Remington catalog as a short-range chambering for the Remington rolling block single shot Sporting Rifle No. 1 and also for Ballard rifles. The cartridge was loaded by Remington, Winchester and others and carried in ammunition catalogs up to World War I, but did not survive the war. It originated in the early 1970s.

General Comments The 46 Long was loaded by Remington with a 305-grain bullet and 35 grains of blackpowder. Winchester listed a 300-grain bullet and 40 grains of powder. There may have been other loadings by other companies. It was a marginal short-range deer cartridge.

46 Extra Long

Historical Notes The 46 Extra Long rimfire was a Ballard cartridge for their single shot rifle and may also have been used by others. It does not appear in the Remington 1871 catalog so it originated sometime after that date. Remington appears to have been the only one who loaded this cartridge and it was carried in their later catalogs up to World War I, but did reappear after the war.

General Comments Remington listed the 46 Extra Long as being loaded with a 305-grain bullet and 57 grains of blackpowder. There was never a smokeless loading. It would have been somewhat more powerful than the 46 Long and a better short-range deer cartridge. None of the 46-caliber rifle cartridges enjoyed a reputation for great accuracy. However, since they survived for quite a few years they did have a fair following.

50 Remington Navy

Historical Notes Developed for the single shot, rolling block, Remington Navy pistol of 1865, this load was replaced within a year by an identical inside primed, centerfire type. The final commercial version, Boxer primed, was manufactured until World War I. The Remington Navy pistol has been obsolete since the early 1870s.

General Comments The 50-caliber rimfire was a rather potent handgun round. Velocity was low, but the big heavy bullet would have had considerable knockdown power. However, 44- or 45-caliber handguns are more efficient and the military eventually standardized on 45-caliber cartridge arms. Original load was a 290-grain bullet and 23 grains of blackpowder.

56-46 Spencer

Historical Notes A post-Civil War sporting cartridge introduced by Spencer in 1866 for his repeating small carbine and sporting rifle. It was also listed as the #46 or 46/100 caliber. Spencer lever-action sporting arms were manufactured from 1866 until the firm failed in 1868-69. Winchester bought up the surplus guns and Spencer patents, but did not manufacture them. However, they sold off the surplus rifles through their agents from 1869 to 1872. The cartridge has been obsolete since before WWI, but was loaded until 1919.

General Comments The 56-46 Spencer is actually a 44-caliber, bottlenecked cartridge considerably more powerful than the 44-40 WCF, although it uses a heavier bullet. A 320- to 330-grain bullet and 45 grains of blackpowder was the standard load. It was a fairly good short-range deer cartridge, but not satisfactory for larger game. The actions of early repeating rifles were not suited to large or long cartridges. This lack of power caused many hunters and the military to adopt the single shot, even though the repeater was well proven. Full powered repeating rifles, able to compete with the single shot on any basis, didn't appear until 1880.

56-50 Spencer

Historical Notes This cartridge was actually designed by Springfield Armory late in 1861. It was used in the 1865 model Spencer repeating carbine, a seven-shot, lever-action arm with 20- or 22-inch barrel. Magazine was in the buttstock, and it was loaded through a trap as with modern 22 rimfire rifles. This particular rifle and cartridge was manufactured too late for use in the Civil War, but was issued to troops fighting Indians on the western frontier. The 56-50 cartridge was listed in ammunition catalogs until 1920. The 1918-19 Remington catalog illustrated it as: "adapted to Spencer, Remington UMC, Sharps, Peabody and other rifles and carbines." The 1865 Spencer incorporated the Stabler magazine cutoff not present on earlier models. Spencer did not like the 56-50 cartridge because he thought it had an excessive crimp and it is not advertised in Spencer catalogs. He designed a slightly different version which became known as the 56-52.

General Comments The 56-50 cartridge was loaded with a 350-grain bullet and 45 grains of blackpowder. It could penetrate almost a foot of soft pine at a range of 15 feet and was a potent short-range caliber. It was adequate for deer-sized animals, but not satisfactory against larger game. Most western hunters preferred the more powerful single shot rifles and their big, long-range cartridges. The Spencer action was not adaptable to the long centerfire cartridges that were developed in the years immediately after the Civil War.

56-52 Spencer

Historical Notes Dating from 1866, this is an alteration of the army-designed 56-50, which Spencer believed had too much crimp. His approach was to incorporate a slight bottleneck, but many manufacturers omitted this, so it is difficult to distinguish between the two rounds. However, they are interchangeable and any arm chambered for one will fire the other. Spencer 56-52 ammunition was listed in ammunition catalogs up to 1920.

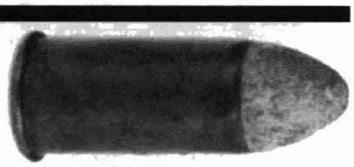
General Comments The 56-52 is more a sporting than a military round. Power is the same as the 56-50, but some companies loaded a heavier bullet. Remington produced a cartridge with 45 grains of powder and a two-groove, flat-point, 400-grain bullet. The 56-50 was always loaded with a 350-grain bullet. By modern standards, the 56-52 would barely qualify as a short-range deer caliber. It is slightly more powerful than modern smokeless factory 44-40 WCF loads.

56-56 Spencer

Historical Notes This is the original cartridge for the first Spencer rifle and carbine, patented March 6, 1860 and manufactured in quantity beginning in 1862. Despite great opposition from the U.S. Army Ordnance Department, these guns were finally adopted and used during the Civil War. They first appeared at the battle of Antietam in September, 1862, and later played a decisive role in other important engagements. The Spencer is credited as having provided the Union armies with an advantage in firepower that gave them a critical edge in turning back the Confederate forces at Gettysburg. President Lincoln tested the Spencer rifle in 1863 and insisted the Army place substantial orders with Christopher M. Spencer. Many authorities insist that if the Spencer rifle had been adopted at the onset of the war and issued early and in quantity, it would have shortened the Civil War by a year or more and greatly reduced the ultimate number of casualties. The 56-56 cartridge was loaded by ammunition manufacturers until 1920.

General Comments The Spencer rifle was a seven-shot repeater of lever-action type with the magazine located in the buttstock and loaded through a trap in the buttplate. It could be fired at the rate of seven shots in 12 seconds, faster in the hands of a real expert. Parts were interchangeable, and the gun could be disassembled with only a screwdriver. The 56-56 cartridge was loaded with a 350/60-grain bullet and 42 to 45 grains of blackpowder. Bullet diameter varies from .540- to .555-inch between various makes of ammunition. Ballard and Joslyn carbines also used this cartridge. It was a short-range number, not very effective on anything larger than deer.

58 Miller
58 Allin



Historical Notes This cartridge was used in the 1867 Miller breech-loading conversion system of the muzzle-loading Springfield rifled musket. It was listed in an advertisement by Schuyler, Hartley & Graham's in 1864. It came in two case lengths, $1^{3}/_{16}$ inches and $1^{7}/_{16}$ inches and was used chiefly in first-model Allin conversions. The Miller swinging block conversion was one of a number of experimental alterations used by the military in an effort to salvage the million-plus 58-caliber muskets left over from the Civil War. The idea was to convert these to some viable breech-loading system rather than scrap them. Although some of the conversion units worked quite well, the effort was not entirely successful and most of these guns were sold off as surplus or scrap metal. There must have been a fair number of the Miller conversions around though because the cartridge was listed in ammunition catalogs at least as late as 1910. This cartridge is also called the 585 Springfield, 58 Musket, 58 Allen and 58 Ball.

General Comments The 58 Miller rimfire featured a 500-grain bullet backed by 60 grains of blackpowder for a muzzle velocity of approximately 1150 fps. It would have been a pretty good short-range deer cartridge. Some specimens have a heavy crimp which effects the measurable length of the unfired case, resulting in variations in published figures as to the case length. Remington, Winchester and others listed this round.

THE HYPER-VELOCITY 22s

THE 22 RIMFIRES are our oldest self-contained metallic cartridges having originated with the 22 Short back in 1857. From time to time various improvements have been introduced by manufacturers, starting with smokeless powder loadings in 1888. Non-corrosive priming was adopted in 1927, and high-velocity loadings in 1930. In about 1965 Remington marketed a super-velocity 22 Short they called the "Rocket," which featured a compressed composition 15-grain bullet with a muzzle velocity of 1710 fps. These were intended primarily as a shooting gallery load with a frangible bullet that would pulverize on striking a metal backstop. The author used them in a small 22 Short chambered auto pistol and various 22 revolvers and found them very deadly on rodents and other small animals at close range. The 22 Rocket was discontinued after about 5 years, probably because of a poor sales record. In 1977 CCI introduced their "Stinger" 22 Long Rifle loaded with a 32-grain hollowpoint bullet starting out at 1640 fps which provides an increase in muzzle velocity of 360 fps over the older high-velocity type. Federal, Remington and Winchester quickly jumped on the bandwagon with their own version. These have been collectively designated as hyper-velocity 22s to indicate their greater or increased velocity as compared to high-speed or high-velocity 22s. They are only manufactured in 22 Long Rifle type.

The original loading of the 22 Long Rifle was a 40-grain bullet in front of 5 grains of blackpowder for an initial velocity of 1150 fps. When smokeless powder was first loaded, the same velocity/pressure relationship as blackpowder was used so as not to create problems with existing firearms. This continued for 42 years until Remington introduced the high-velocity load with the same bullet stepped up to 1250 fps. There was also a 36-grain HP bullet with a muzzle velocity of 1280 fps. These ballistics have remained fairly constant right up to the present except for minor variations between makes. CCI's Stinger pushed velocity up to 1640 fps, but with a lighter 32-grain hollowpoint bullet. To some extent this is a sort of hyper-velocity 22 Long, because the bullet weighs only 3 grains more than the 22 Short bullet. Federal, Remington and Winchester versions have muzzle velocities from 1410 to 1680 fps, and bullets that vary from 32 to 36 grains. Variations in bullet weight depend on the type of bullet, solid or hollowpoint. There is also a difference in bullet shape, some being conventional round-nosed while others are a truncated cone. Increase in performance is achieved by several means including a lighter bullet, modern slower burning powder and a slight lengthening of the case which combined with the lighter/shorter bullet leaves more room for powder. This allows an increase in velocity with only a slight increase in pressure. Therefore hyper-velocity cartridges can be used in any modern firearm in good condition made specifically to handle 22 Long Rifle cartridges. On the other hand, they should not be used in alloy revolvers and also they don't function well in some semi-auto pistols. This is particularly true for the Llama Model XV, which has an undersize bore, and may cause hazardous case ruptures. I understand it is possible to order barrels with standard bore dimensions for these pistols; this will eliminate the problem. The author has testfired the various makes of 22 hyper-velocity in a variety of rifles and handguns with no problems. *(Editor's Note: Having chronographed every available "hyper-velocity" 22 in several revolvers and pistols with barrels from 2 to 6 1/2 inches in length, I have to mention that ballistics can be very disappointing. Often, but not always, velocity of standard high-velocity hollowpoint loads is actually higher in spite of the heavier bullets usually used . The only way you can know how a specific load will perform in your handgun is to chronograph it.)*

The author's test-firing was both on the range and in the field. This has demonstrated that like most everything else, hyper-velocity 22s have both good and, a few, bad points. Accuracy testing was conducted at 50 yards using a benchrest and a scope-sighted 22 bolt-action rifle with the capability of shooting into 1/2-inch or less at 50 yards. It is necessary to establish some sort of base line or standard of comparison in order to evaluate the hyper-velocity 22s. The only way to do this is to also test some standard and high-velocity 22s and see how the hyper-velocities compare with those. The author has a number of boxes of old Remington standard velocity Long Rifles (1150 fps) that consistently shoot into 1/2-inch or better at 50 yards plus a variety of high-velocity Long Rifles; these were tested first. The hyper-velocity 22s were then tested in the same rifle and under the same conditions. The results are compared in Table #2. Test firing consisted of five, five-shot groups shot with each different brand and type of ammunition listed in the tables. Results of these five-shot groups were then averaged for each type of cartridge. For the purpose of this test, high and low are not of any particular value so are not recorded. Average of each of the five, five-shot groups provides a good basis for comparison because a single five-shot group doesn't nec-

TABLE 1
Ballistics of Amunition Used in the Test Series

Cartridge	Bullet Type	Wt. (grs.)	Velocity (fps) Muzzle	100 yds.	Energy (ft lbs) Muzzle	100 yds.	Mid-Range Traj. (in.) 100 yds.	Remarks
Remington Std. Velocity	Solid	40	1150	976	117	85	4.0	Std. Vel.
Reminton Thunderbolt	Solid	40	1255	1017	140	92	3.6	Hi Vel.
Federal HiPower	HP	38	1280	1020	138	88	3.1	Hi Vel.
Win.-Western Super X	HP	37	1280	1015	135	85	3.5	Hi Vel.
CCI Mini Mag	HP	36	1280	1012	135	84	3.5	Hi Vel.
HYPER VELOCITY								
CCI Stinger	HP	32	1640	1132	191	91	2.6	
Federal Spitfire	Solid	36	1410	1055	160	90	2.6	Truncated Cone
Federal Spitfire	HP	33	1500	1075	165	85	2.3	Truncated Cone
Remington Viper	Solid	36	1410	1055	165	90	2.6	Truncated Cone
Remington Yellow Jacket	HP	33	1500	1075	165	85	2.3	Truncated Cone
Winchester Super-Max	HP	34	1500	1056	170	84	2.8	
Winchester Xpediter	HP	29	1680	1145	182	95	2.4	

essarily mean much. Averaging multiple groups helps to reduce the effects of human error. The first groups fired were with standard-velocity Remington ammunition which has a 40-grain bullet at 1150 fps. This was the most accurate of all ammunition tested and produced an average group size of 3/4-inch. The high-velocity types with either 40-grain solid bullets or 36-grain hollowpoints at from 1250 to 1280 fps all managed to average 1-inch. This provided a reasonably good yardstick against which to measure the comparative accuracy of hyper-velocity 22s. Firing conditions were ideal throughout the test with almost dead calm and sun to the rear. Naturally, with a different rifle results would not necessarily be the same, but time did not permit repeating this test with different rifles. Also, run of the mill slide-action, lever-action or semi-auto 22 would probably not shoot as well.

Moving to the hyper-velocity 22s, CCI's Stingers were the first tested. These have a 32-grain hollowpoint bullet at a muzzle velocity of 1640 fps and made a group average of 2 1/4 inches. Federal's Spitfires were next, the 36-grain solid at 1410 fps averaged 2 3/4 inches, with the 35-grain hollowpoint at 1500 fps doing better with an average of 2 1/2 inches. Remington's Viper solids and Yellow Jacket hollowpoints have the same bullet weights and ballistics as Federal's Spitfires. The Viper averaged 1 3/4 inches and the Yellow Jacket 2 1/4 inches. Finally, Winchester's offering, consisting of Super-Max with a 34-grain bullet at 1500 fps and Xpediter featuring a 29-grain bullet at 1680 fps, both hollowpoints. The Super-Max produced an average group of 1 3/4 inches, but the Xpediter opened up to 2 1/2 inches. The two most accurate of the hyper-velocities proved to be Remington's Viper truncated cone hollowpoints and Winchester's Super-Max with its conventional round-nosed hollowpoint bullet. All the others grouped to over 2 inches. Clearly, hyper-velocity 22s are not as accurate as the older standard velocity and high-velocity types. If we extrapolate these results out to 100 yards, which is about the maximum effective range of any 22 Long Rifle ammunition, the older types are all capable of grouping into about 2 inches whereas the hyper-velocities are not going to do any better than 3 1/4 to 4 1/2 inches. Actually this is not bad for practical hunting accuracy, but might be a disadvantage when shooting at very small targets. It is also worth noting that the various brands and types of hyper-velocities did not all shoot to the same point of impact. It is therefore important to find the one that is most accurate in your rifle and then sight-in for that particular cartridge. Another factor that should be considered is cost. The hypers sell for about double what the high-velocity types do, so it doesn't make good sense to buy them for just plinking or casual shooting.

TABLE 2
An Accuracy Comparison of the Hyper-Velocity 22s

Cartridge	Type	Bullet Wt. (grs.)	Average Group Size* (in.)
Remington Std. Velocity	Solid	40	3/4
Remington Thunderbolt	Solid	40	1
Federal Hi-Power	HP	38	1
Winchester-Western Super X	HP	36	1
CCI Mini Mag	HP	36	1
CCI Stinger	HP	32	2 1/4
Federal Spitfire	Solid	36	2 3/4
Federal Spitfire	HP	33	2 1/2
Remington Viper	Solid	36	1 3/4
Remington Yellow Jacket	HP	33	2 1/4
Winchester Super-Max	HP	34	1 3/4
Winchester Xpediter	HP	29	2 1/2

*Average of five 5-shot groups. Range—50 yards

On the other hand, hyper-velocity cartridges are not intended as match ammunition. They are specifically designed for the hunter, and it is here that they have definite advantages. The author made some preliminary expansion tests with these hollowpoints, shooting into clay, wet telephone books and soap bars. Results indicated that the hypers have a much greater destructive potential than high-velocity hollowpoints. This is born out in the field. Other pluses are flatter trajectory and reduced lead on moving targets. The western ground squirrel is difficult to anchor, and at least 60 percent will make it back into their holes after being hit with high-velocity hollowpoints. However, the hyper-velocity hollowpoints practically eliminate this. These squirrels usually go down and stay down after any solid hit with one of these. The same is true of jackrabbits and other pests I tried them on, and it is my observation that hyper-velocities have superior stopping power. They are, however, overly destructive if you intend to eat what you are shooting. Another field observation is that the advantage in killing power disappears out around 100-yards; they don't really provide much extended effective range.

In any event, I rate the 22 hyper-velocity hollowpoint as the most effective 22 Long Rifle cartridge currently available for pest or varmint shooting. I would not, at this time, pick any one brand as superior to all the rest because I have had rather good results with all of them. Try several makes since accuracy is rifle dependant.

Not all of the hyper-velocity 22s had a good sales record and some listed here are now discontinued. However, this account provides a record of how they stacked up.

Rimfire Cartridges—Factory Ballistics

	Pistol			Rifle							
Cartridge	Bullet (grs.)	MV	ME	MV	50 (yds.)	100 (yds.)	ME	50 (yds.)	100 (yds.)	MRT	Remarks
5mm Rem. Mag.	38	—	—	2100	—	—	372	—	—	—	Obsolete Rem. loading
22 BB Cap	20	—	—	780	—	—	26	—	—	12.0	Obsolete U.S. loading
	18	—	—	780	—	—	24	—	—	12.5	CIL Dominion, load
	16	—	—	750	—	—	20	—	—	13.2	RWS load
22 CB Cap	29	760	31	727	667	610	33	28	24	9.3	Typical U.S. loading
	30	—	—	725	—	—	34	—	—	9.3	Eley-Kynoch
22 Short	15	—	—	1710	—	—	97	—	—	3.5	Obsolete gallery load
	27	1077	68	1164	1013	920	81	62	50	4.3	CCI hollowpoint
	29	786	38	830	752	695	44	36	31	6.8	CCI target
	29	—	—	1045	—	—	70	—	—	5.6	Obsolete standard velocity
	29	1065	72	1132	1004	920	83	65	54	4.1	CCI (also Rem. & Win.)
22 Long	29	706	31	727	667	610	33	28	24	—	CCI CB
	29	1031	67	1180	1038	946	—	—	—	—	CCI
22 Long Rifle	29	—	—	1680	—	—	182	—	—	—	Win. Xpediter (Obsolete)
	32	1395	136	1640	1277	1132	191	115	91	2.6	CCI Stinger
	33	—	—	1500	—	—	164	—	—	—	Rem. Yellowjacket/Fed. Spitfire (Obsolete)
	34	—	—	1500	—	—	169	—	—	—	Win. Supermax (Obsolete)
	36	—	—	1410	—	—	158	—	—	—	Rem. Viper/Red. Spitfire (Obsolete)
	36	1089	94	1280	1126	1012	130	100	81	3.5	CCI hollowpoint
	36	1180	110	1425	1261	1136	162	127	103	2.7	CCI hollowpoint
	37	—	—	1280	1127	1015	135	103	85-	3.5	Win./Rem.
	38	—	—	1280	1120	1020	138	105	88-	3.5	Fed.
	38	1089	94	1280	1115	999	138	104	85	3.7	CCI game bullet
	40	940	78	1070	970	890	100	80	70	4.6	Match/Target
	40	1060	98	1255	1110	1016	140	109	92	3.6	High vel.
	42	1025	97	1220	—	1003	139	—	94	3.6	Win. Sil.
22 Extra Long	40	—	—	1050	—	—	97	—	—	—	Late smokeless loading
22 Win. Automatic	45	—	—	882	—	—	77	—	—	—	Early load.
	45	—	—	1055	—	—	110	—	—	—	20″ bbl.
22 Rem. Automatic	45	—	—	950	—	—	89	—	—	—	22″ bbl.
22 ILARCO	40	—	—	1380	—	—	168	—	—	—	Winchester data
22 Win. Rimfire (WRF)	40	—	—	1440	—	—	183	—	—	2.8	High vel. HP (Obsolete)
	45	—	—	1450	—	—	209	—	—	2.7	High vel. solid (Obsolete)
	45	—	—	1050	—	—	109	—	—	5.0	Std. vel.
	45	—	—	1320	—	1055	173	—	110	3.3	Current Win. load.
22 Win. Magnum Rimfire	30	1610	171	2200	1750	1373	322	203	127	1.4	Fe. JHP/CCI Maxi-Mag.+V HP
	40	1428	180	1910	1490	1326	324	197	156	1.7	CCI/Fed./Win. FMJ—CCI/Win. JHP
	50	—	—	1650	1450	1280	300	23 5	180	—	Fed. JHP

Rimfire Cartridges—Factory Ballistics

Cartridge	Bullet (grs.)	MV	ME	MRT 100 yd. (in.)	Remarks
25 Short	43	750	53	6.10	Handgun ballistics
25 Stevens Short	65	950	130	5.4	Smokeless loading
25 Stevens	65-67	1180	208	5.1	Smokeless load
30 Long	75	750	81		8 grs. blackpowder
30 Short	58	700	62		Approx. handgun ballistics
32 Extra Short	54	650			51Approx. ballistics
32 Short	80	950	160	5.6	Late smokeless load, rifle ballistics
32 Long	90950	180	5.2		Modern smokeless load
32 Long Rifle	81-82	960	186	4.9	Approx. rifle ballistics
32 Extra Long	90	1050	221	4.7	Approx. ballistics
38 Short	125-130	725	150		Handgun ballistics
38 Long	150	750	190		Handgun ballistics
	150	980	320	4.5	Rifle ballistics
38 Extra Long	150	1250	526	3.8	3″ bbl.
41 Short	130	425	52		3″ bbl. ballistics
41 Long	163	700	180		Handgun ballistics
41 Swiss	300	1325	1175	4.7	Blackpowder
	334	1345	1330	4.3	Smokeless load
44 Short	200-210	500	112		Approx. handgun ballistics
44 Long	220	825	332	4.5	Approx. rifle ballistics
44 Extra Long	218	1250	763	3.5	Approx. rifle ballistics
44 Henry Flat	200	1125	568	3.9	Approx. rifle ballistics
50 Rem. Navy	290	600	234		Approx. ballistics
56-46 Spencer	330	1210	1080		Approx. ballistics
56-50 Spencer	350	1230	1175		Approx. ballistics
56-52 Spencer	340, 386, 400	1200	1300		Approx. ballistics
56-56 Spencer	350	1200	1125		Approx. ballistics
58 Miller/Allin	500	1150	1468		Approx. ballistics

The following rimfire cartridges are not included above because ballistic data could not be located; the same group, excepting the 61 and 69 rimfires, is, however, listed in the Dimensional Data table: 35 Alcan, 9mm Ball, 42 Forehand & Wadsworth, 46 Ex. Short, 46 Short, 46 Rem.-Carb., 56-46 Ex. Long, 46 Hammond Carb., 50 Ball Carb., 50 Rem. Navy, 50 Rem. Pistol, 50 Warner Carb., 50-60 Peabody, 50-70 Govt., 61 rimfire and 69 rimfire.

AMERICAN RIMFIRE CARTRIDGES

Current and Obsolete

Dimensional Data

Cartridge	Case type	Bullet dia.	Neck dia.	Shoulder dia.	Base dia.	Rim dia.	Case length	Ctge. length
5mm Rem. Magnum	A	.205	.225	.259	.259	.325	1.020	—
22 BB Cap	B	.222	.224	—	.224	.270	.284	.343
22 CB Cap	B	.222	.225	—	.225	.271	.420	.520
22 Winchester Auto	B	.222	.250	—	.250	.310	.665	.915
22 Short	B	.223	.224	—	.225	.273	.423	.686
22 Long	B	.223	.224	—	.225	.275	.595	.880
22 Long Rifle	B	.223	.224	—	.225	.275	.595	.975
22 Stinger	B	.223	.224	—	.225	.275	.694	.975
22 Extra Long	B	.223	.225	—	.225	.275	.750	1.16
22 Remington Auto	B	.223	.245	—	.245	.290	.663	.920
22 WRF & Rem. Special	B	.224	.242	—	.243	.295	.960	1.17
22 Winchester Mag. RF	B	.224	.240	—	.241	.291	1.052	1.35
25 Short	B	.246	.245	—	.245	.290	.468	.780
25 Stevens Short	B	.251	.275	—	.276	.333	.599	.877
25 Stevens	B	.251	.276	—	.276	.333	1.125	1.395
30 Short	B	.286	.292	—	.292	.346	.515	.822
30 Long	B	.288	.288	—	.288	.340	.613	1.020
32 Long Rifle	B	.312	.318	—	.318	.377	.937	1.223
32 Extra Short	B	.316	.318	—	.317	.367	.398	.645
32 Short	B	.316	.318	—	.318	.377	.575	.948
32 Long	B	.316	.318	—	.318	.377	.791	1.215
32 Extra Long	B	.316	.317	—	.318	.378	1.150	1.570
9mm Ball	B	.337	.350	—	.350	.402	.417	.560
35 Allen	B	.342	.342	—	.342	.407	.865	1.388
38 Short	B	.375	.376	—	.376	.436	.768	1.185
38 Long	B	.375	.376	—	.376	.435	.873	1.380
38 Extra Long	B	.375	.378	—	.378	.435	1.480	2.025
41 Short	B	.405	.406	—	.406	.468	.467	.913
41 Long	B	.405	.407	—	.407	.468	.635	.985
42 Forehard & Wadsworth	B	.417	.416	—	.416	.485	.847	1.496
41 Swiss	A	.418	.445	.517	.539	.620	1.519	2.205
44 Short	B	.446	.445	—	.445	.519	.688	1.190
44 Henry Flat	B	.446	.445	—	.446	.519	.875	1.345
44 Extra Long Ballard	B	.446	.456	—	.457	.524	1.250	1.843
44 Long	B	.451	.455	—	.458	.525	1.094	1.842
46 Long	B	.454	.456	—	.456	.523	1.25	1.876
46 Rem. Carbine	B	.455	.455	—	.455	.529	.990	1.635
46 Extra Short	B	.456	.458	—	.458	.530	.633	1.125
46 Short	B	.456	.458	—	.458	.530	.836	1.336
50 Ball Carbine**	B	.456	.476	—	.560	.640	.859	1.134
46 Extra Long	B	.459	.457	—	.457	.525	1.534	2.285
56-46 Spencer	A	.465	.478	.555	.558	.641	1.035	1.595
56-46 Extra Long	A	.475	.468	.551	.563	.638	1.200	1.757
46 Hammond Carbine	B	.481	.500	—	.518	.590	1.625	2.175
50-60 Peabody**	B	.499	.508	—	.559	.645	1.456	1.919
50 Warner Carbine	B	.505	.526	—	.526	.604	.850	1.514
50 Remington Navy	B	.510	.535	—	.562	.642	.860	1.280
50-70 Govt.	B	.512	.532	—	.557	.655	1.720	2.191
56-50 Spencer Carbine	B	.512	.543	—	.556	.639	1.156	1.632
56-52 Spencer Rifle	B	.512	.540	—	.559	.639	1.035	1.500
56-52 Spencer Necked	A	.525	.547	.558	.560	.642	1.020	1.660
50 Rem. Pistol**	B	.529	.536	—	.558	.638	.875	1.300
56-56 Spencer Carbine	B	.550	.560	—	.560	.645	.875	1.545
58 Miller	B	.585	.620	—	.628	.709	1.193	1.701

A—Rim, bottleneck B—Rim, straight **Currently listed by American or other manufacturers
Unless otherwise noted, all dimensions are in inches.
These cases have slight taper at case mouth-neck measurements taken at case mouth.
Note: There is considerable variation in rimfire cartridges as to dimensions, depending on by whom or when manufactured.

Chapter 11

SHOTGUN SHELLS

(Current and Obsolete—Blackpowder and Smokeless)

SHOTGUNS, OR FOWLING pieces as they were originally called, were among the earliest firearms to achieve sporting status. Of course, the use of a number of small pellets of varying sizes for military and hunting purposes predates what we would consider true sporting firearms made primarily for that pursuit. Originally, all guns were smooth-bored because rifling was unknown until around 1500. American colonists used shot in their flintlock muskets because it was easier to hit small moving targets such as birds or rabbits. Single- and side-by-side double-barrel flintlock shotguns reached a high state of development in the late 18th and early 19th centuries.

In England, Joseph Manton and others turned out high quality flintlock shotguns that were the equal of any made today. When percussion replaced the flintlock, fine shotguns of this type were also manufactured. As a matter of fact, single- and double-barrel muzzle-loading percussion shotguns were still popular until the early 20th century. This was not due to reluctance by hunters to accept the new breechloaders, but because muzzleloaders were cheaper and didn't require expensive shotgun shells. For a largely rural population, it was simple economics. *(Editor's Note: It also allowed on the spot custom loading.)*

The first breech-loading shotguns appeared in the late 1840s, although some experimental types go back much earlier. The Lefaucheaux pinfire shotshell was patented in France in 1836. In 1852 Charles Lancaster marketed an improved breech-loading shotgun which was followed by others, leading gradually to our modern break-open type. The 1864 Schuyler, Hartley and Graham catalog illustrates several breech-loading shotguns.

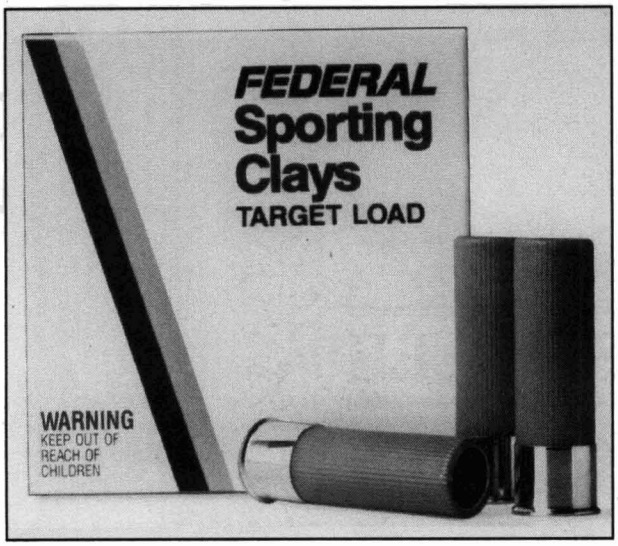
The general acceptance of the breechloading shotgun depended on the development of a gun that was affordable by middleclass hunters rather than only the wealthy. One disadvantage of the flintlock, percussion lock and the pinfire is that they all require external hammers. As soon as breechloaders firing self-contained centerfire ammunition became available, a number of internal lock type shotguns began to appear, starting in the 1870s. The first modern, hammerless, breech-loading double gun was the Anson and Deeley introduced in England in 1875. This shotgun incorporated the self-cocking principle—that operated when the breech was opened—typical of all present day doubles.

The slide-action shotgun was developed in the United States in the late 1800s and is today the most popular type in this country. This is a matter of economics because one can purchase a good slide-action shotgun for less than half the price of a double. The principal of choke boring was recognized by 1871 but was not widely known or used prior to that time. In that year it was further developed and publicized by the American Fred Kimble. Shortly thereafter choke boring became standard on practically all shotguns. Walter Roper, an American, was issued the first patent for choke boring in 1866. However, his screw-on device was for single barrel guns only and did not become popular. By 1990, screw-in chokes had become the practice on nearly all shotguns.

The shotgun has the distinction of being the first firearm to use smokeless powder. Commercially available smokeless powder shotgun shells were first loaded under the 1864 patent of Prussian Captain E. Schultz. Smokeless powder rifle ammunition didn't appear until 20 years later. Schultz's powder was manufactured from nitrated wood pulp and was marketed by Du Pont for many years. The British were still loading it up to 1939. Shot of uniform size and quality was available after 1769 when the Englishman William Watts discovered the advantage of dropping molten lead from a high tower.

Bore and Gauge Defined

The gauge or bore diameter of a shotgun is designated differently than that of a rifle or pistol; the system used goes back to earliest muzzle-loading days. It was the custom then to give the "gauge" of muskets in terms of how many lead balls of the bore diameter weighed one pound. A 12-gauge, thus, had a bore of such diameter that a round lead ball weighing $^1/_{12}$-pound would just enter the barrel. Sometimes gauge was given as a twelfth-pounder or twentieth of a pounder (20-gauge). In England modern terminology often uses "12 bore" or "20 bore," rather than gauge although the two mean the same thing. The gauge system has persisted to the present time. However, there are exceptions such as the 410-"gauge" which is



actually 68-gauge or .410 caliber and the 9mm rimfire shotshell which is also a caliber, not a gauge. At one time shotguns were made in every gauge from about 1-gauge down to 32-gauge. Shotguns above 4-gauge were usually punt guns mounted on some type of support or swivel and used in boats for market hunting of waterfowl. American manufacturers no longer load shotshells larger than 10-gauge for sporting use, but some European companies still turn out 8-gauge shells. Up to the time of the first World War the variety of shot sizes, loads, shell lengths and types of powder was truly amazing. At one time 6500-7000 different factory loads were available. When one added custom and special-order items, the figure was double that. After 1920 the variety of loads was drastically reduced until today only about 200 or so combinations remain.

Modern Shotshells

Shotgun shells were originally made from wound paper or drawn brass, although they have also been made from drawn aluminum, cast zinc and molded or drawn plastic. Paper shotshells consisted of a laminated paper tube made by winding glue impregnated paper sheets around a mandrel. The tube was then coated with paraffin wax to make it moisture resistant, cut to proper length and one end plugged with a tightly rolled paper or composition base wad. The final step was to add a crimped-on brass (or other metal) head which incorporated the rim and primer pocket. The height of the internal base wad determined the volumetric capacity of the hull and therefore loading density. Cases were divided into high-base and low-base types depending on how they were to be loaded.

In general, the low basewad was used with black or bulk smokeless powder because these powders required more volume. The high basewad was used with dense smokeless powders that required less volume. The term high-base or low-base does *not* refer to the heights of the brass head. Over the years shells with a high-brass head have become associated with high velocity or magnum loads and shotshells with low metal heads with target or light field loads.

Almost all modern shotgun shells are made from some variety of polyethylene plastic. Such shells were first introduced by Remington in 1958. Most plastic shells have metal heads of brass, brass-plated steel, or anodized aluminum. A few makers have marketed all plastic shells without metal heads. One brand, ACTIV, has no outside metal head but uses an internal perforated steel washer to reinforce the rim to prevent the extractor from ripping through it. Plastic shotshells are made either by injection molding, compression molding or extrusion, often incorporating an integral basewad.

Smokeless powder has completely replaced blackpowder for loading shotshells. Early smokeless powders were termed "bulk" powders because they could be loaded bulk for bulk with blackpowder. However, they didn't weigh the same even though ballistics were similar with equal volume. A system of nomenclature evolved to accommodate this. Regardless of the powder type, the charge is given in "drams equivalent." Thus, a shotshell marked $3^1/_4$-$1^1/_4$ means the ballistics are the same as $3^1/_4$ drams* of blackpowder and $1^1/_4$ ounces of lead shot, and so on. The ballistics will be approximately the same regardless of brand or the powder used by the manufacturer. Du Pont Bulk Shotgun was the last bulk-type smokeless powder manufactured. All others are designated "dense" and require much less space than black or bulk powders.

Shotgun shell primers differ from rifle primers in size and type. The three or four piece No. 209 battery cup primer is used in most modern shells. Until recently, some European shotshells used Gevelot type primer. Brass shotshells usually take large rifle primers. Brass shells are shorter, but have the same volume as those of paper or plastic. They require large wad diameters as well.

Slugs

It was common practice with muzzle-loading shotguns to load a solid round ball for big game hunting. This worked fine if the range was short, but accuracy beyond 40 yards was poor. It could be improved by using a patched ball, but the lack of proper sights limits what can be accomplished with a smooth-bored gun. When self-contained shotshells arrived, they were furnished in all gauges with a round ball loading. However, when choke boring became common, it was necessary to use an undersized ball to prevent possible damage to the choke. Therefore, it became common practice to load a ball one or two gauges smaller than the bore. Thus, a 13-gauge ball was loaded in 12-gauge shells, a 17- or 18- gauge ball in the 16-gauge and so on. These undersize lead balls usually suffered deformation in passing through the choke, so were less accurate than the bore-size balls. Round ball loads in 12- and 16-gauge were useful in heavy brush where they offered good short-range knockdown power on deer-size animals. Also 4-, 8- and 10-gauge balls were used on dangerous game in Africa and India. Round ball loads were discontinued in 1941.

The rifled slug has an accuracy potential that will allow one to hit deer at ranges of 100 yds. All this provided your

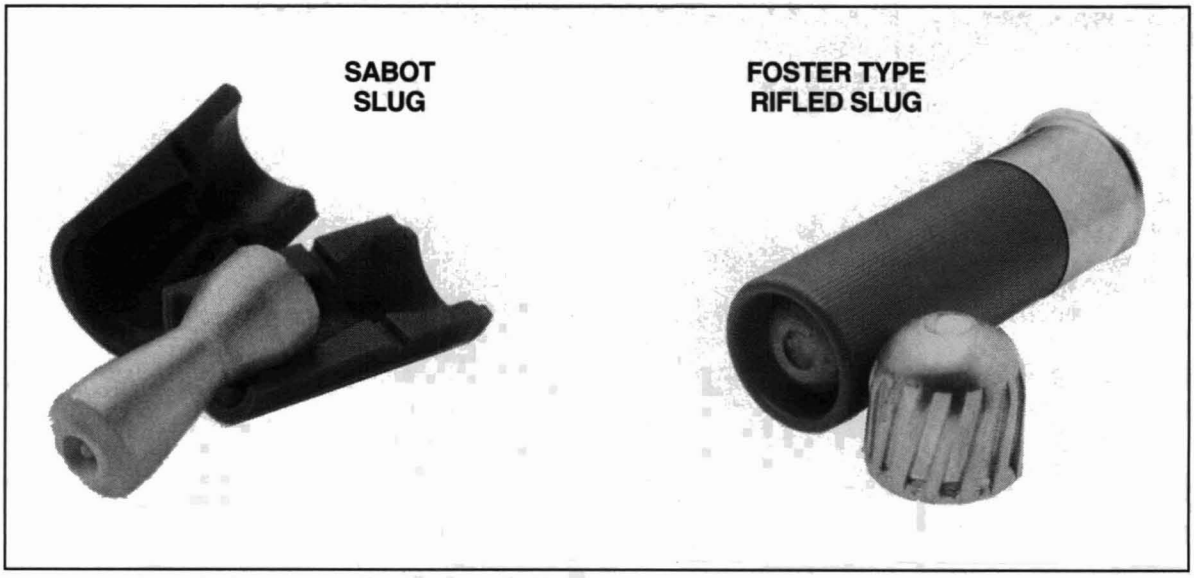
*16 drams = 1 ounce = 437.5 grs.

shotgun is equipped with a set of rifle sights and is properly sighted in. Rifled slugs were introduced by RWS in Germany in 1898. This slug, the Brenneke, is still available under the Rottweil label. The American, or Foster type slug, was introduced by Winchester in 1936. The two differ in that the Brenneke is a solid lead slug with a series of felt and card wads screwed to the base, whereas the Foster type has a deep hollow base similar to the old Minie-projectile used during the Civil War. Both have a series of angular rifling grooves swaged into the outer circumference. Both work on the same principal as the badminton shuttlecock in that most of the weight is forward of the center of air pressure which causes them to fly point forward. The rifling imposes a very slow spin rate as air flows through the rifling grooves. The slow rotation reduces yaw and adds stability. Firing experiments with Foster slugs minus the rifling grooves have demonstrated that although they still fly point first, accuracy is cut in half.

There is a third type of shotgun slug on the market that is quite different than the Brenneke or the Foster. This is the discarding sabot slug. This type is smaller in diameter than the other two, made of lead with a Coke-bottle shape and is enclosed in a two-piece discarding plastic sabot. It does not have rifling grooves and maintains point forward flight because of the shape. Both Winchester and Federal offer this type. Although the sabot slug is of smaller diameter than the Brenneke or the Foster, it weighs about the same. The 12-gauge Brenneke weighs 491 grains, the Foster 438 grains and the sabot slug 450 grains. Federal also loads a heavier 12 ga. Foster type slug that weighs 548 grains. When the sabot slug is fired, the two halves of the sabot separate rapidly and hit the ground a few yards down range.

American rifled slugs start out at about 1600 fps except the 410 which is listed at over 1800 fps muzzle velocity. The Brenneke has a muzzle velocity of over 1500 fps and the sabot slugs 1450-1550 fps. From time to time someone comes up with a new shotgun slug, but they are usually only a variation of the preceeding three types.

The Ithaca Gun Company pioneered the development of slug barrels for their slide-action shotguns. Today, virtually every manufacturer of repeating shotguns turns out slug models or furnishes special slug barrels. Shotguns intended primarily for shooting rifled slugs are characterized by barrels shorter than the usual shot barrel, anywhere from 18 to 24 inches, Cylinder or Improved Cylinder choke boring and rifle sights. Most manufacturers offer models with rifled barrels for slug shooting. When Ithaca did their original work on slug barrels during the early 1960s, the conclusion they reached was that maximum accuracy required a highly polished, Cylinder-bored barrel with a set of rifle sights. They reported 2-inch five-shot groups at 40 yards and 9-inch groups at 100 yards. Some shooters, using the Ithaca Deerslayer 12-gauge equipped with a scope sight, recorded 6-inch groups at 100 yards. Some manufacturers recommend the Improved Cylinder boring as providing the best slug accuracy. Remington in particular suggests this as the most accurate choke with their rifled slugs. Using slugs in tighter chokes, up through Full or Extra Full, is alright according to the manufacturers who say the slugs are designed to pass through any degree of choke without damage to the guns. Slugs can also be used through adjustable choke devices, but the most open setting should be used for best accuracy.



In the years since Ithaca did their original work, there has been a fair amount of additional testing by various individuals. The usual approach is to take one or two shotguns out to the range along with lots of rifled slug ammunition of different brands. Conclusions are drawn on the basis of how the slugs shoot in these one or two shotguns yet there is a considerable difference in the way different shotguns handle rifled slugs. This is true even between guns of the same make and model. From such information one can only make general inferences. One can only arrive at general conclusions. That is to say, such and such is true with the shotguns used in the test, or that it is generally true but might not apply to all shotguns. In addition, many shotguns are like rifles—they will shoot much better with one brand of slug than another. The fact that one particular load shoots the best in one particular shotgun does not suggest that it will also shoot the best in some other gun. Even lot number changes can, and do, matter.

Chronographing shotgun slugs has shown some inconsistencies. Different guns and different chokes give different velocities, but that is not unexpected. Rifled slugs seem to generate maximum muzzle velocity in 18- to 20-inch barrels. Anything over that is more for balance or looks. Minor variations in velocity are of little consequence within the accuracy range of the shotgun slug. The ballistics of the shotgun slug may not be spectacular, but that big heavy slug packs a lot of energy when it connects. Sabot slugs retain more striking energy and have flatter trajectories than other types. Anything smaller than the 12-gauge slug cannot be considered adequate for any North American big game. The 410 slug is useless for anything but small game at short range. The 12-gauge Brenneke slugs have proven effective on thin-skinned African game including some dangerous species such as lion and leopard. Shotgun slugs can be compared to the old large-bore blackpowder cartridges such as the big 45- and 50-caliber numbers. If you could only own one gun, consider a 12-gauge shotgun with an extra slug barrel. It will cover a greater range of game and hunting conditions than any other single gun.

Buckshot

Buckshot comes in seven standard sizes, from No. 4 (.24-inch) to No. 000 (.36-inch). The smaller sizes, offer more pellets in any shell of a given size. The larger sizes of buckshot can be used for deer hunting in some parts of the U.S. It is also used in Africa, on occasion, against leopard and lion in heavy brush. It can be quite effective against soft-skinned game at short range. There are two schools of thought in regard to the use of buckshot: One school advocates the use of larger pellets, Nos. 0 through 000, because they are heavier, have more energy per pellet at any given range, and penetrate deeper. The other school argues that the smaller sizes, No. 4 through No. 1, provide more pellets per load, and a greater multiple hit probability. Also they believe that multiple hits with smaller pellets are just as deadly as a single hit with larger pellets. While there is a certain validity to both sides, it depends on what you are going to hunt. If a dangerous animal is involved, don't use anything smaller than No. 0 (.32-inch).

Muzzle velocity of buckshot loads is about the same as other shot loads, from about 1200 fps to around 1300 fps. The effective range of buckshot is about 40 yards, depending on the number of pellets and the size of the target. The most uniform buckshot patterns are thrown by Cylinder and Improved Cylinder chokes. A tighter choke deforms the pellets as they pass through the constriction so they do not fly true.

Modern buckshot loads with copper plated hard lead pellets, granulated plastic buffer material, folded crimp, and pellet protector plastic wad columns offer superior performance to older buckshot loads.

Up until World War II, some very well made, moderately-priced side-by-side double-barreled shotguns were made in the United States. Today American shotgunners have pretty much opted for the single-barrel repeater. The slide-action shotgun dominates the U.S. market at present. This is not bad, because for the money the American-made repeating shotgun is one of the most durable and reliable guns made anywhere. There is a good choice of imported side-by-side and over/under doubles available,

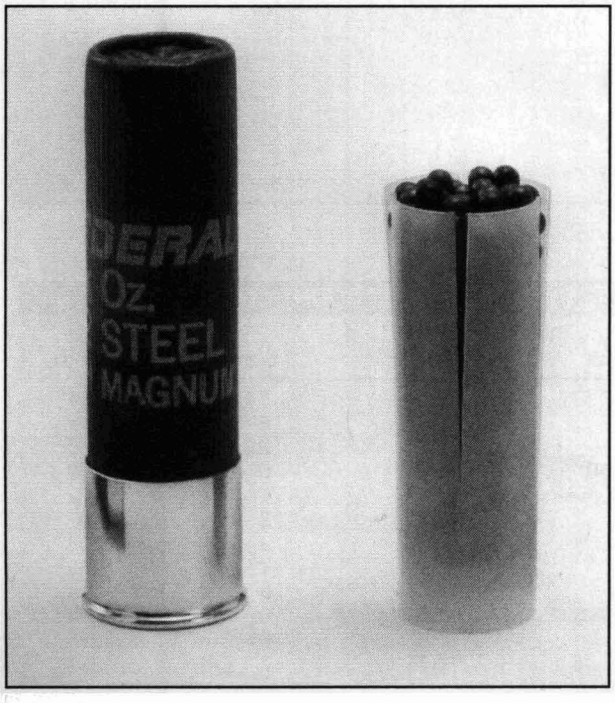
but most of them are expensive. However, some moderately-priced ones are made in Spain and South America and imported under various trade names.

The type of shotgun used is largely a matter of personal preference and one has no great advantage over another as a practical matter. As to gauge, the 12 will cover the widest variety of game and hunting conditions. For the man on a limited budget, the repeating 12-gauge with an adjustable or interchangeable choke system is the way to go. The 16-gauge is almost as good but very few guns are still made in this gauge. Actually, the best shotgun is the one in which you have the most confidence and do the best shooting with. There is nothing wrong with the 20, 28 or even the 410 except that they impose limits on what you can hunt effectively. At one time, smaller gauge shells were less expensive, but today they cost about the same as the larger gauges, so economy is no reason to pick one of them unless you reload.

Shotgunning Myths

There are all sorts of odd ideas in regard to shotguns. It is at least worth some effort to stamp out a few of these. For example there is the idea that some shotguns shoot "harder" than others of the same gauge. The idea may arise in part from the fact that some shotguns have poorly fitted stocks. Since the apparent recoil is more severe than similar guns, the owner decides he has a harder shooting gun. On the other hand, a man who has a gun that fits and handles exceptionally well may conclude he has a "hard shooter" because he does such good work with it.

Another outdated belief is that the longer the barrel the longer the effective range. Modern smokeless powder shotshells develop maximum velocity in about 20 to 22 inches of barrel. Anything over that is just for balance and looks. If the barrel is too long, it will actually reduce velocity slightly through friction or drag. A shotgun with a 26-inch barrel will kill just as far away as one with a 40-inch barrel. In addition, the short barrel will be much faster in getting on target. In deference to those who refuse to accept this, some shotgun manufacturers provide at least one model available with extra long tubes! If it takes a 36-inch barrel to make you happy or build your confidence, by all means use one. However, it does not give you any ballistic advantage over the fellow with a much shorter barrel.



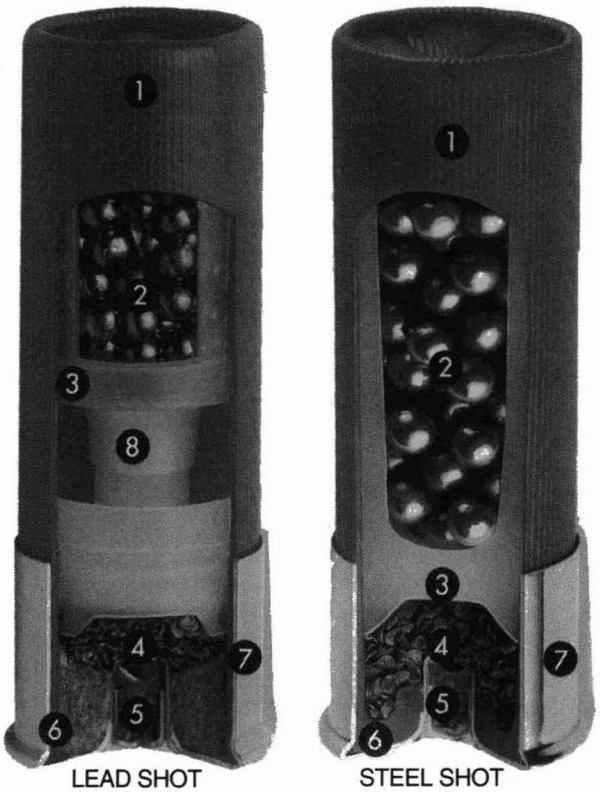
The effective range of shotguns is another matter usually subject to much argument and misunderstanding. Some people believe the larger the gauge the higher the velocity; others believe the smaller the gauge the higher the velocity. Obviously, there is room for all sorts of confusion here. Actually both are wrong. The average muzzle velocity of a similar 10-, 12-, 16- or 20-gauge load is nearly the same. Why then, the larger the gauge the greater the effective range? It's a matter of pattern density. For example, if you fire a 410 at a dove flying 40 or 50 yards away, the chances are he will fly right through the pattern without being touched. If he does get hit, the pellet or pellets will do as much damage as if fired from a 12-gauge. On the other hand, if you fired at this same bird with a 20-gauge, your chances of bringing him down would be greater because you have thrown more pellets in his path. With a 12-gauge at this same range, the pattern density is great enough that the chances of the bird slipping through are not good at all. We are assuming here the same degree of choke for all guns, because choke controls pattern size and density at a given range. There is not much difference in the actual diameter of the pattern thrown by different gauges at the same range if all other factors are equal. However pattern density, the number of pellets in the pattern will vary according to gauge with the advantage going to the larger gauges. This is also contrary to common belief, so if you disagree, go out and pattern a number of guns of different gauge, but similar choke. Be sure you use the same size shot and type of load in all guns.

The Steel Shot Issue

It has been recognized since the late 1800s that ingestion of lead shot by bottom-feeding waterfowl can cause a toxic reaction leading to the death of the bird. In 1959, a wildlife biologist named Frank Bellrose completed a 15-year study on the possible effects of lead shot ingestion and resultant lead poisoning (plumbism) on North American waterfowl. The results of this study were released in a bulletin known as the Bellrose Report. One of the conclusions in this report is that between 2 and 3 percent of the waterfowl species in North America are lost each year through lead poisoning. This was actually only a rough estimate based on incomplete data.

The Bellrose study was based on the examination of bird gizzards furnished by hunters who took them from live, healthy birds they had shot. In other words, none of the wildfowl in the study were suffering from or had died from lead poisoning.

The Bellrose Report was not intended to be a final conclusion, but rather an effort to point out a potential problem in a limited area, possibly requiring further study. Unfortunately, this report was seized on by the U.S. Fish and Wildlife Service and the National Wildlife Federation as a cause celebre, something that would demonstrate their deep concern for wildfowl and the ecology.



1. TUBE
2. SHOT
3. WAD
4. POWDER
5. PRIMER
6. BASE WAD
7. HEAD
8. CUSHION (lead Only)

The original study encompassed a relatively small area in the Midwest, but this did not stop the extrapolation of the data to cover all of North America although there was no valid basis for such a conclusion. Others have tried to expand this invalid theory to cover other animals with the claim that predatory birds, such as eagles and hawks eat duck, rabbits and other game. If these are carrying lead shot in their bodies it is a large factor in reducing the population of the predators. This seems a very weak case.

What these people are doing is making sweeping claims without any solid empirical data to support them with the aim of banning lead shot from the hunting field entirely. Their solution to this self-made problem is low carbon, annealed steel shot, which also creates problems of its own.

Steel shot is about the only presently approved substitute for lead shot since copper and other alloys have toxic properties of their own. Tungsten alloy shot would be nontoxic and would have ballistic properties superior to lead. However such shot would be expensive.

As it turns out, steel shot has a lot of bad features, not the least of which is the ability to ruin the bores of older shotguns now in the hands of hunters. It is as hard as the barrel steel of many high-grade shotguns and can dig grooves in the bores if allowed unprotected contact. Also steel shot won't compress the way lead shot does as it passes through the choke and so will eventually bulge the choke area.

The manufacturers have begun to make shotgun barrels heavier, thicker and of harder steel as steel shot

TYPICAL LEADS FOR STEEL SHOT LOADS AND WATERFOWL CROSSING AT RIGHT ANGLE

MV (fps)	Shot Size	Lead in Feet at Range 30 yds.	40 yds.	50 yds.
12-gauge, 3-inch, 1 1/4-ounce				
12-gauge, 2 3/4-inch, 1 1/8-ounce				
1375/1365	BB	4.7	6.7	9.0
	1	4.8	6.9	9.3
	2	4.8	7.0	9.5
	3	4.9	7.1	9.7
	4	5.0	7.3	10.0
	6	5.2	7.7	10.7
12-gauge, 3 1/2-inch, 9/16-ounce				
20-gauge, 3-inch, 1-ounce				
1335-1330	2	4.9	7.2	9.7
	3	5.0	7.3	9.9
	4	5.1	7.4	10.1
	6	5.3	7.8	10.9
10-gauge, 3 1/2-inch, 1 5/8-ounce				
12-gauge, 2 3/4-inch, 1 1/4-ounce				
1285/1275	T	4.9	6.9	9.2
	BBB	4.9	7.0	9.3
	BB	4.9	7.1	9.5
	1	5.0	7.2	9.8
	2	5.1	7.4	9.9
	3	5.2	7.5	10.2
	4	5.2	7.6	10.4
10-gauge, 3 1/2-inch, 1 3/4-ounce				
12-gauge, 3-inch, 1 3/8-ounce				
1260	T	4.9	7.0	9.3
	BBB	5.0	7.1	9.4
	BB	5.0	7.1	9.6
	1	5.1	7.3	9.9
	2	5.2	7.4	10.1
	3	5.2	7.6	10.3
	4	5.3	7.7	10.6

Actual leads can vary with target speed. Lesser angles will require lesser leads.

LEAD VERSUS STEEL PELLET WEIGHT

Lead Pellet Size	Lead Pellet Wgt. Grs.	Steel Pellet Size	Steel Pellet Wgt. Grs.
BBB	10.4	F(TTT)	11.0
BB	8.8	TT	9.6
BB	8.8	T	8.3
B	7.3	BBB	7.1
1	6.1	BB	6.1
2	5.0	B	5.0
3	4.1	1	4.3
4	3.2	2	3.5
5	2.6	3	2.9
5	2.6	4	2.3
6	1.9	5	1.8
7 1/2	1.3	6	1.4

EQUAL PELLET COUNT COMPARISONS

Steel Pellet Size	Steel Pellet # Per oz.	Lead Pellet Size	Lead Pellet # Per oz.
F(TTT)	39	T	34
TT	46	BBB	42
T	52	BB	50
BBB	62	B	60
BB	72	1	72
B	87	2	87
1	103	3	106
2	125	4	135
3	154	5	170
4	192	6	225
5	243	6	225
6	317	7	299

comes into general use. If in doubt about a particular shotgun, check with the gun factory or a good gunsmith if you contemplate the use of steel shot. Some shotguns have "FOR STEEL SHOT" stamped on the barrel. Never fire steel shot in any of the fine old doubles or any other expensive shotgun. One solution is to purchase an inexpensive shotgun made for steel shot and use that for all wildfowl shooting and save your good guns for those occasions where lead shot is permitted.

Steel shot has poor ballistic properties compared to lead shot of the same diameter. Lead shot of equal size is 44 percent denser. This means that steel shot does not carry as well as lead shot and loses velocity and energy at a faster rate. Out at 40 yards, lead shot will retain about twice the energy of comparable steel shot. Hunters should use larger shot and heavier loads to offset this. Wallace Labisky, writing in the 1980 *Gun Digest*, recommends using steel shot two sizes larger than what would normally be used in lead loads. This has become standard practice.

Mossberg, has teamed with Federal Cartridge Co. to introduce a special slide-action shotgun that shoots a new 3½-inch 12-gauge Magnum shell loaded with steel shot. This is one solution to the problem; a shotgun and shell both designed specifically for steel shot. About the only advantage of steel shot is that it doesn't deform as readily as lead shot and therefore produces a more uniform pattern at comparable ranges. Steel shotshells are available in 10-, 12-, 16- and 20-gauge. Steel shot is also loaded with a thick, tough plastic shot wad to prevent direct contact with the bore. However this may not be sufficient protection for older shotguns. Federal, Remington and Winchester all load steel shot in sizes ranging through F, T, BBB, BB, I, 2, 3, 4, and 6, depending on gauge.

Steel Shot Facts

Let's look at the characteristics and ballistics of steel shot. First off, lead and steel shot are available in the following sizes:

Shot Number	Diameter (Inches)	No. of Pellets/Oz. Lead	Steel
9	.08	585	—
8½	.085	—	—
8	.09	411	—
7½	.095	350	—
6	.11	225	316
5	.12	170	246
4	.13	135	191
3	.14	109	153
2	.15	87	125
1	.16	72	103
B	.17	59	84
BB	.18	50	72
BBB	.19	43	61
T	.20	36	52
F	.22	37	40

Steel shot has required the reintroduction of shot sizes not available for many years. Because of the weight factor, steel shot is not available in sizes below No. 6. At first glance it looks as if steel shot has an advantage over lead shot because there are more pellets per ounce. However, this is misleading because although the diameter is the same in any given size, you can't pack an ounce of steel shot into the same space occupied by an ounce of lead shot since the lead shot weighs more. That is the reason why we now have 3½-inch shells in 12-gauge. For example 3-inch 12-gauge shells are loaded with up to 2 ounces of lead shot but only 1⅜ ounces of steel shot. A 2¾-inch 12-gauge hull will hold a full ¼-ounce more lead shot than steel. If steel shot starts out at the same velocity as lead shot, it has less energy per pellet because it weighs less. A steel No. 6 pellet, for example, has less than 1 foot pound of energy at 30 yards, whereas the same size lead pellet has three foot pounds. A No. 4 steel pellet retains slightly more energy at 30 yards than a No. 6 lead pellet and this is why the ammunition makers recommend you use steel shot two sizes larger than lead shot for any given purpose.

To carry things a step further, steel BBs will deliver about the same energy as lead No. 2s. So if you use steel shot two sizes larger than lead shot, you come up with comparable ballistics. Also, according to some writers you also get an extra bonus because an ounce of steel shot has many more pellets than the same weight of lead. However, that is only true if you are comparing pellets of the same size on an ounce-for-ounce basis. That's not the way it works in practice because the heaviest load of steel shot available in 3-inch 12-gauge is 1⅜ ounces. The same shell holds 1⅞ ounces of lead shot and that is what you have to compare. Also we are advised to use steel shot two sizes larger and that too must be considered, so let's make a pellet count comparison on that basis.

Shot No.	12-Ga. 1⅞ ozs. Lead pellets	Shot No.	12-Ga. 1⅜ ozs Steel pellets
6	422	4	263
4	253	2	172
2	163	BB	99
BB	94	T	71

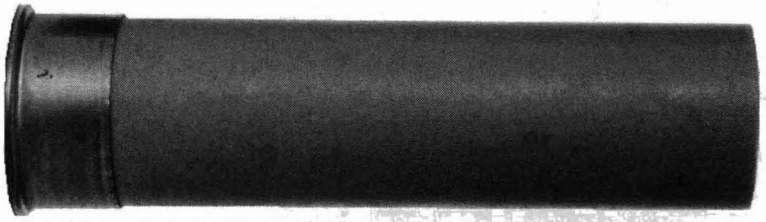
If you compare steel and lead shot on the basis of equal size, even though the steel load weighs less, it will have somewhat more pellets. On the other hand, if you go to two sizes larger with the steel shot, then with the loads available, there will always be substantially more lead pellets. This is the reason why so many hunters report that they do not shoot as well with steel shot as with lead shot. Of course, there is one last redeeming feature with steel shot, and that is it does not deform to any extent going through the gun bore and choke so it delivers more uniform patterns than lead shot.

The editor would like to thank the many shotshell collectors who provided facts and shotshells from their collections for photography. In particular, I'd like to thank Mr. Russell Hooper and Mr. Frank Napoli for providing information, photographs and sample shotshells and for their invaluable assistance. We intend to further enhance this chapter as information on the more interesting oddball shotshells becomes available.

1-4-Gauge

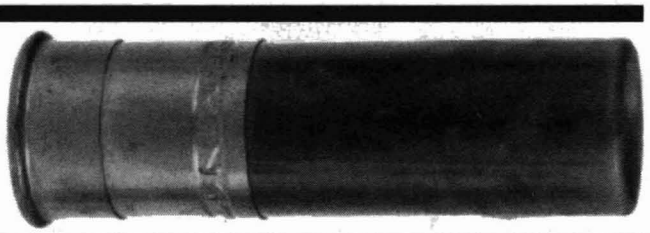
Historical Notes In most instances, gauges larger than 8-gauge were somewhat misnamed. Two-gauge shells are actually 4-gauge and 4-gauge shells actually 5- or 6-gauge. Guns chambered for such cartriges were generally either punt guns, permanently or semi-permantly mounted on movable platforms, or very heavy smoothbore or fully rifled arms used by African hunters for taking the bitggest and most dangerous species. In the former instance the guns were used by market hunters who were an important part of the expanding U.S. economy, as they provided much-needed protein for those who came to occupy new communities. The theory was to launch a vast charge of shot against large flocks of birds that were on the water. In this way the market gunner killed scores of birds with only one shot. Those used in Africa against dangerous game were quite effective and more so when the cartridge was filled with a charge of shot. These are interesting cartridges that are well worth collecting and studying.

4-Gauge



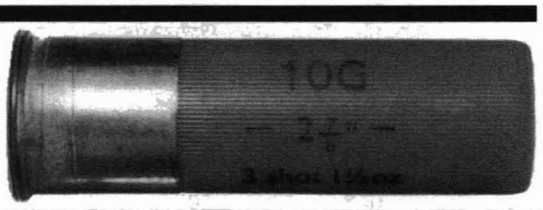
Historical Notes The 4-gauge shotgun was too big for ordinary use, but it was once popular as a market chambering. Smoothbore "rifles" and fully rifled 4-bores were very popular in Africa before the advent of cordite. Four-gauge headstamped shells are usually 5- or 6-gauge in bore size.

8-Gauge



Historical Notes This was another popular chambering that achieved widespread use in the late 1800s. In the United States and elsewhere it was prized as a long-range duck and goose chambering. While "8-gague" still sounds huge, actual loads typically launched less shot than heavy modern 12-gauge loads. In the interest of game bird conservation, laws were enacted in 1918 which prohibited the 8-gauge and larger shotgun bores for sporting use in the U.S. The most common shell lengths for this gauge are 3, 3¼ and 4 inches. Bore diameter is 0.835-inch. In England the 3¼-inch 8-gauge is currently available from Game Bore.

10-Gauge

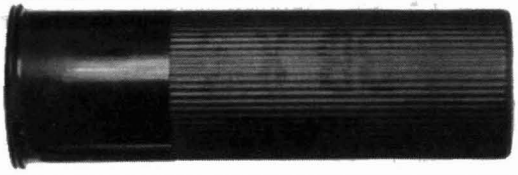


Historical Notes This is the only shotshell larger than the 12-gauge still commercially produced in the U.S. Larger gauges were outlawed for sporting use in 1918. U.S.-produced single- and double-barreled guns in 10-gauge were manufactured until WWII. Then, after a short hiatus, several arms companies reintroduced the big-10 and, for awhile, these guns gained popularity. However, two things have worked to completely eliminate any sporting benefit offered by the 10-gauge for migratory bird hunting. First was the introduction of the 3½-inch 12-gauge shell with a higher pressure standard than the 10-gauge. Second was the adoption of mandatory steel shot loads for hunting migratory species. There is nothing the 10 can do with steel shot that the higher-pressure 12-gauge loading can not do better. However, the 10-gauge still has an advantage for turkey hunting, where large doses of lead shot are preferred medicine and velocity is not so important as it is with steel shot loads. The most commonly seen shell sizes are 2⅝-, 2⅞-, 2¾-, and 3½-inch. In England Game Bore currently produces both the 2¾- and 3½-inch shells. Here in the U.S. 2¾-inch 10-gauge shells are available from New England Arms with the 3½-inch widely available from a variety of sources. Bore diameter is 0.775-inch.

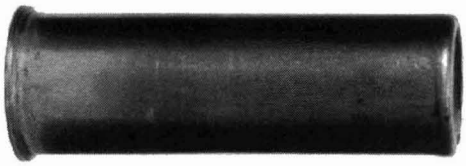
11-Gauge

Historical Notes There is very little information on this oddball shotshell. Both Parker Brothers and UMC Co. headstamps are known producers both listed in West Meridan, Connecticut. The Parker shell featured a large American-type Berdan primer with three holes inside the case. The UMC loading evidently featured an internal primer as it had no external opening to accept a primer. Best information is that two double guns and about 200 shells were made in the 1890s. Dimensions for the 11-gauge are: Rim, 0.835″; base, 0.790″; mouth, 0.782″; length, 2.5″. 11-gauge bore diameter is .751-inch.

12-Gauge

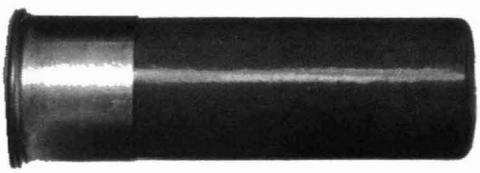


Historical Notes If there is one shotshell that holds all titles as most versatile, most popular and most varied in loading, the 12-gauge is it. Except for the 22 rimfire, by almost any measure, the 12-gauge is the most popular sporting chambering ever offered. It is commonly available loaded with shot made of lead, steel or bismuth. Current shot charges range from about $^{7}/_{8}$- ounce to $2^{1}/_{2}$ ounces. Common shot sizes range from #9 through 000 Buck. Slugs are typically 1-ounce or $1^{1}/_{4}$ ounces but other weights are available. Further, it is relatively simple to have a moderate-sized batch of custom-loaded 12-gauge ammunition with either an odd-sized shot or reduced velocity, produced by a major manufacturer. To gain a true perspective, just consider that at one time in this country there were literally thousands of distinct 12-gauge loadings offered. Even today, 12-gauge commercial offerings from only the big three shotshell manufacturers total 435 unique manufacturer and component combinations. Further, other significant commercial manufacturers offer hundreds more loadings, especially in steel and bismuth shot. In fact, commercially available unique 12-gauge loadings exceed the total of all currently available high-powered rifle loadings for all calibers by a significant margin. The 12-gauge has been and is still used for police and military applications and, as recently as the Viet Nam conflict, was the preferred weapon of front-line troops for jungle combat. No gun is more intimidating or more effective for home defense situations. Properly loaded, the 12-gauge is at home, given proper loads, hunting big game up through whitetail deer at ranges to about 100 yards with some shotguns and loads stretching useful range a bit further. For sporting use the 12-gauge performs admirably on clay pigeons. The key word here is versatility. If any chambering offers that characteristic, this is the one. In 1866 a rebated rim reloadable steel 12-gauge shell was patented by a Mr. Thomas L. Sturtevant. Revolving magazine four-shot guns chambered for this shell were offered by the Roper Sporting Arms Company until the early 1880s. Eley in England currently produces 2- and $2^{1}/_{2}$-inch shells while here in the U.S. the $2^{3}/_{4}$-, 3- and $3^{1}/_{2}$-inch lengths are most common and available from a variety of sources. Longer and shorter versions exist and a rebated rim $2^{3}/_{8}$-inch steel case is known to have been produced. Bore diameter for the 12-gauge is .729-inch.



An all-brass handloaded shotshell loaded with 00 buckshot sent to DBI Books publisher Chuck Hartigan as a gift from Mike and Mary Decker of Kingston, Idaho, after he admired it on a shelf in their restaurant in 1994. The editor believes the components used were from Winchester circa 1916.

14-Gauge

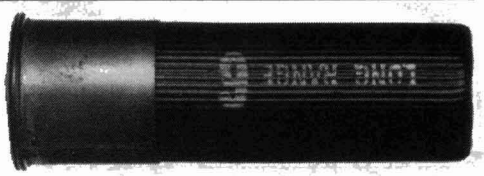


Historical Notes This chambering was generally available between 1880 and the early 1900s. Shells were domestically available until sometime after WWI and generally available in Europe until the 1970s. Original loads included a 3-dram, 1-ounce load. Shells in this gauge are again domestically available from specialty importers. The 14-gauge was experimented with in the 1950s by Winchester in an aluminum casing using both roll and modified roll crimps. There was also a modified version using a 12-gauge case head and lower body. Both brass and plastic versions of these latter are known. Most commonly seen shell lengths are 2, $2^{1}/_{2}$ and $2^{9}/_{16}$ inches. The French still produce empty hulls for the $2^{9}/_{16}$-inch version. Bore diameter for the 14-gauge is .693-inch.

15-Gauge

Historical Notes Winchester's 1877 catalog listed brass shells in this gauge. That was the only year these were listed. Obviously the 15-gauge is extremely rare. Examples are found only in the best collections. The 15-gauge would have a bore diameter of .677-inch.

16-Gauge



Historical Notes The 16-gauge lingers on, in what seems to be a nearly perpetual state of surprising continued existence. Introduction of 3-inch 20-gauge loadings should have sounded the 16's death knell since the 20-gauge can launch the same shot charge at just about the same velocity and, with modern plastic shot cups, patterning is substantially equivalent. However, there are just too many perfectly good 16-gauge guns still in use and the shells, in surprising variety, are still commonly stocked at the retail level. The 16-gauge is even available in steel shot loadings. In 1866 a rebated rim reloadable steel 16-gauge shell was patented by a Mr. Thomas L. Sturtevant. Revolving magazine four-shot guns chambered for this shell were offered by the Roper Sporting Arms Company until the early 1880s. The most common shell lengths in this gauge are $2^{1}/_{2}$- and $2^{3}/_{4}$-inch, both currently produced by various European manufacturers, and the latter in U.S. production. The bore diameter for 16-gauge is .662-inch.

64 Maynard

Historical Notes Brass shells of this description were loaded for various models of Maynard sporting guns. The Model 1865 used a $2^{15}/_{16}$-inch shell with a boxer primer. The 1873, adapted to both the #3 and #4 breech-loading shotguns used a $2^{17}/_{16}$-inch case featuring a modified Berdan primer. The Model 1882 was adapted to a reloadable case of $2^{17}/_{16}$-inch length. This gun, when equipped with interchangeable barrels, also fired the 40-40 Maynard cartridge. All Maynard shotshells were made with brass cases. This bore diameter corresponds to about 18-gauge.

18-Gauge

Historical Notes This European gauge was loaded for use in shotguns manufactured by Braun & Bloem, Kynoch and Gustave Genschow. United Metallic Cartridge Company produced a small batch for use in an experimental Browning shotgun. These shells were $1^{7}/_{8}$ inches long and sometimes featured a 20-gauge headstamp. There were also pinfire versions of the 18-gauge. This gauge is a .637-inch bore.

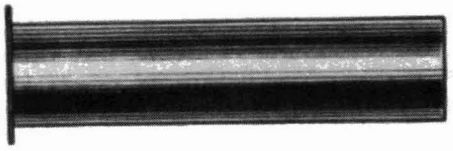
20-Gauge

Historical Notes Very much alive and well, the 20-gauge has always been popular because it can be chambered in a smaller, lighter gun compared to the 12-gauge and offers sufficient punch for use against most sporting fowl. It is also completely at home breaking clay pigeons. Usefulness of the 20-gauge has improved dramatically since the blackpowder era when the top loading was $2^{3}/_{4}$ drams with $^{7}/_{8}$-ounce of shot. The comparatively recent standardization of the 3-inch loading brings 20-gauge performance into a new class with shot charges up to $1^{1}/_{4}$ ounces at higher velocity. Loaded with modern shot-protecting cups, the 20-gauge 3-inch Magnum practically duplicates the performance of top 16-gauge loads. Current loadings range from 1 to $1^{1}/_{4}$ ounces of shot and include several buckshot combinations and the $^{5}/_{8}$-ounce slug. Steel shot loadings up to 1-ounce are gaining in utility and popularity. By a wide margin the 20-gauge is the second most popular U.S. chambering. The $2^{1}/_{2}$-inch version is currently available from various European manufacturers. Bore size is .615-inch.

24-Gauge

Historical Notes Single shot shotguns in this bore size were produced in the U.S. until the late 1930s by Stevens and Harrington & Richardson. The standard load was 2 drams equivalent and $^{3}/_{4}$-ounce of shot. Shells in this gauge, and the double barrel guns that shoot them, are still manufactured in Europe. These have recently been available in the U.S. through American Arms Company and Beretta. Both CBCC and Fiocchi have made this ammunition available domestically. Current loads launch $^{11}/_{16}$-ounce of shot. The most common shell lengths in this gauge are 2 and $2^{1}/_{2}$ inches. The $2^{1}/_{2}$-inch version is still produced by Fiocchi. Bore size is .580-inch.

55 Maynard



Historical Notes Brass shells of this description were loaded for the various models of Maynard sporting guns. The Model 1865 used a $2^{1}/_{4}$-inch shell with a boxer primer. The Model 1873, adapted to both the #1 and #2 breech-loading shotguns used a $2^{3}/_{8}$-inch case featuring a modified Berdan primer. The 1882 loading used a reloadable case of $2^{5}/_{16}$-inch length and was adapted to the #1 and #2 breech-loading guns. This bore size corresponds to the 28-gauge.

28-Gauge

Historical Notes The 28-gauge $2^{3}/_{4}$-inch is currently manufactured in the U.S. The original blackpowder loading used a $2^{1}/_{2}$-inch shell with $1^{3}/_{4}$ drams of powder and $^{5}/_{8}$-ounce of shot. Federal Cartridge now lists a $2^{3}/_{4}$-inch, $2^{1}/_{4}$-dram, $^{3}/_{4}$-ounce load with either #6, #$7^{1}/_{2}$ or #8 shot and a velocity of 1295 fps. The 28-gauge is perfectly adequate for use in hunting upland birds and is at home breaking clay pigeons. However, recent innovations in shotshell technology have limited the 28-gauge's popularity since 3-inch 410 loadings can practically duplicate 28-gauge performance. Nevertheless, light, easy handling and graceful guns still attract shotgunners; the 28-gauge hangs on to a small but dedicated following, chiefly for this reason. Bore size is .550-inch.

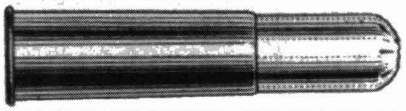
32-Gauge

Historical Notes U.S. manufacturers offered 32-gauge guns well into the 1930s. The Winchester Model 1886 rifle was routinely offered on a custom basis especially chambered and barreled for the 32-gauge shotshell, which is essentially a 52-caliber bore. The standard loading was 1/2-ounce of shot but a 5/8-ounce shot load and a 158-grain round ball loading were offered. Loads in this gauge have been continuously available in Europe and shells are domestically available through Fiocchi loaded with either #6 or #8 shot. Guns in this chambering have recently been imported through the American Arms Company. Even before WWII, the 410 practically duplicated 32-gauge performance. Nevertheless, light, easy handling guns with graceful lines still attract European shotgunners; the 32-gauge hangs on to a small but dedicated following there, chiefly for this reason. Currently Fiocchi offers the 2 1/2-inch shell. Actual 32-gauge bore size is .526-inch.

11.15x52mm

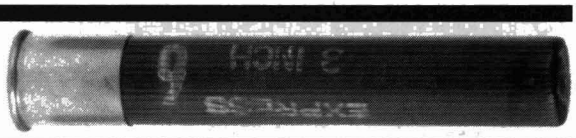
Historical Notes This European brass shotshell was popular in the early 1900s. It was generally loaded with shot but was also available in a ball loading for use in rifled barrels. Performance of this loading would be quite similar to the modern 44 Magnum shot loadings offered by CCI/Speer. The intended purpose was small game hunting. For targets the size of rabbits and hares, the 11.15x52mm was reasonably effective. This bore size corresponds to 0.439-inch and would be called a 55-gauge.

44 XL (1 9/16-inch)



Historical Notes Made in the early 1900s, shotguns in this bore size were intended solely for use in hunting small game. This could be considered a forerunner to the 410 shotshell. Brass cases and paper shot containers were used. Overall length was 2 1/32-inch with a case length of 1 9/32 inches. The standard loading used #8 shot in a folded paper container, which protruded substantially from the brass case. Both single barrel and double barrel shotguns were offered in this chambering. Actual bore diameter was similar to the 44-caliber rifle cartridges (0.425-inch) and would be called 61-gauge.

410 Bore



Historical Notes Though gun and load selection is somewhat limited, the 410 bore (12mm) is a perfectly good dove and quail chambering and can be argued as the ideal small game combination. A light handy 410 breech-break shotgun is a pleasure to carry on long hunts and top 3-inch loads deliver all the punch necessary to cleanly anchor rabbits and smaller species. Many use this diminutive chambering for breaking clay pigeons. Interestingly, it is possible to fire 410 shells in 45-70 chambered rifles. There is also a slug loading but its value for any purpose is certainly moot. The 410 follows the 12 and 20 gauges in popularity. Many young shooters have learned to shoot with a 410 and that tradition continues. The .410-inch bore would be called 68-gauge.

360 Centerfire

Historical Notes Similar to the more popular 9mm rimfire, this chiefly European chambering is strictly in the small game and pest control genre. Shells are found in both paper and brass and are 1 3/4 inches long. While it might be possible to dispatch smaller species of small game with this and other of the various diminutive shotshell chamberings, such use is questionable. Nevertheless, none of these are toy cartridges. All high-velocity shot pellets are equally dangerous, regardless of the source. The chief problem with the various diminutive shotshells is the lack of sufficient shot volume to achieve useful hunting pattern density with shot of sufficient size to get the job done. A 0.360-inch bore would be called a 99-gauge.

9.1x40mm

Historical Notes The 9.1x40mm (.358″x1.575″) was an early European shotshell intended for small game hunting. It was also offered in a ball loading for use in rifles. While it might be possible to dispatch smaller species of small game with this and other of the various diminutive shotshell chamberings, such use is questionable. The chief problem with the various diminutive shotshells is the lack of sufficient shot volume to achieve useful hunting pattern density with shot of sufficient size to get the job done. This corresponds to a 0.358-inch bore and would be called a 101-gauge.

9mm Rimfire

Historical Notes Offered by Winchester for use in the Model 36 shotgun, which was introduced in 1920 and discontinued in 1927. Only 20,306 such shotguns were made. While that is a surprisingly small production total for a mainline arms manufacturer, it is a lot of units for a gun with such limited usefulness and limited market. The only viable use for such a chambering is pest control. While it might be possible to dispatch smaller species of small game with this and other of the various diminutive shotshell chamberings such use is questionable. The chief problem with this and other diminutive shotshells is the lack of sufficient shot valume to achieve useful hunting pattern density with shot of sufficient size to get the job done. The shotshell length was $1^{9}/_{16}$ inches. This corresponds to a 0.354-inch bore and would be called a 105-gauge.

9mm Centerfire

Historical Notes Recently available in Europe (Spanish manufacture), these are found with plastic bodies and a metal head. The only viable use for such a chambering is pest control. While it might be possible to dispatch smaller species of small game with this and other of the various diminutive shotshell chamberings, such use is questionable. The chief problem is the lack of sufficient shot volume to achieve useful hunting pattern density with shot of sufficient size to get the job done. This corresponds to a 0.354-inch bore and would be called a 105-gauge.

32 Rimfire

Historical Notes Stevens offered their No. 20 Favorite shotgun in this caliber. Shell casings were copper or brass and shot containers were wood or paper. Case length was $^{7}/_{8}$-inch for copper rolled rim or $^{25}/_{32}$-inch for those with wooden shot containers. Overall length for the wooden container shotshells was $1^{7}/_{32}$ inches. Remington UMC and WRA manufactured these shells. The only viable use for such a chambering is pest control. While it might be possible to dispatch smaller species of small game with this and other of the various diminutive shotshell chamberings, such use is highly questionable. The chief problem is lack of sufficient shot volume to achieve useful hunting pattern dinsity with shot of sufficient size to get the job done. A 0.320-inch bore would be called a 142-gauge.

310 Remington

Historical Notes This brass-cased, rimfire shotshell was made by Remington for a mini-Skeet shooting game. The shotgun was a bolt-action used to shoot miniature clay pigeons. Shell length was $1^{1}/_{16}$-inch..

7mm

Historical Notes This is a European shotshell and long obsolete. It was also available in a ball loading. Shells are usually copper based with a paper body. The only potential value of such a chambering is pest control. The 7mm shotshell corresponds to a 0.276-inch bore and would be called a 223-gauge. Most commonly seen length is $1^{1}/_{4}$-inch.

6mm

Historical Notes Little is known about this diminutive chambering. The example seen has a metal case head and paper body. The only potential value of such a chambering is pest control. The 6mm corresponds to a 0.236-inch bore and would be called a 353-gauge.

20-Caliber Wingo

Historical Notes These straight-wall rimfire shells were loaded by Winchester in the 1970s for use in special single shot lever-action shotguns used in special indoor Wingo Skeet shooting galleries. The shells feature a 22 rimfire rim size but have a smaller case body to prevent chambering of standard 22 rimfire ammunition in these guns. Wingo ammunition was assembled with 2.1 grains of Ball powder and approximately 113 No. 12 shot pellets. Winchester-Western was the sole manufacturer of this cartridge. The 20-caliber Wingo corresponds to a 0.200-inch bore and would be called a 582-gauge.

Collath Gauges

Historical Notes Available in 0, 1, 3, 4, 5, 6, 7 and 8 gauge, these were an early 1900s Euopean development. The shells used a unique gauging system. The 1-gauge is somewhat smaller than the common 12-gauge. Pinfire versions also existed. Collath ammunition was cataloged as late as 1911. The 5-gauge shell in Frank Napoli's collection has a metal band around the outer brass and paper joint. The empty shells were made in Frankfurt, Germany and available in the Alfa Arms Catalog of 1911. Although never very popular, specimens are sometimes seen in collections and at gun shows. The unusual sizings and headstamps can cause confusion.

SHOTSHELL LOADS

Dram Equivalent	Shot Ozs.	Load Style	Shot Sizes	Brands	Nominal Velocity (fps)
10 Gauge 3½" Magnum					
4½	2¼	premium	BB, 2, 4, 6	Win., Fed., Rem.	1205
4½	2¼	premium	4, 6	Win., Fed.	1205
4¼	2	high velocity	BB, 2, 4	Rem.	1210
4½	2¼	duplex	4x6	Rem.	1205
Max	18 pellets	premium	00 buck	Fed., Win.	1100
Max	54 pellets	premium	4 buck	Win.	1100
4¼	1¾	steel	T, BBB, BB, 1, 2, 3	Win., Rem.	1260
4¼	1¾	steel duplex	TxBB, BBBx1	Rem.	1260
Mag	1⅝	steel	T, BBB	Win.	1285
4⅝	1⅝	steel	F, T, BBB	Fed.	1350
Max	1¾	slug, rifled	slug	Fed.	1280
12 Gauge 3½" Magnum					
Max	2¼	premium	4, 6	Fed., Rem., Win.	1150
Max	18 pellets	premium	00 buck	Fed., Win.	1100
4⅛	19/16	steel	F, T, BB, 1, 2	Win., Fed.	1335
12 Gauge 3" Magnum					
4	2	premium	BB, 2, 4, 5, 6	Win., Fed., Rem.	1175
4	2	duplex	4x6	Rem.	1175
4	1⅞	premium	BB, 2, 4, 6	Win., Fed., Rem.	1210
4	1⅞	duplex	BBx4, 2x4, 2x6, 4x6	Rem.	1210
4	1⅝	premium	2, 4, 5, 6	Win., Fed., Rem.	1290
4	24 pellets	buffered	1 buck	Win., Fed.. Rem.	1040
4	15 pellets	buffered	00 buck	Win., Fed., Rem.	1210
4	10 pellets	buffered	000 buck	Win., Fed., Rem.	1225
4	41 pellets	buffered	4 buck	Win., Fed., Rem.	1210
Max	1¼	slug, rifled	slug	Fed.	1600
Max	1	slug, rifled	slug, magnum	Win., Rem.	1760
Max	1	saboted slug	slug	Win.	1550
3⅝	1⅜	steel	F, T, BBB, BB, 1, 2, 3, 4	Win., Fed., Rem.	1275
3⅝	1⅜	steel duplex	BBBx1, BBx2, 1x3	Rem.	1275
4	1¼	steel	F, T, BBB, BB, 1, 2, 3, 4, 6	Win., Fed., Rem.	1375
4	1¼	steel duplex	BBx1, BBx2, BBx4, 1x3, 2x6	Rem.	1375
12 gauge 2¾"					
Max	1⅝	magnum	4, 5, 6	Win.	1250
3¾	1½	magnum	BB, 2, 4, 5, 6	Win., Fed., Rem.	1260
3¾	1½	duplex	BBx4, 2x4, 2x6, 4x6	Rem.	1260
3¾	1¼	high velocity	BB, 2, 4, 5, 6, 7½, 8, 9	Win., Fed., Rem.	1330
3½	1¼	mid velocity	7, 8, 9	Win.	1275
3¼	1¼	standard velocity	6, 7½, 8, 9	Win., Fed., Rem.	1220
3¼	1⅛	standard velocity	4, 6, 7½, 8, 9	Win., Fed., Rem.	1255
3¼	1	standard velocity	6, 7½, 8	Rem., Fed.	1290
3¼	1¼	target	7½, 8, 9	Win., Fed., Rem.	1220
3	1⅛	target	7½, 8, 9, 7½x8	Win., Fed., Rem.	1200
2¾	1⅛	target	7½, 8, 8½, 9, 7½x8	Win., Fed., Rem.	1145
2¼	1⅛	target	7½, 8, 8½, 9	Rem., Fed.	1080
3½	1	target	10	Fed.	1350
3¼	28grams(1oz)	target	7½, 8, 9	Win., Fed., Rem.	1290
2¾	1	target	8½	Fed.	1180
3¾	8 pellets	buffered	000 buck	Win., Fed., Rem.	1325
4	12 pellets	premium	00 buck	Win., Fed., Rem.	1290
3¾	9 pellets	buffered	00 buck	Win., Fed., Rem.	1325
3¾	12 pellets	buffered	0 buck	Win., Fed., Rem.	1275
4	20 pellets	buffered	1 buck	Win., Fed., Rem.	1075
3¾	16 pellets	buffered	1 buck	Win., Fed., Rem.	1250
4	34 pellets	premium	4 buck	Fed., Rem.	1250

Dram Equivalent	Shot Ozs.	Load Style	Shot Sizes	Brands	Nominal Velocity (fps)
12 gauge 2¾" cont.					
3¾	27 pellets	buffered	4 buck	Win., Fed., Rem.	1325
Max	1	saboted slug	slug	Win., Fed.	1450
Max	1¼	slug, rifled	slug	Fed.	1520
Max	1	slug, rifled	slug, magnum	Rem.	1680
Max	1	slug, rifled	slug	Win., Fed., Rem.	1610
3	1#	steel	7	Win.	1235
3½	1¼	steel	T, BBB, BB, 1, 2, 3, 4, 5, 6	Win., Fed., Rem.	1275
3½	1¼	steel duplex	BBx2, 1x3	Rem.	1275
3¾	1⅛	steel	BB, 1, 2, 3, 4, 5, 6	Win., Fed., Rem.	1365
3¾	1⅛	steel duplex	BBx1, BBx2, BBx4, 1x3, 2x6	Rem.	1365
3¾	1	steel	2, 4, 6	Win., Fed.	1390
16 Gauge 2¾"					
3¼	1¼	magnum	2, 4, 6	Win., Fed., Rem.	1260
3¼	1⅛	high velocity	4, 6, 7½	Win., Fed., Rem.	1295
2¾	1⅛	standard velocity	6, 7½, 8	Fed., Rem.	1185
2½	1	promotional	6, 7½, 8	Win., Fed., Rem.	1165
Max	15/16	steel	2, 4	Fed.	1300
Max	⅞	steel	2, 4	Win.	1300
3	12 pellets	buffered	1 buck	Win., Fed., Rem.	1225
Max	4/5	slug, rifled	slug	Win., Fed., Rem.	1570
20 Gauge 3" Magnum					
3	1¼	premium	2, 4, 6, 7½	Win., Fed., Rem.	1185
Max	18 pellets	buck shot	2 buck	Fed.	1200
Max	24 pellets	buffered	3 buck	Win.	1150
2¾	20 pellets	buck	3 buck	Rem.	1200
3¼	1	steel	1, 2, 3, 4, 5, 6	Win., Fed., Rem.	1330
20 Gauge 2¾"					
2¾	1⅛	magnum	4, 6, 7½	Win., Fed., Rem.	1175
2¾	1	high velocity	4, 5, 6, 7½, 8, 9	Win., Fed., Rem.	1220
2½	1	standard velocity	6, 7½, 8	Win., Rem., Fed.	1165
2½	⅞	promotional	6, 7½, 8	Win., Rem.	1210
2½	1#	target	8, 9	Win., Rem.	1165
2½	⅞	target	8, 9	Win., Fed., Rem.	1200
Max	20 pellets	buffered	3 buck	Win., Fed.	1200
Max	⅝	slug, saboted	slug	Win.	1400
2¾	⅝	slug, rifled	slug	Rem.	1580
Max	¾	slug, rifled	slug	Win., Fed.	1570
Max	¾	steel	4, 6	Win., Fed.	1425
28 Gauge 2¾"					
2	1	high velocity	6, 7½, 8	Win.	1125
2¼	¾	high velocity	6, 7½, 8	Win., Fed., Rem.	1295
2	¾	target	9	Win., Fed., Rem.	1200
410 Bore 3"					
Max	11/16	high velocity	4, 5, 6, 7½, 8, 9	Win., Fed., Rem.	1135
410 Bore 2½"					
Max	½	high velocity	4, 6, 7½	Win., Fed., Rem.	1245
Max	⅕	slug, rifled	slug	Win., Fed., Rem.	1815
1½	½	target	9	Win., Fed., Rem.	1200

NOTES: * = 10 rounds per box. ** = 5 rounds per box. Pricing variations and number of rounds per box can occur with type and brand of ammunition. Listed pricing is for load style and box quantity shown. Not every brand is available in all shot size variations. Some manufacturers do not provide suggested list prices. All prices rounded to nearest whole dollar. The price you pay will vary dependent upon outlet of purchase. # = new load spec this year. A "c" indicates a change in data.

TABLE 1

40-Yard Patterns
Full, Modified and Improved Cylinder Chokes
Lead and Steel Shot
12-Gauge, 2 3/4-Inch Loads, 1979

Load	Choke	Pellets per oz. Nominal	Approx. Number Pellets in Load	Pattern Per Cent
1 1/8-oz. #2 Steel	Full	120	135	76
1 1/8-oz. #2 Steel	Mod.	120	135	68
1 1/8-oz. #2 Steel	Imp. Cyl.	120	135	44
1 1/4-oz. #2 Steel	Full	120	150	76
1 1/4-oz. #2 Steel	Mod.	120	150	68
1 1/4-oz. #2 Steel	Imp. Cyl.	120	150	44
1 1/4-oz. #4 Lead*	Full	135	169	72
1 1/4-oz. #4 Lead*	Mod.	135	169	56
1 1/4-oz. #4 Lead*	Imp. Cyl.	135	169	34
1 1/2-oz. #4 Lead*	Full	135	202	73
1 1/2-oz. #4 Lead"XX"	Full	135	202	87

**This is a standard, non-buffered load*

TABLE 2

Pellet Count and Distribution in Patterns
Full, Modified and Improved Cylinder Chokes
Lead and Steel Shot
12-Gauge, 2 3/4-Inch Loads, 1979

			Pattern Percent 40 Yards			Pellets in Pattern 40 Yards		
Load	Choke	Approx. Number Pellets in Load	30" Circle	20" Circle	Annular Area, 30"-20" Circle	30" Circle	20" Circle	Annular Area, 30"-20" Circle
11/8-oz. #2 Steel	Full	135	76	47	29	103	64	39
11/8-oz. #2 Steel	Mod.	135	68	40	28	92	54	38
11/8-oz. #2 Steel	Imp. Cyl.	135	44	22	22	60	30	30
11/4-oz. #2 Steel	Full	150	76	47	29	114	71	43
11/4-oz. #2 Steel	Mod.	150	68	40	28	102	60	42
11/4-oz. #2 Steel	Imp. Cyl.	150	44	22	22	66	33	33
11/4-oz. #4 Lead*	Full	169	72	43	29	122	73	49
11/4-oz. #4 Lead*	Mod.	169	56	29	27	95	49	46
11/2-oz. #4 Lead*	Full	202	73	44	29	147	89	58
11/2-oz. #4 Lead"XX"	Full	202	87	59	28	176	119	57

**This is a standard, non-buffered load*

Notes: Area of 30" Circle:707 sq. in.
Area of 20" Circle:314 sq. in.
Annular area:707 - 314:393 sq. in.

TABLE 3

Downrange Velocities and Energies
Lead and Steel Shot
12-Gauge, $2^3/_4$-Inch Loads

Load	Velocity @ 3 ft. Nominal ft/sec.	Velocity @ 3 ft. Measured ft/sec.	Downrange Velocity, Measured at 40 yd. ft/sec.	Energy p/Pellet at 40 yd. ft-lb.
11/8-oz. #2 Steel	1365	1350	773	4.84
11/4-oz. #2 Steel	1300	1305	761	4.69
11/4-oz. #4 Lead	1330	1319	803	4.64
11/2-oz. #4 Lead	1260	1252	778	4.35
11/2-oz. #4 Lead*	1260	1240	793	4.52

**Buffered load*

TABLE 4

40-Yard Penetration
20 Percent Ordnance Gelatin
Lead and Steel Shot
12-Gauge, $2^3/_4$-Inch Loads

Load	Velocity At 3 ft. ft/sec.	Energy Per Pellet At 40 yd. ft-lb.	Energy Density At 40 yd. ft-lb/sq. in.	Penetration in Gelatin inches
11/8-oz. #2 Steel	1350	4.84	274	2.0
11/4-oz. #2 Steel	1305	4.69	265	1.9
11/4-oz. #4 Lead	1319	4.64	350	2.5
11/2-oz. #4 Lead	1252	4.35	328	2.4
11/2-oz. #4 Lead*	1240	4.52	341	2.5

**Buffered load*

COMPARATIVE SHOTGUN SLUG PERFORMANCE

Gauge	Shell Length ins./mm	Slug Weight oz./grs.	Slug Type	Velocity (fps) MV	Velocity (fps) 50 yds	Velocity (fps) 100 yds	Energy (fpe) MV	Energy (fpe) 50 yds	Energy (fpe) 100 yds
10	31/2/89	13/4/766	Foster	1280	1080	970	2785	1980	1605
12	3/76	11/4/547	Foster	1600	1320	1130	3110	2120	1785
12	3/76	13/8/600	Brenneke	1502	1144	936	3017	1749	1240
12	3/76	1/437.5	Foster	1760	1345	1075	3009	1396	891
12	3/76	1/437.5	Sabot	1550	1410	1190	2400	1665	1220
12	23/4/70	11/4/547	Foster	1520	1260	1090	2805	1930	1450
12	23/4/70	11/10/490	Brenneke	1590	1190	975	2745	1540	1035
12	23/4/70	1/437.5	Foster	1680	1285	1045	2741	1605	1061
12	23/4/70	1/437.5	Foster	1610	1330	1140	2520	1725	1255
12	23/4/70	1/437.5	Sabot	1450	1320	1130	2100	1475	1120
12	23/4/70	1/437.5	Foster	1560	1175	977	2364	1342	927
16	23/4/70	4/5/350	Foster	1600	1180	990	1990	1075	755
16	23/4/70	9/10/415	Brenneke	1590	1190	975	2320	1300	875
20	23/4/70	3/4/328	Foster	1600	1270	1070	1865	1175	835
20	23/4/70	7/8/370	Brenneke	1590	1190	975	2080	1165	780
410	21/2/63.5	1/5/88	Foster	1830	1340	1060	650	345	215
410	3/76	1/4/110	Brenneke	1755	1162	917	780	342	213

Chapter 12

CARTRIDGE IDENTIFICATION

CARTRIDGE identification is important to anyone who works with cartridges, whatever the reason. It is of particular consequence to those involved in forensic firearms identification, military intelligence or serious collecting. In addition to the information presented here, the collector of old, obsolete cartridges has special problems involving ignition systems and types not manufactured for 100 years or more. Much of this is beyond the scope of this book, but the basic procedures are still the same.

In teaching classes in firearms identification, I always tell my students that the easiest way to identify a cartridge is to look at the headstamp, if there is one, because in many instances that will tell you exactly what it is. Unfortunately, it isn't always that simple since some cartridges don't have headstamps, or if it is a military or foreign round, the headstamp may not be readily decipherable. Additionally, the headstamp may be misleading. You might be dealing with a wildcat cartridge, something made by necking an original brass case up or down or otherwise changing the configuration. For example the 30-06 case is used as the basis for a variety of wildcats using both military and commercial brass, so the headstamp would only indicate the original brass, not the actual cartridge. Cartridge identification may range from a simple determination of caliber to the more complex ascertainment of the country of origin, date of origin, place of manufacture and the type of gun involved.

The various factors and problems involved in cartridge identification can be summarized as follows:

I. What is the caliber and/or other designation of the cartridge? For example, 38 Special, 9mm Luger, 250 Savage, 7.62x39mm (M43) Russian, 303 British, etc.

II. What type of cartridge is it, handgun, rifle, sporting or military? Is it modern or obsolete?

III. What is the country of origin, who made it and when was it made? The headstamp is usually the clue to these questions, but it may not answer all of them.

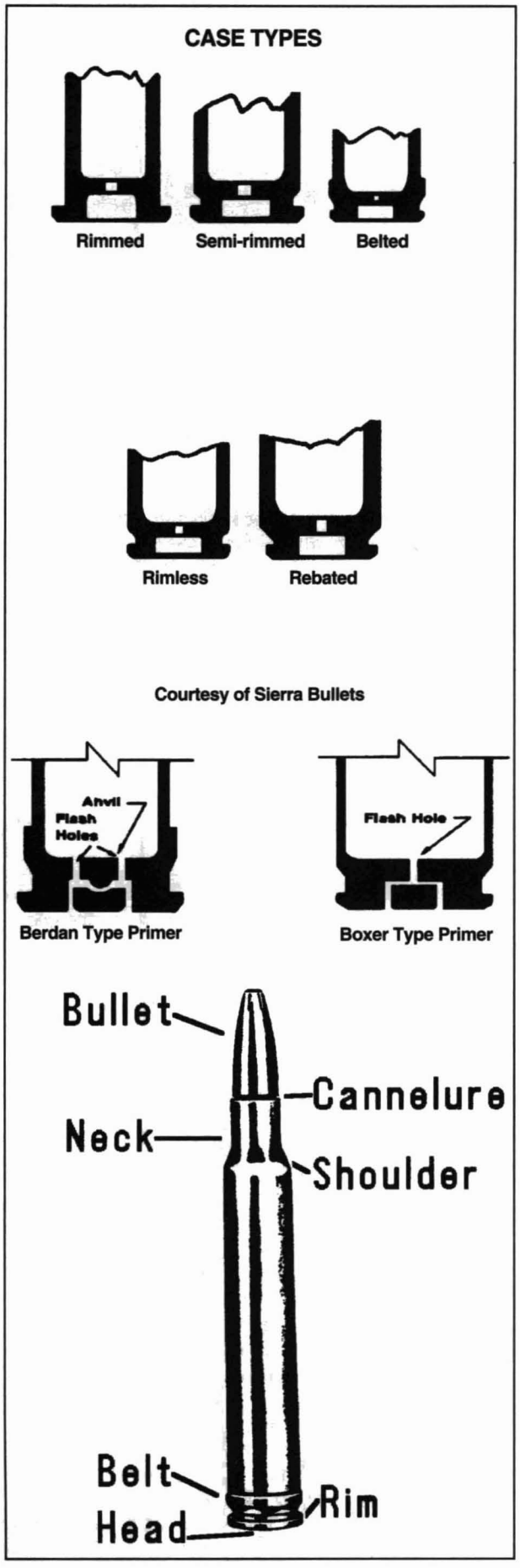
IV. What is the functional character of the cartridge—ball, tracer, incendiary, explosive, sporting, match, etc.

V. Is the cartridge functional? This usually requires actual testing and is important primarily to those in the forensic field. Obviously, one does not testfire rare and valuable collectors cartridges.

Cartridges are classified on the basis of ignition type, case shape, and rim type. Combustion of the propellant charge is initiated by the primer. If the priming compound is distributed around the rim of the cartridge, it is a rimfire. If the priming compound is contained in a separate cup in the center of the case head, it is a centerfire. All small arms cartridges are percussion fired, that is, the primer is detonated by the blow or impact of a hammer or firing pin. However, some military ammunition, usually of 20mm or greater, is electrically fired. There are two types of centerfire primers currently in general use, Boxer and Berdan. The Boxer primer is entirely self-contained with the anvil (see illustration page 413) as a part of the primer. The Berdan type lacks the anvil which is produced as a small "tit" or protrusion in the primer pocket. Boxer-primed cases have a single flash hole in the center of the primer pocket, whereas Berdan-primed cases have two or more flash holes surrounding the anvil. The Boxer-type primer is used almost exclusively in the United States at the present time, although some Berdan-primed cartridges were manufactured here in the 1800s and early 1900s. The Berdan type is preferred by many European manufacturers and is usually an indication of such origin.

The cartridge base and rim type are an important identifying feature. They also serve an important functional purpose in feeding and extraction of the cartridge within the gun mechanism. There are five rim types: rimmed, semi-rimmed, rimless, belted and rebated. (See illustration on page 413.)

Rimmed cartridges have a rim or extractor flange of larger diameter than the base often with a grooved or



undercut area immediately ahead of the rim. Semi-rimmed cartridges have a rim that is only slightly larger in diameter than the base and usually also a distinct undercut area between the rim and the base. It is sometimes difficult to recognize a semi-rimmed cartridge without actually measuring the rim and base diameter, and they can easily be mistaken for a rimless case. Rimless cartridges have a rim and base of the same diameter although the rim may actually be .001- or .002-inch larger than the base. They are the most common type of military cartridge. Belted cartridges have a distinct belt or flange at the base, just forward of the rim, and an extractor groove between the rim and the belt. Rebated cartridges have a rim of smaller diameter than the base, plus a definite extractor groove between the rim and the base or belt. There are not many cartridges of this design, and they are usually easy to identify. There are a few rebated rim designs where the rim is only very slightly smaller than the case head. The 404 Jeffery and its derivatives (chiefly the Imperial and Canadian Magnums) are the best examples. These can be difficult to identify without taking careful measurements. Also, note that naming a case design "semi-rimmed" versus "rimmed" is strictly a subjective call—there is no specified difference in base diameter and rim diameter that automatically separates these two styles. However, cases described as semi-rimmed are usually visually distinguishable from similar rimless cases.

The shape or configuration of the cartridge case is also an important identifying characteristic. Cartridges can be divided into the following 10 case types:

A. Rimmed bottleneck
B. Rimmed straight
C. Rimless bottleneck
D. Rimless straight
E. Belted bottleneck
F. Belted straight
G. Semi-rimmed bottleneck
H. Semi-rimmed straight
I. Rebated bottleneck
J. Rebated straight
K. Rebated belted bottleneck
L. Rebated belted straight

Each of these types has a letter designation that is used in the cartridge dimensional tables at the end of each chapter. Note that cases described as "straight" are often tapered; case diameter can be considerably larger at the base, compared to the neck.

The bullet or projectile also provides a clue to the identity of a cartridge, its functional use and the gun it is fired in. Based on the material or construction, bullets are divided into two major types: lead and jacketed. Lead bullets are used for low-velocity guns, such as handguns or blackpowder arms. However, they may also be used for target practice in more powerful guns. Training cartridges may have wooden, fiber, composition or plastic bullets. The shape of the projectile is also important and can be round-nose, flat-nose, conical or spitzer (sharp pointed). Because of the Hague Convention, military bullets do not have lead exposed at the point and are restricted to full-metal-jacketed types. Sporting ammunition or that

intended for civilian use can have a variety of bullet tips with varying degrees of lead exposed, hollowpoint, plastic tips and bronze or other metal tips to control expansion in the target.

Bullets for military use can also be classified in terms of special functional design, such as ball; tracer (T); armor-piercing (AP); incendiary (I); high explosive (HE); and observation/ranging, or spotter-tracer types. There may also be two or more of these combined in the same bullet, such as APT, API-T, HEI or HE-T. Not all types are made in every caliber since their function is developed to fulfill a specific military requirement. In addition, their makeup depends to some extent on the gun they are to be used in. In general, ball, or full metal jacketed (FMJ), bullets are intended for use against personnel or unarmored vehicles. They usually have a lead core covered by a cupronickel jacket, or a mild steel jacket plated with some copper alloy. These can be easily identified with a magnet. At one time the French 8mm Lebel military bullet was made of solid bronze. Tracer bullets are used for fire correction or target designation. They cannot be distinguished from ball unless they have some identifying marking such as a colored tip (usually, but not always, red). Armor piercing bullets are also similar to ball except they have a hardened steel or tungsten alloy core. They may or may not have a colored tip. Incendiary bullets contain an incendiary mixture that ignites on impact. Visual identification depends on the color coding system used. High explosive bullets are uncommon, but they do exist. They are made to explode on impact and can only be recognized by the color coding. Observation and ranging bullets are intended to produce a flash and/or a puff of smoke to mark the point of impact. Again they are recognizable only if they are color coded. One should handle any ammunition with a colored bullet tip with great care as appropriate.

Headstamp Markings

The headstamp is the stamped markings on the head of the cartridge. Information that can be obtained from the headstamp is extremely varied and depends on the intended purpose or use of the cartridge and who manufactured it. Headstamps consist of one or more parts or information elements. Cartridges intended for sporting or civilian use usually have two elements; one identifies the caliber and the other the manufacturer. Military cartridges may have anywhere from one to five elements including caliber, date and place of manufacture plus other identifying markings. Some headstamps are segmented, that is, they have one or more segment lines that divide the head into two to four equal parts. This usually indicates an older cartridge since most countries discontinued segment lines shortly after World War I. The location of the elements is most conveniently indicated by its clock face orientation in which 12 o'clock is at the top, 3 o'clock at the right, 6 o'clock at the bottom and 9 o'clock at the left. The basic U.S. military headstamp prior to World War II had two elements with the factory code at 12 o'clock and the date at 6 o'clock. The rapid expansion of ammunition manufacturing facilities as the result of the war introduced many new designs without any effort at standardization. Some used three elements spaced equidistant from each other while others adoted a four element system located at 12, 3, 6 and 9 o'clock. Also the location of the factory code was changed, in some instances, to 6 o'clock or other locations.

Worldwide, there are over 800 military headstamps in existence plus some 400 or more commercial headstamps that have existed at various times. Obviously, this is a complex and highly specialized field. Several volumes have been published on headstamps including at least three by various U.S. governmental agencies. In addition, some books for cartridge collectors include headstamp data on obsolete cartridges. Since it would require another whole book to adequately cover the subject, it is quite impossible to include more than a few basics here. However, we have listed several sources for such data to assist those readers who find a need for it.

The procedure for identifying a cartridge, using the tables in CARTRIDGES OF THE WORLD, is as follows:

1. First look at the headstamp and see what, if any, information is provided there.
2. Look at the cartridge and determine what type it is: straight, necked, rimmed, rimless, etc.
3. Measure the dimensions of the cartridge and make up a table as follows:

Type (A, B, C, D, etc., as shown in the tables)
Bullet Diameter
Neck Diameter
Shoulder Diameter (if there is one)
Base Diameter
Rim Diameter
Case Length
Cartridge Length

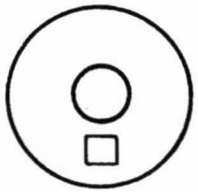
Now go to Chapter 18 of the book and compare your data with the dimensional tables in that chapter.

Check the bullet diameters or calibers, under the proper type, next compare the case length and finally the other dimensions with your measurements. The type of cartridge case, caliber and case length are the key elements to start with. For practice, two examples are shown below. See if you can identify the cartridges.

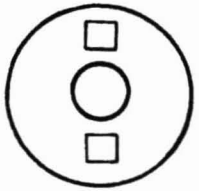
Example #1		**Example #2**	
Type: C		Type: B	
Bullet Dia.:	.308″	Bullet Dia.:	.410″
Neck Dia.:	.340″	Neck Dia.:	.432″
Shoulder Dia.:	.441″	Shoulder Dia.:	n/a
Base Dia.:	.470″	Base Dia.:	.433″
Rim Dia.:	.473″	Rim Dia.:	.488″
Case Length:	2.490″	Case Length:	1.280″
Ctg. Length:	3.340″	Ctg. Length:	1.580″

Bear in mind that there is a certain amount of manufacturing tolerance to be allowed for and your measurements may vary .001- to .002-inch plus or minus from some dimensions in the table. The cartridge in Example 1 will be found in the chapter on modern rifle cartridges; Example 2 is the chapter on handgun cartridges. Not every known cartridge is listed in CARTRIDGES OF THE WORLD, particularly the more obscure blackpowder types. However, practically all modern sporting and military are included so most readers will not have any difficulty. The idea here is to help you to determine what the cartridge is rather than where it originated or when.

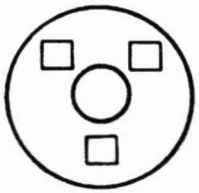
EXAMPLES OF HEADSTAMP STYLES



SINGLE ELEMENT
6 O'CLOCK

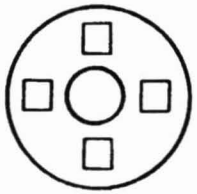


DOUBLE ELEMENT
6 & 12 O'CLOCK

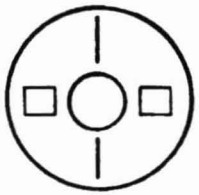


TRIPLE ELEMENT
2, 10 & 6 O'CLOCK

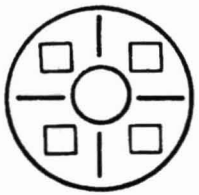
RIMFIRE
FEDERAL CART. CO.



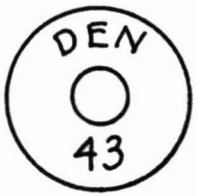
QUADRUPLE ELEMENT
3, 6, 9 & 12 O'CLOCK



DOUBLE SEGMENTED
3 & 9 O'CLOCK



QUADRANGLE SEGMENTED
FOUR ELEMENTS
2, 4, 8 & 10 O'CLOCK



MILITARY
DENVER ORDNANCE
PLANT 1943

COMMERCIAL
REMINGTON

COMMERCIAL
WESTERN CART. CO.

In trying to identify cartridges, there are a couple of things the reader should be aware of. For one thing, the major ammunition manufacturers have, from time to time, made up batches of ammunition on special order with the purchaser's headstamp. Anyone can do this if your order is large enough and you have the money. Then there is the matter of commercial reloading firms that turn out ammunition for police departments and others using recycled brass cases of varying make and loaded with powder and bullets never used by the original company. Last, but not least, you have the individual handloader whose imagination is unbounded and who may turn out a few wondrous and non- standard products.

Headstamp Markings Of The Principal American Ammunition Manufacturers

Federal Cartridge Co.	Rimfire, AL EP, G or **G**, HP, F, XL, XR and **WM** Centerfire, FC
General Electric Co.	GE plus date (military)
Newton Arms Co.	NA plus caliber (Made by Rem.)
Peters Cartridge Co.	Rimfire, P or **PETERS**HV Centerfire, P, PC, P.C., PCCO, PETERS
E. Remington & Sons (1870-1890)	E. REMINGTON & SONS
Remington Arms Co.	U, UMC, REM, REM* UMC, R-P, RAH
Robin Hood Ammunition Co.	R, RHA, R.H.A. Co.
Savage Arms Co.	S.A. Co. (made by U.S. Cartridge Co.)
Savage Repeating Arms Co.	S.A. Co., S.R.A.C.O.
Richard Speer Manufacturing Co.	SPEER WEATHERBY
Union Metallic Cartridge Co. Purchased by Remington in 1911	U, UMC or R B
United States Cartridge Co. (1869 to 1936)	US, U.S., , *U.S CARTRIDGE CO*, U.S.C. CO. or RL
Western Cartridge Co.	SUPER X, SUPER-X, W, WCC, W.C. Co. WESTERN
Winchester	W, H, SUPER SPEED, W. C. Co.,
Winchester-Western	W-W, super speed

There were about 15 other companies that manufactured ammunition at various times, particularly during the 1860-1900 period. Also a number of private firms manufactured military ammunition during World War I and II.

United States Arsenal Headstamp Markings

Alleghany Ordnance Plant	KS plus date
Denver Ordnance Plant	DEN plus date
Des Moines Ordnance Plant	DM plus date
Eau Claire Ordnance Plant	EW plus date
Evansville Ordnance Plant	ECS plus date
Frankford Arsenal	CF plus date (45-70) F plus date FA plus date
Lake City Arsenal	LC plus date
Lowell Ordnance Plant	LM plus date
Milwaukee Ordnance Plant	M plus date
Saint Louis Ordnance Plant	SL plus date
Twin Cities Ordnance Plant	TW plus date
Utah Ordnance Plant	U or UT plus date

U.S. Small Arms Ammunition Color Codes

Bullet Tip Marking	Functional Type
Black	Armor piercing (AP)
Red	Tracer
White	Tracer, aircraft type
Blue	Incendiary

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Chapter 13

A SHORT HISTORY OF PROPELLANT POWDERS

by M.L. McPherson

ALTHOUGH THE origin of blackpowder is lost in history, we do know that it was the first substance used for propelling objects from tubes with one essentially closed end—later referred to as barrels, owing to their banded resemblance to wooden water barrels. In the Middle Ages alchemists tested various formulations related to fulminate of mercury for cannon fodder, all were entirely too violent for that purpose. Later came energetic nitrations of cellulose, guanidine and ammonia. Also worthy of mention are various compositions combining these substances with various organics. These compositions represented an effort to mitigate the energy release of the smokeless compounds. Most recently we have seen "new" blackpowder substances, Pyrodex and Arco powder, added to the list. Chemists have tested several other substances, some of which found some application. However, these are the most important. We will contain our discussion to this list and a few others.

What was the first use of a propellant in the military context? In the 13th Century, armies of the Middle East (Greek and Muslim) used a crude mixture of potassium nitrate and pine pitch (or petroleum) to power rockets. Evidently these were less than a booming success. No doubt the unpredictable nature of the propellant mix was a major concern. Even if combatants did use these devices primarily for psychological effect, the effect was often a two-edged sword—gunnery crews needed to have faith that the weapons they were using would bring destruction upon the enemy and not those pulling the trigger.

Blackpowder was the first substance adapted to use as a propellant powder in the modern sense. The best evidence is that the Chinese were the first to have discovered this physical mixture of potassium nitrate [KNO_3], elemental sulfur [S] and charcoal (elemental carbon [C] with an imprecise admixture of various hydrocarbons). The Chinese certainly knew of blackpowder dating to at least the 8th century BC. Roger Bacon described the product in 1242 AD but in an anagram. His intention, evidently, was to veil his discovery, as if that might somehow delay others from discovering and using blackpowder for potentially nefarious purposes—such misdirections have seldom been of much value.

The first known recording of blackpowder in Europe was in 848 AD by Marcus Graecus in a treatise called *Liber Ignium*, which was almost four centuries earlier than Bacon's widely credited 1242 anagrammatized references.

It is likely that several Europeans discovered the basic product, blackpowder, at about the same time. Certainly, it is most likely that various experimenters independently discovered blackpowder's propellant properties—and chemistry students are still at it. Although, as noted, the Chinese knew of blackpowder for many centuries, there is certainly no *proof* that the Chinese were either first or unique in their discovery. It is very likely that Bacon or others deduced the mix, based upon hearsay, without ever seeing its use in firecracker type devices or as a novelty compound.

The vagaries of an uncertain history have shrouded all such information. What is a bit more certain is that Bacon was among the first to have realized the potential military applications and, specifically, blackpowder's potential for destructive use. Interestingly, we do know that because of military secrecy we cannot know with any certainty anything about the first use of blackpowder to launch a projectile. What that means is that sometime after 1242 someone adapted some type of tube and projectile for use with a charge of blackpowder, but we can never know for certain who, where or when—let alone the effectiveness of that device.

Experimenters fashioned the earliest guns by hollowing out pieces of wood. Obviously these were not strong enough to withstand substantial charges of properly prepared blackpowder, even without any projectile inserted. That weakness led to the introduction of the steel-banded wooden structure. Artisans fashioned these in direct copy of the well-established banded water barrel. Hence the name "barrel."

For various reasons, powder makers did not establish or follow exact formulations for the most energetic form of blackpowder until centuries later. One problem was that raw ingredients were often of unknown and variable purity. Another factor was that each manufacturing craftsman kept his favorite recipe a trade secret. An important consideration was that different applications required more-or-less energetic formulations. Across a wide range, adjusting the percentages of each ingredient serves to change the rate of combustion. While changing the com-

positional balance also alters energy production, effects of that change were not an issue for several centuries—owing to limitations in barrel strength.

Typical formulations of blackpowder from various eras are listed below in parts by weight from *The Chemistry of Powder and Explosives.*

Historical Blackpowder Formulations

Source	Saltpeter	Charcoal	Sulfur
8th century, Marcus Graecus	66⅔	22⅔	11⅓
8th century, Marcus Graecus	96.22	23.07	7.69
Roger Bacon, c. 1252	37.50	31.25	31.25
Arderne (laboratory Sample), c. 1350	66⅔	22⅔	11⅓
Whitehorne, c. 1560	50		16⅔
Bruxelles studies, c. 1560	75	15.62	9.38
British Government Contract, c. 1635	25	12.50	12.50
Bishop Watson, c. 1781	75	15	10
Typical, c. 1990	75	15	10

What those early producers strove to realize was a product that generated the most performance without destroying the fragile gun. More of a slower, less efficient, product could often produce more projectile range without busting the gun—that was all that mattered. We follow the same path today.

The first formulations of blackpowder were simply loose physical mixtures and would not stay properly mixed during handling. Gunners had to use these powders without significant transport, which rapidly separated the component particles. Also, owing to the extremely hygroscopic nature of the original variety of raw blackpowder, powder makers most often mixed the product on the battlefield and immediately before its use. This development added an interesting new specter to battle. For the first time in military history, the principles found themselves concentrating on protecting their own turf!

Very early on it was discovered that coating the loose powder granules with graphite significantly reduced their potential to absorb moisture. Some evidence suggests that producers might have standardized this approach as early as the late 13th century. However, the advantages offered by graphite (also called blacklead at that time) were of little value when cannoneers typically used the powder within minutes of preparation!

Around the same time, experimenters discovered the recrystallization purification of saltpeter. Again, the disadvantage was that typical guns of the era simply could not withstand the new powder. For hundreds of years, cannoneers preferred the original blackpowder product for most applications.

By 1450 most manufacturers had adopted a more-or-less standard blackpowder composition, by weight: 50 parts potassium nitrate [KNO_3] (common name saltpeter), 25 parts sulfur [S] and 25 parts charcoal (essentially carbon [C] with a small percentage of hydrocarbons). Production included pulverization of these ingredients, which were mixed in the dry state to form Serpentine Powder. Burning this material provided all the energy necessary (by deflagration, a rapid burning) to generate gun bursting pressures if cannoneers used a too heavy projectile. Therefore, despite the poor energy yield, serpentine powder was sufficient to the task; there was little demand for a more energetic formulation.

When stronger gun barrels became available, limitations of serpentine powder began to matter to gunners and battle strategists. Perfection of corn powder occurred in about 1450 in Nuremberg. This came after initial investigations in France beginning in the mid-1300s. Production of this product begins with a paste of the basic ingredients plus water. Application of crushing blows from large hammers or crushing from large rolling stone wheels provides the energy necessary to process the paste. The resulting well-mixed paste dries to produce a layer of product where the ingredients are in intimate physical contact. Constituent particle size is reduced to any required size by simply extending the mechanical mixing of the paste. The longer the mixing and the finer the constituent particles, the cleaner and more rapid the powder's combustion. After partial drying, manipulation of the resulting sheets breaks the material into small pieces called corn—the name derives from the general size and shape of the resulting particles (corn is also a term for various cereal grains of European origin).

In the most advanced production, the final step was application of a graphite glaze to the corn powder, which occurred soon after drying, polishing and sieving. Graphite glazing represented a significant improvement and offered several benefits. First, it reduced the tendency of the granules to absorb moisture directly from the air. Second, it reduced the tendency for the production of static electric charges as a result of inter-particle mixing. Third, it improved the powder's flow characteristics. Finally, it reduced the tendency of the powder granules to form large cakes while in storage. Excepting the final of these factors, graphite glazing provides the same benefits in modern smokeless powder.

Owing to the intimate inter-crystalline physical contact the wet mixing process imparts, corn powder burns at least twice the rate of serpentine powder. This creates a significant indirect benefit. Back-venting through the touch-hole consumes very little (effectively, almost none) of the combustion force. Conversely, serpentine powder loses considerable performance in this manner. Corned powder leaves less residue and requires less careful ramming (serpentine powder could ignite during loading). As a result of these benefits, when used in a weight-for-weight replacement, corned powder produces one-third more power than serpentine powder.

Despite corned powder's benefits, serpentine powder retained a stronghold for applications in lower strength barrels for many decades. Employment of corned powder in small arms in England began long before 1560. However, high cost and excessive power barred corned powder from use with early ordnance—the big guns.

Comparison of blackpowder energy production from *From Clubs to Cannons* by O.F.G. Hogg is shown below.

Relative Blackpowder Energy Levels

Powder Type	Strength Factor	—Composition— Saltpeter	Sulfur	Charcoal
Serpentine	57%	50	25	25
Corned	75%	50	25	25
Modern	100%	75	10	15
Bacon's	41.2%	37.5	31.25	31.25

Here we should note that blackpowder does burn and that it is also a progressive burning substance. At low temperatures, increasing temperature about 10°C doubles the rate of combustion. In a propellant charge, the temperature of combustion easily exceeds 2000°C. In a typical cartridge, complete combustion of a charge of blackpowder occurs in less than 0.005 seconds. A comparable charge burned freely in the atmosphere might take several tenths of a second to fully consume.

That blackpowder burns, rather than detonates, is easily proven by examining the performance of progressively smaller granulations in otherwise identical loadings. As one tests progressively smaller particles, the rate of pressure generation increases. In effect, the particles, ignite and burn inward from their perimeters until combustion is complete. The smaller the particles, the greater the initial combustion surface and the faster combustion is completed.

Any significant deviation from the typical modern formula reduces both combustion rate and effective energy yield of blackpowder. This reduces internal ballistic performance in firearms applications. However, such alternate formulations are in common use for other applications.

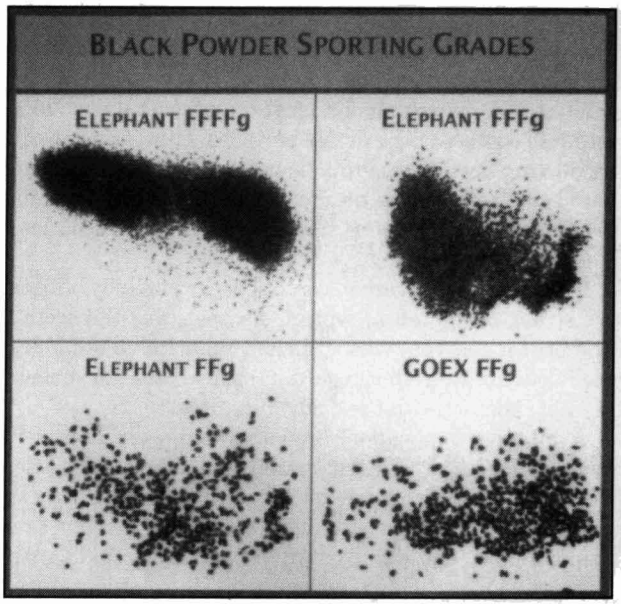
One final note on blackpowder regards its ultimate development as a propellant. Napoleon's chemists perfected this final advancement. It was discovered that incorporation of one or more central holes in hexagonal prisms of blackpowder was extremely beneficial. This design allowed use of larger granules, which, upon combustion, initially generated gas comparatively slowly. As combustion proceeded, the rate of gas generation increased. A single central perforation created a substance that burned with a flat rate response curve—as combustion progressed, the area of combustion and, therefore, the amount of energy released was constant (at a constant confining pressure). Multi-perforation granules were true progressive burning substances—as burning progressed, the rate of energy release increased (even when combustion occurred under a steady confining pressure). Within a given pressure limitation, use of perforated granules (which were more complicated to manufacture) allowed loadings producing *vastly* more energy, compared to use of optimum-sized non-perforated granules. The same scheme is in use today in the most effective smokeless powders.

Cocoapowder, also known as brownpowder, was an improvement upon blackpowder. The saltpeter content was slightly higher than the best blackpowder compositions (up to 80 percent). It also incorporated a reduction in sulfur content (sometimes to zero). Most importantly, it used brown charcoal (from about 17.6 percent to 20 percent). Partial combustion of rye straw produces brown charcoal, which includes considerable hydrocarbons.

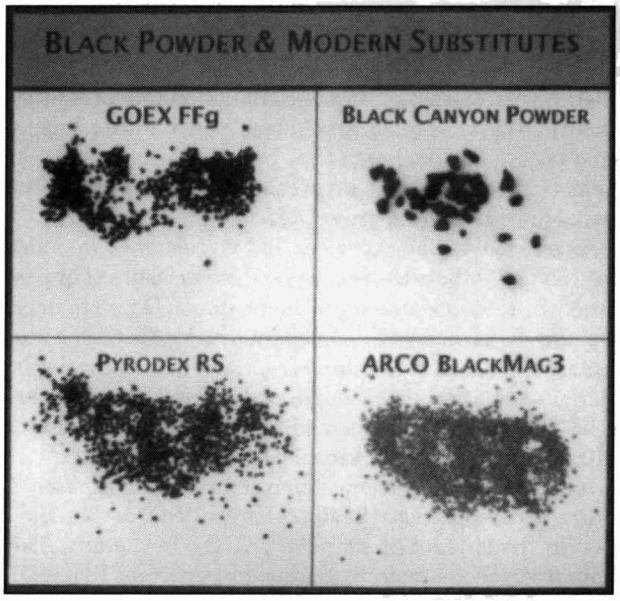
Typical brown powder compositions are shown below from Davis' *The Chemistry of Powder & Explosives.*

Brown Powder Composition

Country	Saltpeter	Brown Charcoal	Sulfur
England	79	18	3
England	77.4	17.6	5
Germany	78	19	3
Germany	80	20	0
France	78	19	3



Equal weights of representative blackpowders now available for sporting purposes. Elephant Brand powder also offers a FFFFFg (5F) granulation. That product looks more like dust than blackpowder. It is suggested that an ignition powder using about 30 percent of 5F mixed with 4F can improve flintlock ignition. Elephant and GOEX do not use the same formulation; ballistics differ. Typically, 4F is used only as a flintlock ignition powder. However, with certain bullets it works quite well in the Ruger Old Army revolver, providing very clean burning and good ballistics. Normally, 3F is used in guns of 45-caliber and smaller. For guns of 45-caliber and larger, 2F is preferred. Shotguns can use F grade. However, F is nominally a cannon-grade granulation useful in salute cannons.



Equal charges of blackpowder and several substitutes are still quite widely used in sporting applications. GOEX offers a complete sporting line, as represented by FFg, shown here. They also offer Cartridge grade, intended for use in the long Sharps cartridges such as the 45-120 and 50-140 with heavy bullets. Black Canyon Powder is capable of good performance but requires careful attention to loading details. Pyrodex is the standard to which all blackpowder substitutes compare. It duplicates blackpowder performance with less fouling and reduced corrosion potential. Arco's BlackMag3 is an exciting new propellant with many interesting characteristics.

The reduction of sulfur content slowed the combustion rate of these powders. Sulfur's role in the combustion of blackpowder is not simple to define. It is something of a catalyst and something of a plastic carrier that promotes intimate contact of the active particles while also rapidly conducting heat. Owing to a slower combustion rate, compared to blackpowder, these various brownpowders provided improved ballistics. Similarly, they produced less steel-attacking acid.

The higher hydrocarbon content of the partially burned rye straw, compared to typical charcoal, was the secret. The brown charcoal was sufficiently plastic to supplant the role of sulfur in that regard. It easily flowed to achieve intimate contact with the oxidizing saltpeter.

In gunnery applications brownpowders were, however, more difficult to ignite, compared to blackpowder. Also, these products were more apt to ignite under the process of vigorous shaking or stirring. This type of powder saw application in the Spanish American war of 1898 with impressive effect. However, owing to its volatile nature, unused stocks were destroyed. Owing to its superior potential as a projectile propellant, smokeless powder was then eclipsing almost all blackpowder derivatives.

As noted, by the turn of the century, smokeless powders were gaining popularity for use as propellants. This result is easy to understand if we consider the consequences of blackpowder's combustion. The byproducts include heat, gas and particulates. Blackpowder produces sufficient heat to suggest impressive ballistic potential. However, even the most efficient combustion of the best grade of blackpowder produces more than 50 percent particulates, by weight. This characteristic dramatically limits the energy blackpowder can impart to a projectile—docile particles cannot effectively accelerate the bullet but they consume considerable energy in their own acceleration. Since combustion converts practically 100 percent of smokeless powder into gas, a smokeless powder charge that generates the same total heat and the same peak pressure will impart about twice the energy to a projectile.

Before leaving blackpowder and its relatives, we must mention two others that achieved some measure of importance. In 1885, a Hamburg resident named Gäns obtained a patent for an energetic propellant powder that came into use under the name *amidpulver* (*pulver* means powder in German). His original formulation contained 40 to 45 percent saltpeter [KNO_3] with 35 to 38 percent ammonium nitrate [NH_4NO_3] and 14 to 22 percent charcoal [C].

Later changes in composition improved *amidpulver's* propellant properties. Chiefly this resulted from a reduction in the amount of saltpeter [KNO_3] in the mix. The improved version typically contained 14 percent KNO_3, 37 percent NH_4NO_3 and 49 percent charcoal. Testing and use of similar mixtures containing a small percentage of aromatic nitrogen compounds (generally explosives related to picric acid or trinitrotoluene) also occurred.

These powders had significant advantages, compared to blackpowder. When used as a propellant, *amidpulver* was said to be flashless. This suggests a comparatively low temperature of combustion. Low combustion temperature suggests low barrel erosion and corrosion rates. Equally important, while *amidpulver* does produce a small amount of bluish smoke, that product disappears very rapidly in the field. The absence of any visible flash and production of only a limited amount of smoke that quickly dissipated made it possible for cannoneers to maintain a clear field of fire and to shoot at night without compromising their location. Both were, and are, significant considerations.

During WWI, there was extensive use of a similar propellant, *ammonpulver*, composed of 80 to 90 percent NH_4NO_3 (ammonium nitrate) with charcoal making up the remainder of the mix. *Ammonpulver* has several interesting characteristics. In an unconfined burn the flame temperature is only about 900°C. Its ballistic effect is very similar to a double-base smokeless powder containing about one-third nitroglycerin (by weight). This represents a startling amount of energy for a simple physical mixture.

Ammonpulver is also very inexpensive to produce. It is powerful, flashless and smokeless. It is insensitive to shock and friction but is more difficult to ignite than blackpowder. The former two factors are significant positive attributes. For application as a propellant powder it requires a strong igniter charge but, in most applications, that is not a problem.

When used as a cannon propellant, *ammonpulver* granules are typically a single cartridge-fitting perforated piece. Minor modifications to this basic geometry allow precise control of burn rate. A more serious drawback is that *ammonpulver* is *dramatically* hygroscopic. Transport and storage packaging for this powder requires use of hermetically sealed containers. Further, ammunition loaded with this powder has to be absolutely airtight.

Worse, *ammonpulver* does not tolerate wide swings in ambient temperature. If the granules contain any significant portion of water, freezing will generate ice crystals that can disrupt the granules. At only 32.1° C (89.8° F) ammonium nitrate [NH_4NO_3] undergoes a state transition. Heating of *ammonpulver* beyond this temperature causes ammonium nitrate to recrystalize from the low-temperature rhombohedral form to the high-temperature monoclinic form. This changes the crystalline shape, which crumbles the powder granule. Firing a cartridge containing such a pulverized charge is almost certain to result in dangerous chamber pressures—a burst gun is very likely.

Since both *amidpulver* and *ammonpulver* are simple physical mixtures of an oxidizer and a fuel, most ballisticians consider these substances as modifications of blackpowder. Both are simply intimate physical mixtures. Excepting the newest blackpowder substitutes, these are the only such substances showing significant potential as propellant powders.

New blackpowder substitutes include Arco Powder's *BlackMag3* (which is a physical mixture composed chiefly of saltpeter [KNO_3] and ascorbic acid [$C_6H_8O_6$]), *Black Canyon Powder* (which is chemically similar to *BlackMag3*) and Hodgdon's *Pyrodex* (the formulation being proprietary).

Smokless Powder

Captain Schultze of the Prussian Artillery produced what seems to have been the first successful smokeless powder in 1864. This was long after the 1846 discovery of nitrocellulose by Christian Friedrich Schönbien, a German Swiss; it took some time for experimenters to find a way to

tame nitrocellulose for use in guns. Captain Schultze's product was a bulk smokeless powder and consisted of saltpeter-impregnated sawdust. The process was quite sophisticated. It was, however, worthwhile. It resulted in the production of a substance that factory ammunition producers and handloaders could substitute on a volume-for-volume basis with blackpowder. Further, bulk powder was essentially ballistically interchangeable with blackpowder on a volume-for-volume basis, hence the name.

Compared to blackpowder, this product had many of the clean burning advantages of modern smokeless powders without any significant handicaps. It and similar acting products (organic mixtures containing nitrocotton and related compounds) continued in use for the better part of a century. Nevertheless, these powders were of limited value. They could not fulfill the promise of improved ballistics offered by newer, stronger steels. With the advent of nickel steel, in the 1880s, came the need for a more energetic and ballistically controllable propellant substance.

Typical bulk powder compositions from Davis' *The Chemistry of Powder & Explosions* are listed below.

Bulk Smokeless Powder Composition

% Nitrocellulose	% Nitrogen in Nitrocellulose	% Potassium Nitrate	% Barium Nitrate	% Starch	% Paraffin Oil	% Diphenylamine
84.0	13.15	7.5	7.5	0	0	1.0
87.0	12.9	6.0	2.0	0	4.0	1.0
89.0	12.9	6.0	3.0	1.0	0	1.0

In 1884 the French physicist, Paul Vielle, invented a dense colloided *poudre B*, which stood for *poudre blanch*—white; as opposed to *poudre N*, which stood for *poudre noire*—black. The French army and navy immediately adopted his new product.

The basis of *poudre B* and all typical smokeless powders is nitrocellulose, as represented by guncotton. Production of nitrocellulose begins with the chemical action of concentrated nitric acid on simple cellulose fibers which can come from cotton, sodium hydroxide treated wood or other sources. The addition of concentrated sulfuric acid (a strongly hygroscopic substance) removes the water produced in the altered fibers as a result of nitration. Otherwise this acid has no function in the reaction. Various physical and chemical manipulations during the nitrating process control the percentages of the various forms of nitrated cellulose in the finished product. Some cellulose nitrates are fully soluble in ether-alcohol; others are not. Modern guncotton contains some admixture of the insoluble fraction, which acts as a reinforcing fiber in the finished product—in the same manner that glass fibers reinforce epoxy resins in fiberglass.

Composition of various types of nitrated cellulose is shown below.

Production of guncotton is quite simple. Take pure cotton and subject it to the action of concentrated nitric acid in a controlled environment with the addition of a small amount of concentrated sulfuric acid. When the reaction has completed, rinse the resulting solution sufficiently with clean water to remove the acidity. Bathe the resulting material in ether-alcohol to form a colloidal suspension. Evaporate the solvent until a stiff jelly results. Manufacturers can manipulate this product in various ways to achieve several of the common forms of modern smokeless powder—flake or tubular. Producers manufacture the ball form of smokeless powders through specific control and agitation of a colloidal suspension. In any case, formation of the finished product results in tough plastic granules of carefully controlled dimensions.

Addition of potassium nitrate to the colloidal guncotton allows manufacturers to produce porous based powders. Kneading the mixture evenly distributes minute crystals of potassium nitrate throughout the colloidal guncotton. Later in the processing, water is added to the guncotton. This dissolves these crystals into solution. Thorough rinsing then removes the potassium nitrate. The resulting product is shot full of porosity, hence the porous base terminology.

We can follow the production of a typical tubular powder. The action of a hydraulic press expresses the stiff jelly through a steel plate with many identical perforations. Typically a central needle extends from behind the plate (the working side) into each opening. These pins create a perforation in each extruded tube. Since the product still contains about 30 percent solvent, this substance is quite safe to handle. Further drying reduces solvent content of these strands to about 15 percent. This is necessary to prevent collapse of the central hole during the next operation. A sophisticated cutting system then chops the strands into specific lengths. Careful sifting ensures the finished product will contain granules of proper size and dimensional uniformity.

Further drying of the resulting granules, through the action of low-humidity warm air, removes essentially all the solvent. Chemical treatment of these granules imparts a carefully controlled deterrent coating layer into the surface. This alteration occurs in a water bath. Finally, application of a graphite glaze

Chemistry of Nitrated Cellulose

Name	Comments	Chemical Formula	% Nitrogen	Density
Cellulose Hexanitrate	Chief component of guncotton	$(C_{12}H_{14}N_6O_{22})_x$	14.1417	1.66
Cellulose Pentanitrate		$(C_{12}H_{15}N_5O_{20})_x$	12.7502	1.66
Cellulose Tetranitrate	Constituent of collodion	$(C_{12}H_{16}N_4O_{18})_x$	11.1103	1.66
Cellulose Trinitrate	Constituent of collodion	$(C_{12}H_{17}N_3O_{16})_x$	9.1491	1.66

produces a finished powder granule. This glazing limits its hygroscopic tendency, improves flow characteristics of the resulting powder granules and reduces the hazard of static discharge. All are important improvements but the latter is paramount. I should also note that, in some instances, manufacturers manipulate the amount of graphite glazing to slightly alter product burn rate. A thicker graphite glaze will slightly retard initial combustion.

There are several other noteworthy things worth mention here. The biggest problem with producing smokeless powder is safety. However, production safety is achievable for two basic reasons. First, in almost all the stages the product is comparatively safe to handle. Second, most of the production stages can be carried out through remote monitoring and control.

Equally important to one's understanding of the production of smokeless powder is that the quality of finished product is in the details. There really is not any magic here. What separates also-ran smokeless powder from top-of-the-line material is practically all explained in these two simple clauses: proper control of production; quality of raw materials.

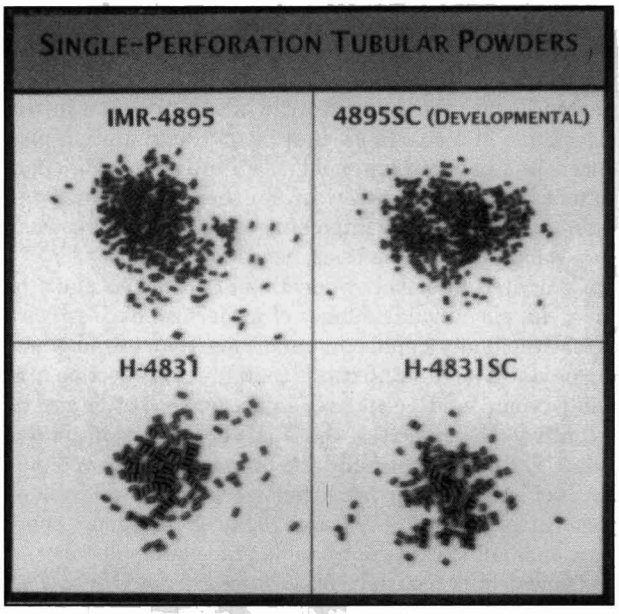
Besides the various deterrent coatings referred to, guncotton jelly typically contains about 1 percent of a thoroughly blended-in stabilizer, such as diphenylamine. These products work by displacing any residual acid in the mix. Effectively, they are wetter on guncotton than acid and thereby prevent the acid from retaining a physical contact—if the acid cannot touch the nitrocellulose it cannot attack it!

Typical deterrent coatings, which are adsorbed into the surface of the powder granules, include: centralite, potassium sulfate, dibutyl phthalate, cryolite and others—some of which are proprietary. These chemicals work by reducing the rate of combustion of the outside of the powder granules. This reduces the initial rate of gas generation, providing for a slower buildup of pressure, which allows the projectile to move further down the bore before the pressure peaks. This allows substantially increased muzzle velocities at any given peak pressure level.

Smokeless powders often include small percentages of several other substances. Commonly, manufacturers add lead stearate or lead oxide, which combine with copper fouling in the bore and strip it out of the gun. These work very well. Tin has the same effect but, unfortunately, is not as efficacious.

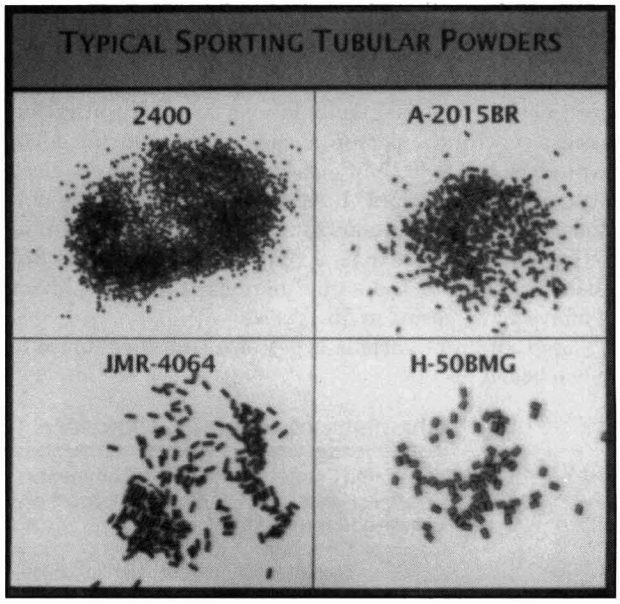
Finally, addition of certain salts acts to reduce muzzle flash, which is an important military and self-defense consideration. These can significantly reduce the size of the flame produced as the bullet clears the muzzle and generally redden the flame's color. Both effects significantly reduce the hazard of a shooter giving away his position when firing under limited illumination conditions. However, such substances invariably increase barrel erosion and corrosion rates and are otherwise detrimental to the overall performance of the powder.

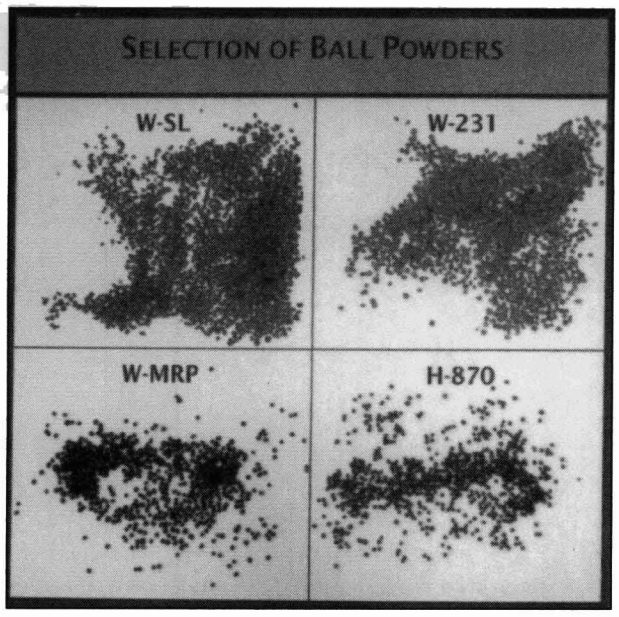
Control of the effective burn rate of modern smokeless powder results from manipulation of deterrent coatings, size and shape of the granules, porosity and the number and size of any perforations. As was noted with blackpow-



These tubular powders suggest the ongoing research toward perfection of smokeless powder. In many instances, tubular powders for sporting purposes do not meter consistently. The "Short Cut" (SC) approach addresses this limitation. Another limitation is sensitivity to ambient temperature. Hodgdon is addressing this with their new line of tubular powders, as exemplified by VarGet, which is very similar in general appearance to 4831SC but with smaller granules.

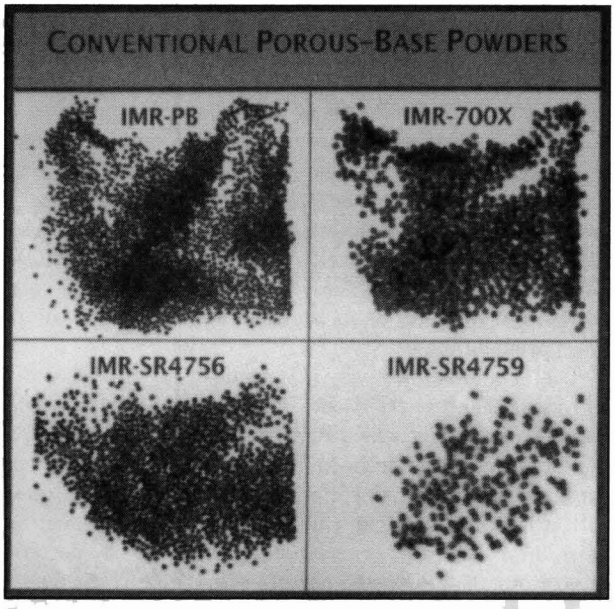
A representative sampling of sporting tubular powders covering a wide range of burning rates (the fastest here is about ten times quicker burning than the slowest): Alliant's 2400, very fine granuled or thick flake powder, useful in magnum handguns and relatively small capacity rifle cases; Accurate's 2015BR, a well proportioned and finely granuled powder that meters quite uniformly and is useful in relatively small capacity rifle cases; IMR's 4064, a very-long granuled powder that does not meter particularly well but is very useful in relatively medium-capacity rifle cases; Hodgdon's 50 BMG, a very short-cut large granule powder that meters consistently and is useful only in relatively very large capacity cases.





Olin Industries invented Ball powder and has marketed these fine products under the Winchester banner and through independent distribution and surplus sales as typified by Hodgdon Powder Company. Winchester Super-Lite (W-SL) is a porous, flattened double-base (34 percent) powder with a bulk density of about 0.765. W-231 is similar in form but with less nitroglycerin (22.5 percent) and a bulk density of about 0.70. Winchester MRP is double-base (13.5 percent) with the typical slightly-flattened spheres showing a bulk density of about 1.00. H-870 is double-base (10 percent) and typically quite spherical with a bulk density of about 0.965.

Porous-base powders are available in a wide variety of burning rates, chemistry and configurations as represented by these IMR offerings. Described as a flake type powder, 700X is double-base (29 percent nitroglycerin) and is among the fastest burning and least dense of sporting powders, with a bulk density of about 0.50. Also a flake type, single-base PB, while nominally considerably slower, is still among the fastest and least dense of sporting powders with bulk density about 0.55. Described as either a thick flake or a short tube, single-based SR4756 is a slow pistol powder with bulk density about 0.61. An interesting tubular powder, single-based SR4759 is among the fastest of rifle powders with bulk density about 0.675.



der, multi-perforation tubular powders can achieve significant ballistic advantage. Unfortunately, it is not possible to produce such granulations in powders suited for use in small arms.

For this reason, the big guns have a massive advantage. In those applications, use of essentially uncoated granules of very large size with as many as 37 perforations is feasible. These granules provide a very progressive burning curve—as the bullet moves out of the barrel the powder burns faster and faster. This allows the use of very large powder charges to obtain essentially flat pressure curves for practically the entire time the bullet is in the barrel. This approach can approximately double the energy imparted to the bullet, compared to the very best single-perforation powders.

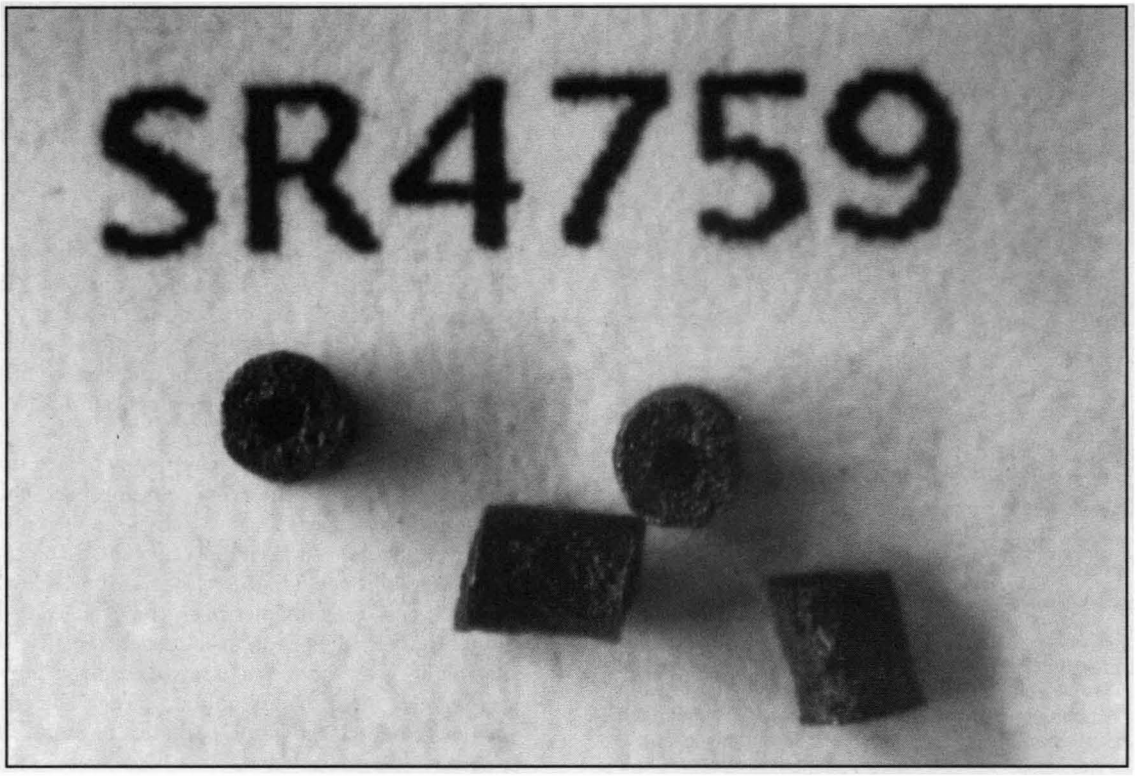
Ball powders cannot incorporate any perforation. These powers rely solely on the existence of properly chosen and applied deterrent coatings to achieve a measure of progressive burning—as do almost all tubular powders. One advantage ball powders have is that they allow a somewhat increased loading density—they generally pack better and have a higher intrinsic specific density. It is often possible to use a heavier charge of a slower-burning ball powder, compared to any tubular powder. Effectively, ball powders produce the same ballistics in small arms cartridges as tubular powders.

On the other side are the porous based powders. Usually designers of porous powders look to achieve two goals: Compressibility and *increased* burning rate. Compressibility is essential for proper shotshell loading. This provides for accommodation of various packing schemes in the powder and shot. This characteristic also allows substantial variations in charge and shot volume without altering the shotshell's basic casing or shot container. Increased burning rate accommodates shotshell and pistol loadings where a small charge of powder pushes on a comparatively light bullet of large diameter. Granulation of nonporous powders to accommodate these applications would result in a material with very fine particles, which would be correspondingly difficult and dangerous to handle. The porous base approach solves both problems.

Porous powders can have bulk densities as low as about 0.4, compared to about 0.85-1.035 for non-porous powders. Reduction in bulk density results partly from deliberate crinkling of the flakes. However, the majority of this effect results from the inherent porosity. Porous powders also accommodate novel applications of flash suppressors, which can coat the cavities. Typically, compression of porous powders to less than one-half their unconfined volume requires little force and will not significantly disrupt the individual granules.

Double-base powders incorporate nitroglycerin, which is adsorbed into the colloidal nitrocellulose. Alfred Bernhard Nobel (benefactor of the Nobel prize) invented this process in 1888. Nobel patented his new product under the name, *ballistite*. The original formulation included camphor, which he later omitted with superior results.

It seems almost miraculous that any process can incorporate nitroglycerin into nitrocellulose with extreme safety. Nevertheless, this is exactly the situation. The normally eruptive nitroglycerin is dissolved in a compatible solvent. The resulting suspension is



IMR's interesting SR4759 is a unique offering among the 130-plus sporting powders available in the U.S. With a large central perforation and a porous base, it has a low bulk density, ignites easily and is quite compressible. It is particularly useful in applications such as blackpowder cartridges loaded with smokeless to duplicate blackpowder pressure and velocity.

essentially no more dangerous than gasoline in handling. Physical mixing of this solution into the colloidal nitrocellulose facilitates adsorption of the nitroglycerin into the colloidal paste. Thereafter, detonation of the nitroglycerin requires intense shock, which never occurs in normal handling or use. However, firing a high-velocity rifle bullet into a can of double-base powder is ill advised—it will explode!

Admixtures of nitroglycerin up to about 14.5 percent are particularly safe to handle. Common powders often exceed this amount (Bullseye is fully 40 percent) and require special handling precautions during manufacture. Nevertheless, manufacture of these products is routine and with an amazing degree of safety.

There is another process whereby nitroglycerin is cooked into the formed granules. The manufacturer suggests that this process can result in a situation where the maximum concentration of nitroglycerin occurs at some controlled depth from the granule's surface. In theory, this should result in an increase in the rate of energy release when that maximally impregnated layer burns. If that layer happens to be at the center of the web (originally equidistant from all surfaces), a boost in energy release will occur at the end of the burning curve—a desirable result.

Nitroglycerin is somewhat more energetic than nitrocellulose but it also increases the bulk density of the resulting granules. This latter point is somewhat analogous to mixing ethyl alcohol with water—one part of each does not yield two parts of 100 proof moonshine. The nitroglycerin takes up the voids in the plastic molecular fabric of the nitrocellulose without a commensurate increase in volume. This is the other area where ball powders shine; they typically incorporate a comparatively large percentage of nitroglycerin.

Finally, we must note that addition of nitroglycerin also dramatically reduces the tendency of smokeless powder to absorb moisture from the air. This equally reduces the moisture content-related variation in burning rate, which is substantial.

Triple-base powders are less important for small arms applications. The addition of nitroguanidine provides a flashless powder and can provide other advantages. However, these powders are also more fragile and, therefore, less tolerant of improper handling. For application to artillery, pentaerythrite tetranitrate (PETN) is also useful; it significantly increases the energy yield of smokeless powder. Nevertheless, for various reasons, triple-base powders have found no meaningful applications as small arms propellants.

The last substance we will consider is of great historic significance—it carried the British through two world wars. This product was a British invention based upon a modification of the original ballistite formulation, which contained camphor. Cordite is an unlikely blend of guncotton, nitroglycerin and mineral jelly (now known as petroleum jelly). The original composition was 37 percent guncotton, an amazing 58 percent nitroglycerin and 5 per-

cent mineral jelly. Owing to the extremely high percentage of nitroglycerin, this early formulation caused excessive barrel erosion. A modified composition was soon settled on, which worked essentially the same but reduced erosion substantially. This later material contained 65 percent guncotton, 30 percent nitroglycerin and 5 percent mineral jelly.

The designers believed that the mineral jelly would lubricate the barrel. However, since the powder's combustion consumed the mineral jelly, it could not function in this manner. However, mineral jelly does act as a very effective stabilizer since it takes up any excess acidic nitrates from the guncotton.

Cordite found wide application in rocketry. It was safe to cast cordite into simple shapes and machine it into complex shapes. Military and commercial ammunition loaders controlled cordite's burn rate through proper choice of individual cord diameter for each application. In most applications, producers cut the cords to precisely fit the powder chamber in the finished cartridge (the length behind the bullet and in front of the solid case web). For this reason, cordite was more difficult to charge into bottleneck cases, compared to modern tubular powders. For a thorough and concise discussion of cordite and all of its variations, see page 168 of the 15th Edition of *Handloader's Digest* (1996).

In closing, I cannot resist including an early formula for blackpowder, this translation taken from Mr. Hogg's work.

From the Codex Germanicus a formula for powder (14th century): "If you want to make a good strong powder take 4# of saltpetre, 1# of sulphur and one pound of charcoal, one ounce of salpractica and one ounce of salammoniac and one twelfth part of camphor. Pound it all together and add spirit of wine and mix it in, and dry in the sun. Then you will have a very strong powder of which one pound will do more than three pounds otherwise. It also keeps well and becomes better with time.... Where there is no camphor it crumbles and easily spoils. But the camphor holds all powder together and it is also strong and quick in all powder, if one puts it in."

Salpractica is a mixture of saltpeter camphor and salammoniac (Ammonium Chloride) dissolved in spirits of wine (ethyl alcohol). It was made by scraping off the deposit formed by evaporating off the resultant liquid. It was considered to develop power by introducing more air to the blackpowder.

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Chapter 14

THE CARTRIDGE CASE—WHY BRASS?

by Bob Forker

DID YOU EVER wonder why most cartridge cases are made from brass. Why not other materials? Over the years there have been plenty of alternative materials tried and several have been successful in specific applications. All you have to do to find cases made from steel, aluminum, paper, and plastic is to look around a little. I have even seen a case made from titanium. I wonder if that titanium case cost more than the gun in which it was used!

To see what is being done today we can start with the pistol ammunition made by CCI/Speer and sold under the Blazer logo. Those cases are aluminum. Shotshells can be found in paper, plastic and brass. In some European areas, steel cartridge cases are not uncommon. Still, brass seems to be the material that sets the standard. Everything else that is used tends to be judged on whether or not it is "just as good as brass."

When considering why things are the way they are, it is always a good idea to take a look back in history. If we do not count the prepackaged paper "cartridges" of powder and a ball that were furnished to troops toward the end of use of muzzleloaders as military weapons, the first real cartridge cases were made of nearly pure copper. They were rimfire case units that were formed out of thin sheet material. They worked very well and their success demonstrated that the breech-loading gun was the way to go. These first cartridge cases could not be reloaded, at least not by individuals. The reloadability factor has played a role in all subsequent cartridge case development.

Let us stop for a moment and consider just what the cartridge case (in any material) is required to do. For openers, the case makes a package to hold the primer, powder and bullet together for convenient insertion into the gun. Additionally, for what it is worth, the case also provides a grip (the rim or extractor groove) to get the fired case or unfired cartridge back out of the chamber. Perhaps the most important function of a cartridge case is to provide a seal to keep the gas pressure, generated as the gun fires, from leaking back into the shooter's face. There is also the factor of providing some environmental protection to the powder. Powder changes performance as it picks up moisture; the metal cartridge case can easily be sealed to make an "air tight" package. There is also a small factor of protecting the powder from hotspots in the gun. (Why do you think cannoneers with the old blackpowder muzzle-loading cannons swabbed the bores with water between shots?) All in all, the cartridge case does many good things for us. Developers of "caseless" ammunition have to account for all these good things, but that is another story. However, these considerations do explain why caseless ammunition is still not in common use in small arms.

But just because the case is required to perform a number of functions does not mean that one single material (brass) is the only suitable choice. Actually, the functions listed above can be accomplished by a number of materials. The choice of material usually depends upon other considerations. Perhaps the most significant of these other factors is the working pressure of the gun. Another is the amount of support the gun provides to the head of the case. Cost, both for the material and the manufacturing setup, is certainly a major consideration, perhaps even more so in military ammunition. From time to time copper or zinc (the basic material needed to make cartridge brass) have been in short supply in various parts of the world. These shortages necessitated development of substitute case materials. For commercial ammunition, the possibility that the cartridge case will be reloaded is clearly an important factor. Any change in what has become a standard material has to account for any change in reloadability it might represent.

The copper rimfire case worked well in the very low pressure guns that were common in the 1860s. Blackpowder was still the only propellant and blackpowder pressures typically run in the 10,000 to 15,000 psi range, so case strength was not a major problem. As the cartridge was fired, the thin copper case would also readily swell up to seal the breech. But copper is far from the easiest material in the world to form and machine. Manufacturers had the technology to roll copper into sheets and draw it into

Left to right, a 50 BMG; an experimental 30mm two-piece aluminum case; an experimental 30mm case with an aluminum head and a plastic forward portion; a titanium case that was too expensive to even think about.

wire but other operations were difficult and expensive. Brass, an alloy of copper and zinc (sometimes with lead and tin added), was in common use at that time and was much easier to form and machine. As fixed ammunition developed, the desire to include a centerfire primer and do additional forming of the case head led to the selection of brass for many of the newer cartridge case designs.

At the same time the brass cartridge case was starting its development for use in rifled guns, the shotgun was also being converted from muzzleloader to breechloader. Shotgun pressures have not changed since blackpowder days. Pressures are still right around 11,500 psi, plus or minus a little. Here, manufacturing cost has driven case material selection as much as anything. The rolled paper tube with a thin copper or brass head was the standard for decades. There have been some all brass shotshells available over the years but they never accounted for a significant percentage of production. Perhaps in earlier days, brass cases were more suitable for reloading but that is not a factor today. Injection moulded plastic has become the material of choice for shotshells. The thin metal head covering is still usually included but some all-plastic shells have been produced that have been satisfactory. However, the all-plastic casing is a long way from taking over the market.

Shooters are not very quick to accept radical changes in something like cartridge case construction. It is an interesting aside that Federal Cartridge Company still produces shotshell target loads with paper tube cases. They actually sell the same basic load in either paper or plastic cases. The paper tubes are only offered in 12-gauge size today because the demand has fallen off for other gauges; still, paper has a loyal following from the clay target shooting fraternity. You can find many reasons why some shooters prefer paper; a few of those reasons may be more emotional than operational. Regardless, the paper tube still works just fine. *(Editor's Note: Paper tubes can be made to open with less resistance and that might result in improved pattern coverage.)*

The head end of shotshells comes in a huge variety of designs. High brass, low brass, high base, low base, all these designations can be found on shotshells. The manufacturers of high brass shells might like consumers to believe such shells are stronger or more powerful than other types. However, since all shotshells manufactured by members of the Sporting Arms and Ammunition Manufacturers' Institute, (SAAMI), which includes the bulk of shotshells fired in this country, have the same maximum pressure and velocity limits, regardless of external configuration, we can assume most of these variations in external appearance originate in the marketing department. There may be minor differences in case strength but that should not be your primary reason to use one brand in favor of another. There are enough meaningful reasons, such as pattern density, to select a particular brand. You do not need to make your selection based on cosmetic differences.

It is wrong to believe that "strength" is an important factor in cartridge case design. Even the strongest cartridge case materials cannot come close to containing the pressures developed by the burning of the powder unless the case is supported by the gun. As the case stretches, it

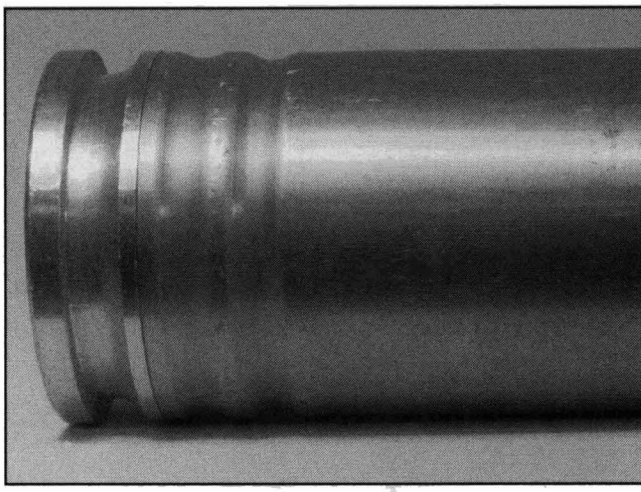
stretches the chamber and forces the bolt back. As the gun reacts to this stretching it develops resistance to continued stretching. At some level, the gun's resistance equals the pressure. Further stretching does not occur. In all instances the case is supported by the gun. Therefore, the gun contains the pressure; the cartridge case only seals the breech end of the chamber to keep the gas from blowing out the back of the action and into the shooter's face.

Other than pure strength, what properties does brass have that make it such a good material for cartridge cases? First, the brass case develops "enough" strength. But today the same strength can be provided with either steel or aluminum. Actually both materials can generate more tensile strength than brass. Note that in the strongest standard gun types the typical brass case will withstand all the pressure that it is prudent to use — a stronger case would add nothing. As we said above, strength is not all that important. The ability of brass to stretch a long way without rupturing is a much more important consideration in this application. While some plastics have good elongation characteristics, neither steel nor aluminum can come close to matching brass in that attribute.

By changing the amounts of the various elements in any alloy, metallurgists can tailor the material to a specific application. The table lists tensile strength, maximum elongation, and density for several materials with possible applications to the cartridge case task.

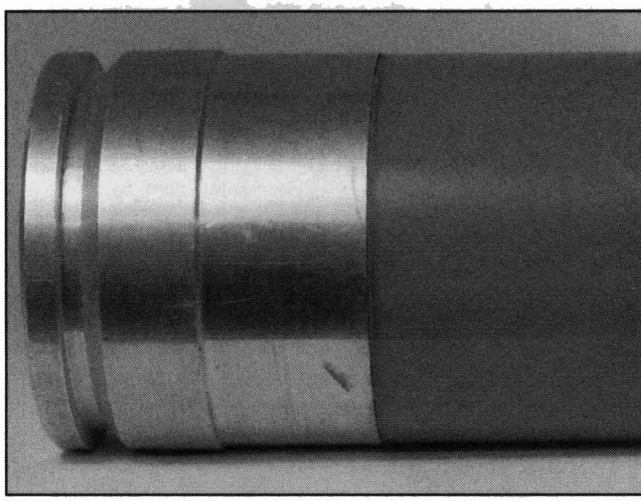
The two tensile strength values, yield and ultimate, need some explanation. Ultimate tensile strength is just what the name implies. It is the stretching load that could be supported by a 1.128-inch diameter rod (exactly 1 square inch in cross-sectional area). In the United States, tensile strength values are usually expressed in pounds per square inch. Yield strength is the same sort of number except that yield strength reflects the load at which the tensile specimen begins to permanently stretch a noticeable amount. This is called plastic deformation. That criterion has been standardized at 2 percent permanent stretch, so a sample that is 4 inches long will be judged as having reached yield strength when permanent stretching reaches 0.080-inch (4 x 0.02). In the real world, yield strength is a far more important design factor than ultimate strength because beyond this value the cartridge case will not spring back to (or near) its original size. It could jam the gun.

In the fully work-hardened state, the material known as cartridge brass has an ultimate tensile strength of about 90,000 psi. That compares to copper's 20,000 to 25,000 psi. Even in the condition that it is usually used in (somewhat annealed), cartridge brass is about twice as strong as the hardest work-hardened copper. Each manufacturer of cartridge cases has his own formula for the brass used and actual composition affects strength. However, most compositions are about 70 percent copper and 30 percent zinc; the reported numbers are typical.



(Above) Close-up of the two-piece aluminum case. Note the case is made from a head and body that are joined by crimping. This design never made it past the first tentative test firings. Gas leaks.

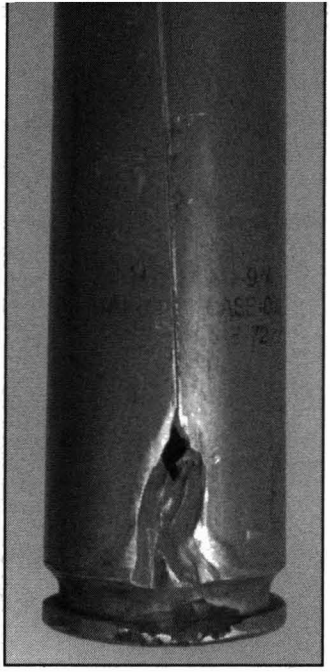
(Below) Close-up of an aluminum/plastic composite case. This design wasn't a big winner either.

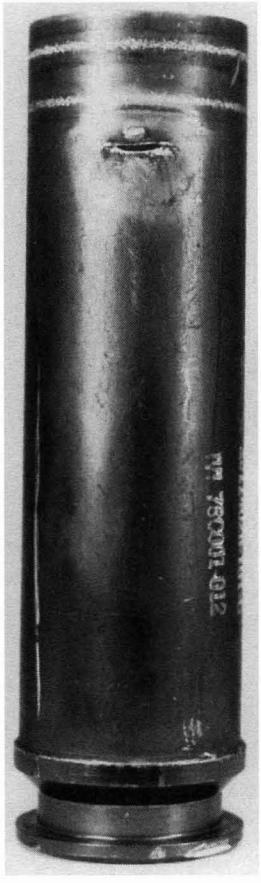


Physical Properties for Common Case Materials

Material	Yield Strength (psi)	Ultimate Strength (psi)	Maximum Elongation	Density Lbs./cubic inch
Brass	35,000**	50,000**	50	0.308
Alloy Steel	140,000	160,000	15	0.283
Aluminum	70,000	80,000	11	0.100
Titanium	150,000	175,000	15	0.164
Plastic*	10,000	20,000	15	0.050

* Properties vary widely for different plastics.
** Brass case heads are often work-hardened to far exceed these strength values.





(Above) This shows what happens when a leak develops in an aluminum cartridge case at the 65,000 psi level. The crack started from a scratch made by the ammunition link. The barrel and bolt were both ruined.

(Left) This photo of a M788 aluminum cartridge case shows a small leak that resulted from damage caused by inserting the bullet. With the chamber pressure level at only 46,000 psi, the leak didn't go anywhere and there was no damage to the gun. Aluminum cartridge cases work great at moderate pressure levels, but they really have their down side at pressures over about 60,000 psi. Still, the advantages of the aluminum case (light weight) outweighed the disadvantages (occasional gun damage) in the GAU-8 application.

As mentioned previously, CCI/Speer is producing aluminum cartridge cases for their Blazer ammunition line. Aluminum has the advantage of being about one-third the weight of brass. Weight can get to be a huge consideration, especially in guns with large magazines. With automatic pistols with 15-round magazines the shooter can easily feel the difference between a magazine loaded with aluminum-cased ammunition and one loaded with brass-cased ammunition. However, aluminum is not nearly as tolerant a material for reforming and recrimping in the reloading process. CCI/Speer discourages reloading of Blazer ammunition by using a Berdan type primer (with two small flash holes instead of the single hole used with Boxer-type primers in common use in this country). Berdan primers are a giant pain to remove from the case so their use in Blazer ammunition effectively makes this aluminum case a "one shot" item.

All these relatively low pressure applications are interesting. However, it is only when we begin getting into the world of high-performance centerfire ammunition for sporting rifles and military uses that material selection for cartridge cases becomes a serious matter. Both civilian arms makers and government arsenals have done extensive research and development on a whole host of alternative case materials. We can review a few of these variations.

During WWII, because of a copper shortage (real or perceived), steel cartridge cases for 30-06 Springfield and 45 Automatic ammunition were produced in huge quantities. Except for a few corrosion problems these steel cases worked just fine. These cases were even about 10 percent lighter than brass cases. Soon after WWII ended, the Navy was developing a new 20mm round and selected a steel cartridge case for the production configuration. The Navy's MK-100 series ammunition was about $^{5}/_{8}$-inch longer than the M-50 series Air Force 20mm round. The difference is something like that between the 30-06 Springfield and the 308 Winchester.

There is a story that the Secretary of Defense at that time, Robert MacNamera, was at the USAF base at Da Nang in Viet Nam when he was told that the Air Force units there were running out of M-50 20mm ammunition. He told them to just go across the field and get some 20mm ammunition from the Marines, because they had plenty. When Mr. MacNamera was informed that USAF 20mm and U.S. Marine 20mm ammunition were not interchangeable he reportedly went ballistic. Anyway, the MK-100 series ammunition did use a steel case for a large portion of the production period.

The first attempts at producing aluminum or steel cartridge cases maintained the same internal configuration as the original brass cases. Of course *external* dimensions had to remain the same if these cases were to fit into existing guns. But because of differences in the way these different materials form, any change in material requires almost a complete new set of tooling. A commercial ammunition company that has invested in tooling for brass cases, and has a whole production line dedicated to brass cartridge case manufacture, is not going to take the decision to convert to another material lightly. It is a major change and could require a whole new production facility. And, always remember, that the shooting industry measures progress and innovation on a glacial scale of speed. I am not sure that is all bad. Many world-beating ideas have not been practical for genuine field usage. It is ultimately you, the buyer, who determines the speed of change.

As far as loading and cartridge performance goes, if the internal volume of an alternative material case is the same as the brass case, performance of the ammunition will be the same. At one time, conventional "wisdom" held that the cartridge case itself determined the maximum pressure that could be used for any specific caliber. It was taken as an article of faith that 30-30 Winchester cases were far "weaker" than, let us say, a 30-06 Springfield case; therefore the 30-06 could be loaded to higher pressures. While there might be a speck of truth in this in some instances, the important factor in deciding the commercial pressure limit for any cartridge is the strength of the weakest guns that are chambered to use that cartridge. *(Editor's Note: This is no small consideration; misunderstanding of this fundamental truth can lead to*

disastrous consequences. Never assume case strength suggests anything about maximum loading pressures.)

We can take the 45-70 Springfield as an example. There are still a number of Trapdoor Springfields around and in use; most are chambered for this cartridge (only rarely are Trapdoor rifles chambered for the 50-70 Springfield encountered). These guns cannot stand much pressure. Most loading manuals recommend that pressures be kept under about 16,000 psi in ammunition for these guns. There is that blackpowder limit again. There are not enough Trapdoors around and in common use to make loading this cartridge a profitable large-scale commercial venture. Conversely, lever-action guns chambered for the 45-70 Springfield are still in fairly common use. Marlin's 1895 and Winchester's 1886 are examples of rifles that can safely take considerably more pressure than the Trapdoor Springfields. For this reason the SAAMI pressure limit for the 45-70 Springfield is 28,000 psi (also 28,000 CUP). Much modern ammunition is marked showing that it is *not* for use in Trapdoor guns. Even the 28,000 psi pressure limit creates a very real restriction on the performance of this cartridge. In modern single shot guns, like the new Shiloh Sharps or the Ruger Nos. 1 & 3, pressures can be safely pushed into the 40,000 psi class. So you can see that it is mostly the gun that determines the maximum allowable pressure in any given cartridge.

Another example: I have tested 30-30 Winchester ammunition in remotely fired pressure barrels. We were in the process of developing proof loads for a very small gun manufacturer. Proof loads typically generate as much as 150 percent of the maximum allowable working pressure for the cartridge, so we had to load to 63,000 psi to have a valid proof cartridge (42,000 psi x 1.5). In this testing, we took some of these 30-30 loadings clear up to 80,000 psi (in a remotely fired pressure barrel, not in a gun in front of our faces) before we began loosening primers. This result clearly shows that the 30-30 case itself is not the thing that limits the 30-30's working pressure. Again, it is the gun.

When some of the early military chamberings were first converted from brass cases to steel cases, case volume remained unchanged. Then some clever cartridge designer realized that the steel alloy used in the new cartridge cases was so stiff that the sidewalls and the case head could be made a lot thinner and still properly seal the chamber. It turns out that the thinned design would do a better job of expanding and sealing the chamber. This modification had the dual advantage of making the case a lot lighter while increasing internal volume so performance could be increased, keeping to the same pressure limit.

Ultra thinwall cases worked perfectly when single loaded and fired. However, when these paper-thin wall steel cases were put into ammunition links, the links crushed the cases like a toothpaste tube. Back to the

Cartridges (left to right) are 50 BMG which uses a brass case and is included here for scale; the 20mm M-50 series USAF ammo which uses a brass case; the 20mm MK-100 series Navy ammo (for aircraft use) which uses a steel case; and the 20mm Hispano (Oerlikon) HS-820 which uses a steel case and was used by the U.S. Army in some small armored personnel carriers.

Left is the 30mm M-788 round used for the AH-64 Apache helicopter. This is also an aluminum case. The 50 BMG shows that this is a much shorter round than the 30mm GAU-8. Compared to brass, the aluminum case made a huge difference in the number of rounds that could be carried on a mission.

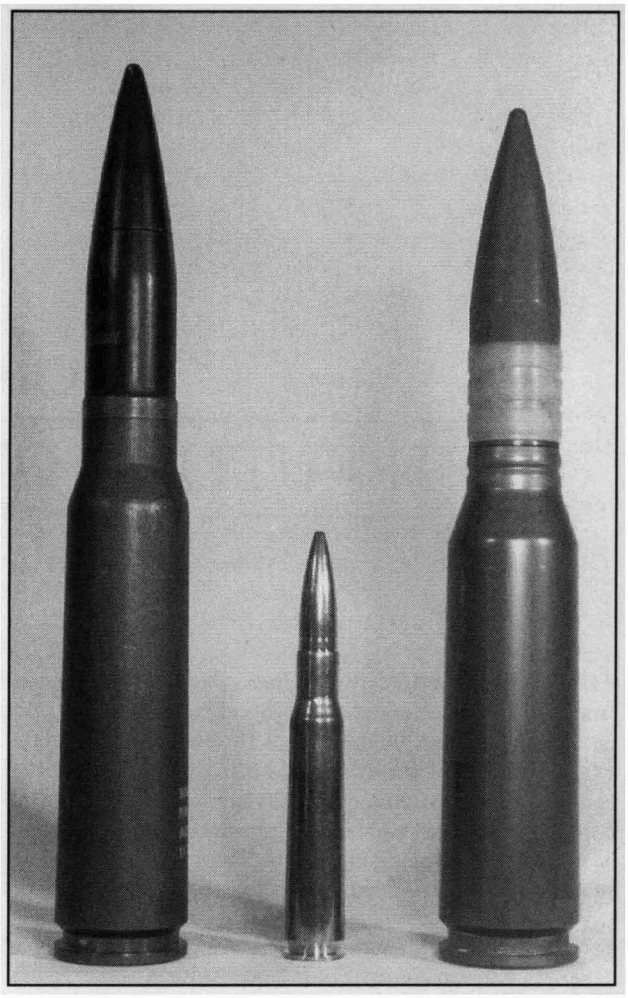
drawing board. A "welterweight" cartridge resulted that turned out of be a good compromise between light weight and handling strength. This is an excellent example that demonstrates that safe firing loads are not the only design considerations.

There have been numerous attempts to produce a plastic case, either one piece or of composite construction, for rifle and small cannon calibers. So far these attempts have not been highly successful, but the developers are still trying.

Aluminum is in use as a high pressure case material. I have personally tested aluminum cases in 20mm, 25mm and two sizes of 30mm. Both 30mm rounds went into production with aluminum cases. The first of these was for the 30mm GAU-8 gun used on the A-10 Wart Hog airplane. This is a large bottlenecked case that holds about one-third of a pound of propellant and develops a working pressure exceeding 60,000 psi. The use of aluminum at these pressures can turn the evil genie loose. If you get any minor case failure, even a primer leak, the hot propellant gasses cut through the aluminum like water breaking a dam. That would be bad enough but that is only the beginning of the problems. The gas and the molten, or vaporized, aluminum combine in some form of nasty (thermite type) chemical reaction to produce an instant cutting torch. One leaky shot and you have deep canyons washed into the bolt face, or cutting the side right out of the chamber. It took a whole lot of work to get the aluminum case developed for that round. There was a real incentive because in that airplane the change from brass to aluminum cartridge cases saved nearly one ton of weight at take-off.

The ammunition for the AH-64 Apache helicopter is also a 30mm. But this ammunition is an entirely different 30mm, compared to the GAU-8. This is a relatively mildly loaded straight-walled case that is identical in performance to the British ADEN and the French DEFA ammunition. The U.S. design for this M-788 series ammunition was required to be NATO interoperable with ADEN and DEFA. Here again, because the AH-64's magazine can hold so many rounds, weight got to be a very, very important factor and aluminum was selected as the only production material for these U.S. cartridge cases. This job was somewhat easier than the GAU-8 case design because the working pressure was only about 46,000 psi. The difference between the 60,000 psi level and the 46,000 psi level is the difference between having the cutting torch reaction and not having any such problem. The M-788 aluminum cartridge case development went relatively smoothly. There has never been any M-788 series production ammunition with a cartridge case of any other material.

All of these military cartridge case applications share one very important point. Military ammunition is not designed to be reloaded. Imagine a combat infantryman stopping to pick up his fired cases. In some aircraft applications (but not all) the empty cases go overboard. Those get really hard for the pilot to recover. In all the calibers larger than sporting rifles, the case becomes a smaller and smaller part of the overall cost of firing the gun. Ammunition for operational use often has projectiles that account for more than 50 percent of the cost of each round. By the time you reprocess such a case you have spent as much as



Left, early prototype of the 30mm GAU-8 round for the A-10 aircraft. This is an aluminum cartridge case. Later versions of the GAU-8 round used plastic rotating bands. A 50-caliber BMG cartridge (middle) is used for scale. On the right is an experimental 30mm for the GAU-8 program. This round also used an aluminum case. Note the plastic rotating band on this projectile.

buying a new one. There is another fly in the reloading ointment. Steel and aluminum cases do not resize and reform as completely as brass cases so it is hard to get consistent and adequate neck tension or a reliable crimp with a reused case made of either of these materials.

It is the current practice to nickel-plate brass cases for premium ammunition. The claim is made that these cases are less subject to corrosion and extract more easily, compared to plain brass cases. There may be a lot to both of those claims but I suspect that, more than anything else, manufacturers just want everybody to be able to see at a glance when someone is using their premium stuff. There may be more than a little bit of marketing spin riding piggyback on a couple of small, but real, improvement factors. I am not knocking premium ammunition, just the opposite. At the cost of a hunt today, it does not make a whole lot of sense to use ammunition other than the best you can find or make.

With all the work that has been done with alternative case materials, it is remarkable that after 125 years of development of the effective self-contained cartridge, the brass case is still the one to beat.

Chapter 15

THE FUTURE OF HIGH VELOCITY

by Ralph Lermayer

THE WORD SABOT (pronounced say-bow), originates from the French language and loosely translates to shoe or boot. The word sabotage is a throwback to the days when disgruntled workers would toss their wooden shoes into the boss's machinery to stop the works. The use of cups or buffers between a gun's bore and a projectile is not a modern phenomenon. Early cannoneers launched reduced diameter projectiles using wooden buffers (sabots) to extend a cannon's range. Throughout the age of black-powder and muzzle-loading, the occasional application of sabots in rifles was not uncommon.

Early sabots were painstakingly handcrafted, usually made of wood or leather, and were hardly an economic option for mass production. I should also note that the patches used in the classic patched-round-ball muzzle-loading system provided some of the benefits of the sabot—separation of the bore and the projectile.

So, we see that the idea of a buffering device, which allows the use of a sub-caliber projectile, is not a new one. All such devices have the following in common: They separate the bullet from the bore and the propellant gasses, protect the bore from metallic fouling (caused by the bullet) and protect the bullet from direct bore damage—all worthwhile advantages. A further advantage is that the sabot allows use of smaller diameter and lighter projectiles—very worthwhile. However, effective commercial sabot application awaited the age of plastic polymers.

We know that the military is extensively researching development of sabot-housed, flechette projectile loads, which can be launched at extremely high velocities. Flechettes are dart-like projectiles designed for aerodynamic stability. Reports of six- to seven-thousand fps muzzle velocity from both hand-held and artillery guns using exotic projectile loads continue to trickle in, but researching or validating these rumors is next to impossible. While these exotic applications are no doubt of interest, it is the utilization of sabot technology for today's sporting shooters that is our concern here. The changes sabots will bring could soon alter the ballistic world as we know it.

Many shooters associate the sabot only with increased muzzle velocities in highly specialized cartridges, such as military artillery loadings. To a degree, that is an accurate perception. However, what is currently emerging as a viable sabot application is "upgunning" existing cartridges—increasing velocity to levels previously unattainable. This is accomplished by using a lightweight sub-caliber bullet. Remington's 30-06 Accelerator loading is a prime example of this concept: This loading launches a 55-grain 0.224-inch bullet at over 4000 fps at the muzzle. Many 220 Swift loads and even a few 22-250 loads reach 4000 fps, but this velocity was never before accurately achieved using the 30-06 case and rifle.

The first significant commercial application of saboted bullets was an offshoot of a request from the law enforcement community. They called for a lead slug, fired from a 12-gauge shotgun, capable of stopping a moving automobile. The "Blockbuster" was soon marketed to hunters by a firm called B.R.I. (Ballistics Research Industries). Successful 12-gauge slug loadings suitable for deer hunting soon emerged. Because of the comparatively low pressures and temperatures encountered in a shotgun's breech, polymers for those applications did not have to be particularly high-tech to get the job done. Today, Winchester, Federal, and others market saboted shotgun loads. These launch a 0.50-inch diameter, 437.5-grain (1 ounce), lead or solid copper slug at 1450 fps from a 12-gauge bore that measures 0.73-inch. This slug generates 2040 foot pounds of energy at the muzzle. It is the polymer sabot that takes up the slack between the sub-caliber, 1/2-inch projectile and the much larger (almost 3/4-inch) bore. This powerful slug loading is the backup medicine found in the hands of many of Alaska's grizzly bear hunting guides.

The early 1960s saw developing interest in application of sabots to centerfire sporting cartridges. Mr. David S. Reed applied for a patent in November of 1962, which was finally granted in January of 1965. That patent describes a polymer sabot very similar to the one used in the Remington Accelerator load. At that time, Remington was a wholly-owned subsidiary of Dupont. Perhaps Mr. Reed

Left to right: Factory 45 Colt load; experimental saboted load; blue MMP 45/38 caliber sabot; Speer 158-grain 0.358″ JHP; and base of sabot. MMP color codes all of their sabots to avoid confusion. The blue unit is specifically designed for shooting 0.358″ bullets in 45-caliber muzzleloaders ((0.450″-0.451″) but can be used for certain cartridge applications.

was employed somewhere within the Dupont corporation because this patent is assigned to Remington.

Engineers at Remington tell me that it was under Dupont's direction and instruction that they undertook the Accelerator project. In any event, it was not until 1978, almost thirteen years after the initial patent was granted, that the project was completed. The project goal: Using a 30-caliber case (the 30-06 Springfield), develop a cartridge that would propel a 55-grain, 0.224-inch bullet at higher than standard 22-250 Remington velocities (3700 fps). That round had to reach 4000 fps, from a 24-inch barrel, stay within SAAMI pressure specifications, and maintain Remington's (then current) 22-250 accuracy standard—3.7-inch groups at 200 yards.

This task turned out to involve much more than just the seating of a 22-caliber bullet in the Dupont polymer sabot over a conventional powder charge. By the time the research was completed, Remington had redeveloped every component involved in the load, excepting the case.

First, it was discovered that no existing powder would accomplish the required task. Remington asked Dupont's IMR Powder Division to develop an entirely new propellant, specifically suited to the saboted load. (Remington still keeps the specifications of that powder close to the vest; it has never been available to handloaders as a canister-grade propellant.)

Likely, Remington encountered propellant difficulties for several reasons. The loading they had developed required a powder with a burn rate similar to typical pistol and shotgun powders, but with a density similar to typical rifle powders, and the proper charge had to entirely and almost exactly fill the usable case capacity! While powders with approximately the correct burning rate were available, those were all low-density formulations. No available propellant combined the correct burning rate with a relatively high density.

Pulling a 30-06 Accelerator apart reveals a full case of a comparatively fine granuled tubular powder resembling a miniature version of IMR-4320. The charge, which just fills the usable case capacity, weighs 56 grains. In bulk density, this powder is very similar to IMR-4320.

Properly igniting this powder in the saboted cartridge was also beyond the capabilities of existing components. It was discovered that the pellet charge in the existing large rifle primer had to be reduced from the standard 0.55-grain to 0.45-grain (18 percent). Why reduce the primer pellet charge? With the low coefficient of friction between the sabot and the bore, the hotter standard primer probably started the bullet moving before the powder ignited. Such an eventuality would result in a loss of consistency, which would result in poor accuracy. This new primer maintained the requisite accuracy standard and afforded reliable ignition.

I have not been comfortable with this, or any other, internal ballistics theory. However, I have encountered similar problems with small caliber bullets and fast burning powders in other calibers. Most 22 Hornet loads show a marked improvement in accuracy, as well as an improvement in ballistic uniformity, when lower-powered pistol primers are substituted for the standard rifle primers, which is most often called for in 22 Hornet loading data. Whatever quirk of ballistic balance causes this phenomenon, it is obviously greatly amplified with the 30-06 case firing a 0.224-inch bullet in a low-friction sabot. In any case, Remington settled on a new primer with the 0.45-grain charge (not available to handloaders) and went on to the next design hurdle—the bullet.

The lead core of Remington's standard 22-caliber jack-

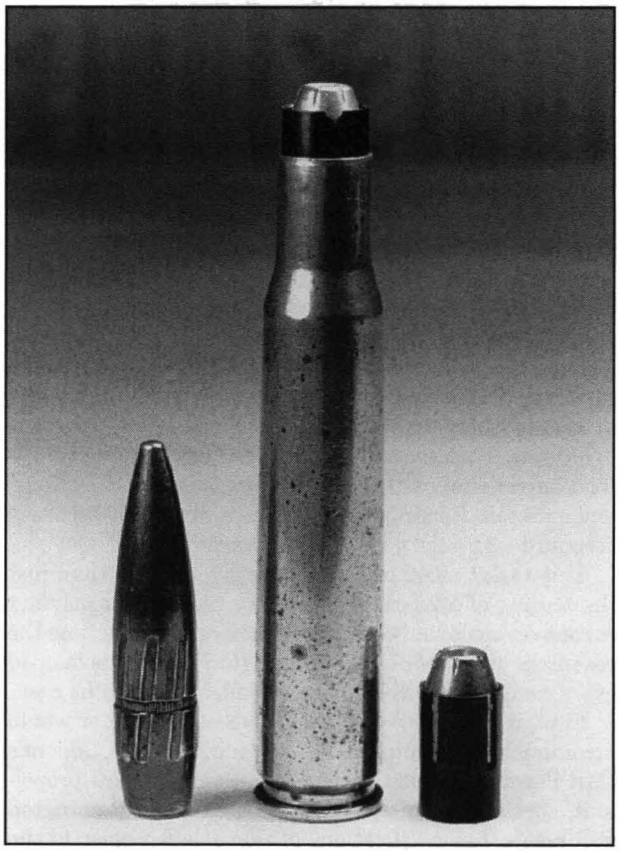
In 1978 Remington offered the first commercial sabot loading, the 30-06 Springfield Accelerator. Factory ballistics are impressive: 55-grain 0.224″ bullet at 4080 fps. More recently Remington has added similar 30-30 Winchester and 308 Winchester loadings, though at somewhat lower velocities. Also shown here is the saboted bullet.

eted bullet was then made from a lead alloy containing about 0.75 percent antimony, which provides hardness. While the existing bullet jackets held up acceptably in the sabot loading, Remington's ballisticians discovered that to maintain the required accuracy standard they had to substantially increase bullet core hardness. Remington settled on a 2.5 percent antimony alloy. For lead alloy used in jacketed bullets, that is a comparatively hard composition. As with the rest of the Accelerator components, these special bullets are not marketed to the handloading community.

Why the need for harder bullet cores? Remington discovered that once the sabot loading bullet was no longer contained by the rifle's bore, the centrifugal force of rotation (imparted by the rifling) at such a high velocity caused the bullet to disintegrate before reaching the target. Additionally, the pressure the sabot applied to the bullet's bearing surface as the unit traveled through the bore was evidently violating the integrity of the core-to-jacket bond. In response to acceleration and rifling forces, the sabot squeezed the bullet so hard that the bullet was swaged smaller as it passed through the bore. When the sabot came free of the bore and relaxed its grip on the bullet, the bullet's jacket sprang back more than the core. The bullet lost balance and stability. All of Remington's high velocity 22-caliber bullets now use this harder core alloy.

With this step, the accelerator project was finally completed. Today shooters have a choice of three saboted Accelerator loads—30-06, 308, and 30-30—all using components developed exclusively for these loadings.

The goal of this entire endeavor was to provide ammunition that would allow owners of 30-06 chambered rifles to use those guns beyond deer season, specifically for varmint hunting. However, Accelerator sales have always been lackluster, likely for several reasons. First, most dedicated varmint hunters are also handloaders. Second, many varmint hunters have a smaller caliber rifle intended exclusively for varminting. Finally and importantly, typical Accelerator accuracy in hunting rifles just did not



Military 50 BMG loadings have long included ultra-velocity armor piercing saboted versions. Here a typical 50 BMG bullet stands beside a 50 BMG case whimsically loaded with a 0.458″ pistol bullet in a sabot. Such a combination would be truly impractical but this photograph does suggest the versatility of sabots.

satisfy varmint shooters. In spite of this lack of sales success, much valuable information was gathered in the Accelerator project.

Has this research continued? Yes, experiments by Remington with their 30/22 sabot and bullet combination fired from a 300 Winchester Magnum easily generated muzzle velocities exceeding 4500 fps. However, not one of those high-velocity bullets made it to the target during the firing of hundreds in test shots. Even with the harder alloy core material, all bullets disintegrated en route. Evidently 4500 fps is just too fast for a conventional lead-alloy cored bullet.

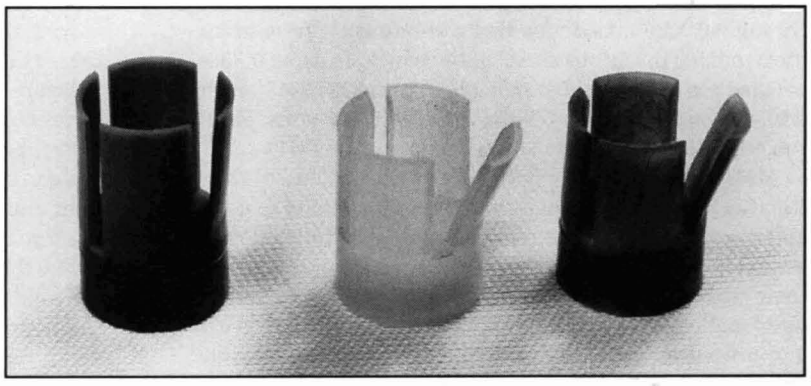
How long will it be before someone takes a sabot made from one of today's improved polymers, inserts a homogeneous copper bullet like the Barnes-X, and makes their 300 Winchester Magnum into the ultimate varminter? Considering what has already been learned as a result of these 30-06 Accelerator experiments, can the 338 Winchester Magnum case be coaxed into safely launching a 100-grain, Barnes-X type 6mm bullet at 4250 fps? I suspect such applications are just around the corner. Likely, marketing departments of the firearms industry will demand this approach, as the constant introduction of niche filling calibers will cease to excite customers and create sufficient new sales. Is the market ready? Without question. Sabot sales to the muzzle-loading community in 1995 exceeded 10 million units, all finding their way into the hands of average shooters.

Oddly, while sabots are a mystery in much of the centerfire shooting world, these devices are now widely used and understood by perhaps more than one million muzzleloader shooters. Sabots have become the accepted standard for the majority of new entrants to the fast growing muzzle-loading world. In the early 1980s, Mr. Del Ramsey, an extremely savvy shooter and true muzzle-loading enthusiast, took up the long-dormant challenge of improving the muzzleloader bullet. Until then, choices were essentially limited to a patched, pure lead round ball (a ballistic misfit that sheds velocity quickly and loses effectiveness at ranges much beyond 75 yards) or the pure lead conical bullet.

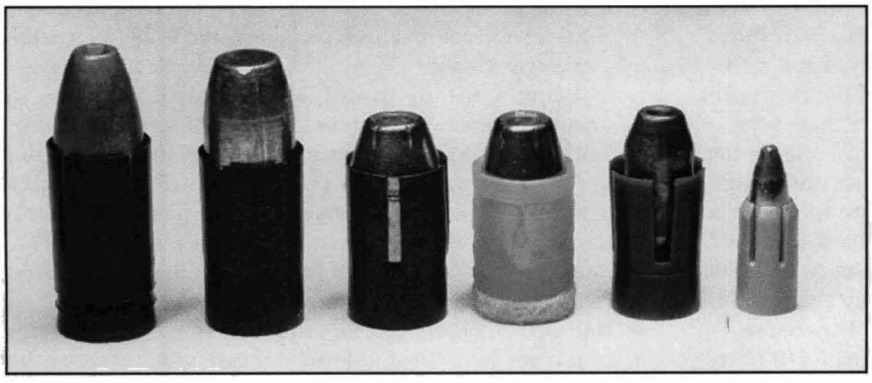
Pure lead is necessary for loading conventional muzzleloaders. Harder alloys do not work. If sized to fit the rifling, such a bullet is too difficult to force down the barrel by any feasible means. Conversely, if such bullets are sized small enough to allow easy loading, they will not dependably obturate (in response to the powder's blast) to properly seal the bore and engage the rifling. So essentially pure lead it is. However, pure lead conical bullets have a significant built-in performance limitation. This is similar to the problem encountered by shooters who use cast alloy bullets in centerfire firearms loadings—bore leading occurs at higher velocities.

A typical 50-caliber conical lead bullet of 480 grains, has a reasonably high ballistic coefficient. However, when blackpowder charges are increased to launch these bullets fast enough to take advantage of the high ballistic coefficient, the bases will not stand the pressure and heat of combustion. Severe bore leading results. This makes loading the next bullet down the bore difficult, if not impossible, and it destroys accuracy. To avoid barrel leading problems, velocities for conventional muzzleloader conical bullets had to be held to about 1200 fps, maximum. Conical bullets are also comparatively heavy and generate substantial recoil energy when fired from typical hunting rifles.

Mr. Ramsey owns and operates one of the largest injection moulding shops in the U.S. His company makes many of the dashboard components found in one make of domestic cars and trucks. Mr. Ramsey reasoned that if he could



Left to right: black MMP, white MMP and purple MMP sabots. Black sabot is designed to house a 45-caliber bullet for shooting from a 50-caliber bore. White sabot is designed to house a 45-caliber bullet for shooting from a 54-caliber bore. Purple sabot is designed to house a 50-caliber bullet for shooting from a 54-caliber bore. Note the thickness of these petals; these sabots are designed to allow use of slightly reduced diameter bullets. However, sabots can allow use of dramatically reduced diameter bullet in any given bore. For example, military loadings include both 50/30 caliber sabots and flechette offerings; where the projectile is much less than 10 percent of bore size.



This line-up shows various combinations of sabots and bullets, left to right: MMP 50-caliber sabot with 435-grain, 45-caliber Shooting Star bullet; special hard polymer 50-caliber sabot with 400-grain, 45-caliber hard cast Harvester bullet; MMP 50-caliber sabot with 300-grain, 45-caliber Hornady XTP bullet; Thompson/ Center two-piece 50-caliber "Breakaway" sabot (note fibrous wad on bottom) with 300-grain, 44-caliber Hornady XTP bullet; MMP 45-caliber sabot with 158-grain, 38-caliber Speer JHP bullet; Remington 30-caliber Accelerator sabot with 55-grain, 22-caliber Accelerator bullet.

Remington 30-06 Accelerator. Left to right: sabot; specially constructed 55-grain, 0.224″ bullet in sabot; case head showing special primer; special powder from sabot loading; second saboted bullet. Only the case is stock; all other components were specially designed for the Accelerator project.

use the injection moulding capabilities available to him to create a sabot that would allow him to shoot lighter, jacketed, handgun bullets in his muzzleloader, he would gain the benefits of controlled expansion, reduced recoil, and extended range, due to the higher velocities that such loadings could safely achieve. Mr. Ramsey was successful. His new company, MMP, Inc. (Magnum Muzzleloading Products, Incorporated) now markets about 10 million polymer sabots annually. Today MMP provides sabots for Lyman, Knight, Hornady, Barnes and a host of other distributors throughout the muzzle-loading community. These units are available in various sizes. Options include using 0.358-inch bullets in a 45-caliber gun and using either 0.430-inch or 0.452-inch bullets in 50-, 54- or 58- caliber guns. Each sabot type is color coded to avoid confusion.

MMP now has many polymers at their disposal. Mr. Ramsey reports amazement at the quality of high density polymers readily available today, compared to what was available when he began this work in the early 1980s. For their current line of sabots MMP chooses to use a softer, more malleable formula appropriate to the comparatively low pressures used in muzzle-loading rifles. However, polymers appropriate to higher pressure loadings are readily available.

Will these devices move into the centerfire world? Purely in the interest of satisfying my curiosity, I ran a few experiments. These results are only cited for reference and illustration. Do not attempt to duplicate these tests.

Handguns, especially revolvers, are not suitable for saboted loads. Trying to move a flexible sabot under high pressure, past a barrel cylinder gap and into the barrel's forcing cone is inviting disaster. Ordinarily, the 45 Colt would not have served as a likely prospect for this research. However, I had a unique specially chambered, 16-inch, single shot rifle barrel on hand. This barrel is chambered to accept both 45 Colt and 3-inch 410 shotshells. To accommodate the longer shotshells the chamber was bored extra deep. The barrel has almost 2 inches of freebore when a 45 Colt load is chambered. That freebore facilitates long loading with a sabot in this revolver case.

MMP muzzleloader sabots are slotted two-thirds of the length down the sides. In the bore, these petals are held closed, and grip the bullet quite firmly. Bullet and sabot travel through the bore as one unit, with a rate of spin determined by the rifling twist; friction between sabot and bullet is sufficient to transfer rotation to the bullet. Upon leaving the bore, centrifugal force causes these slotted portions of the sabot to flare out like petals on a flower. Air pressure on these expanded petals slows the sabot. This forces it to separate from the bullet, which continues down range. Sabots are typically found about fifteen feet from the gun's muzzle—they do not travel far since they are so light and have such a poor ballistic shape. After separating from the sabot, the bullet maintains the rate of spin dictated by the rifling. The bottom third of MMP's sabots are solid polymer with a concave, cupped base which faces the powder charge. When the charge is fired, propellant gas pressure expands this cupped base (obturates) and seals the bore. My first concern was that these bases, designed for blackpowder use, might not hold up under the temperature and pressure generated by heavy smokeless powder loads.

Using a readily available (blue) sabot, designed to accommodate 0.358-inch bullets in a 45-caliber muzzleloader, I began my experiment by placing a premium quality 158-grain JHP in the sabot. I seated this assembly in an empty case deep enough to allow a firm crimp to grip the sabot's sides. I then marked the case, and noted how much powder capacity was left. A 15-grain charge of 2400 completely filled the limited space. Velocity with that load was dismal. I then tested a faster burning powder. I began at the one-half case-full level and carefully increased the

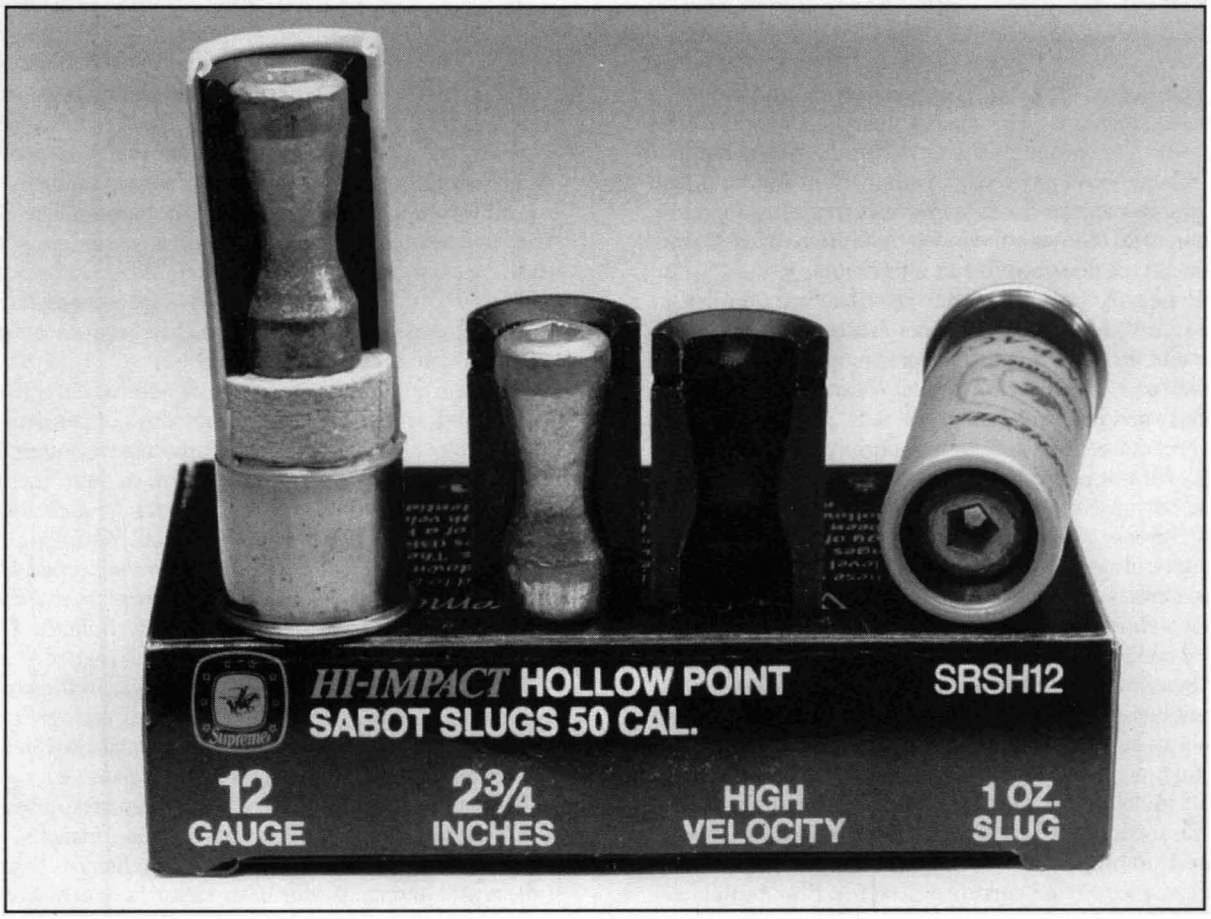
charge in small increments. The final test load was a slightly compressed charge. Pressures remained safe for use in that rifle barrel. There was no sign of primer flattening or case head expansion. With this experimental load I was shooting a 158-grain bullet from a 16-inch rifle barrel using a 45 Colt case. This experimental load achieved a surprising 2275 fps muzzle velocity. Even more surprising, the load was comparatively accurate.

For comparison, note that this bullet cannot be driven from a carbine designed for the 357 Magnum at anywhere near this velocity without the load exceeding established maximum pressure limits. What does this prove? With a properly designed sabot and components selected for the task, existing high pressure cartridges can shoot sub-caliber bullets at *much* higher velocities.

But what about using sabots in higher capacity big bore cartridges? Such loads are quite feasible. I will intentionally forego discussing any details here, however, I will note that with similar components loaded in a 45-70 case I was able to safely launch a 158-grain JHP handgun bullet at 3200 fps. This experimental load was fired in a strong, modern single shot rifle and would definitely not be safe in a blackpowder era rifle.

After just a little load tinkering, I was able to achieve 3-inch groups at 100 yards with that combination. I am amazed that these bullets, which are designed for handgun velocities, would hold together to reach the 100-yard target. I would never recommend using such a load on game, but consider the possibilities using 200-grain bullets designed for use in the 358 Norma Magnum or 350 Remington Magnum?

Is sabot technology going to introduce the next level of centerfire performance? Will sabots soon take us beyond the 4000 feet-per-second era? Will we soon be able to stare in awe as numbers exceeding 5000 fps blink at us from our chronograph's readout? This writer predicts the next decade will herald the age of the sabot. But we will just have to wait and see.



Saboted shotgun loadings are becoming quite common. Left to right: cut-a-way view of load; saboted slug in one half of two-piece sabot; second half of sabot; and front-view showing special roll crimp on sabot loading.

Chapter 16

REVOLUTIONARY BULLET DESIGNS

by M.L. McPherson

WE WOULD be hard pressed even to speculate who it was that first considered placing a projectile in a closed tube and used a propellant to expel it. And when such a device was first used as a weapon, we cannot even guess. The idea seems to have come to several individuals at about the same time. However, we can follow, in broadest detail the progression of the development of the ballistic projectile as wood gave way to stone, then iron and lead castings. In modern times we have seen a continued progression until today we have several families of exotic bullets, each type designed to suit a particular job.

For the purpose of this article, I will define a "bullet" as follows: Any object projected from a tube, which is closed at one end, by generation of gas pressure in the closed end of that tube (behind the bullet). Since this definition includes such objects as potatoes, it is, perhaps, a somewhat broader definition than is generally applied. However, we will disregard less important materials; focusing rather on those of military, sporting and target significance. Further, we will arbitrarily restrict our discussion to single projectile types. While shotguns and their antecedents have always been very important, we will not consider that genre here. Finally, we will necessarily restrict our investigation of modern military projectiles to what is nothing more than a cursory examination.

Long before anyone considered the possibility of using propellant powders to project objects from closed tubes as weapons, similar devices were used for pyrotechnic effect. Unfortunately, owing to the vagaries of historical documentation and the deliberate military secrecy imposed upon gun-related subjects throughout history, we cannot know for certain what the first bullet was made of, what it was launched from, what the propellant material was, what it was fired at, the result of that launching, or even when that event occurred. However, considering the era of the invention of blackpowder, the oldest effective propellant known, we would expect that a modification of the simple wooden arrow would have been the first "bullet" ever used. It seems almost certain that the first projectiles fired from closed tubes in anger were constructed of wood.

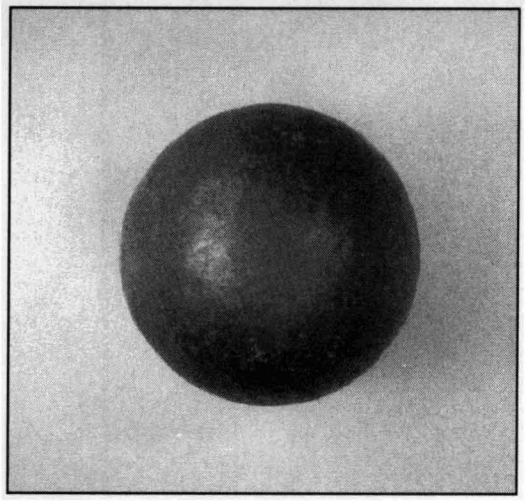
The limitations of such a "bullet" are obvious. The first that comes to mind is limited strength against the forces of acceleration; there are others. No doubt, within a short time after the invention of the firing tube, materials other than wood were tried. A partial listing of those materials would have to include the following: Hardened clay balls, natural and modified stones, stones saboted with wood, and various metallic castings. Metallic castings were chiefly lead and iron and their alloys; copper and its alloys were historically entirely too valuable for use in this application, those materials finding essential uses elsewhere—among them several military applications such as gun barrels. The simple iron ball was among the most successful of early bullet designs. The advantages these offered included ease of proper fit to a given bore, and relative speed, ease and economy of manufacture. Simple casting techniques sufficed to produce high-quality cannon balls.

While iron balls were effective against fortifications (among other things), in the early days of cannoneering these projectiles had two significant disadvantages. First, manufacture required sophistication in equipment and skills, a process which was also expensive and time-consuming. Second was a logistical problem of significant importance: An enemy that was also equipped with a properly-sized cannon could potentially recover the spent iron ball and reuse it—no small consideration in a siege-like confrontation.

Finally, and most importantly, iron was too heavy. Early cannon barrels were simply not strong enough to withstand the force of blackpowder's combustion when that force was contained behind an iron sphere.

In many regards, lead and lead alloy projectiles were even worse! While lead was much easier, faster and less expensive to manufacture, it was much heavier than iron (about 45 percent). Moreover, lead is much easier to refashion for reuse. For these reasons, lead was simply out of the question for early cannon fodder. Therefore, until the advent of effective shoulder weapons, lead saw little use in single-bullet loadings.

For these reasons, fitted stones (which are only about one-fourth the weight of iron) were the material of choice for many centuries; especially in the larger cannons used in siege and counter-siege. In most areas stones were plentiful. Craftsmen who were used to working with stone for construction purposes had the skills and tools needed to modify common rocks to "fit" any given cannon's bore. Significantly, the rocks thus produced were



The basic round ball exemplifies the earliest objects fired from guns. Except for wooden dart-like projectiles, which were almost certainly adapted from the crossbow quarrel and were among the earliest of projectiles, the spherical projectile was practically ubiquitous for many centuries after the invention of the gun. In an unrifled bore this is the most accurate, non-dart design.

likely to shatter on impact—a shattered rock was of limited value to an enemy. Even if the stone did not shatter, it was a common object, and giving one to the enemy represented a small sacrifice compared to the potential damage that "gift" could inflict. Finally, and most importantly, stone was light enough to allow generation of significant projectile energy without producing gun-destroying pressures.

On the down side, stone was not particularly effective against heavy fortification; owing to limited mass, stone projectiles simply lacked sufficient penetration potential. Nevertheless, for large cannons, use of iron had to await the advent of sufficiently strong barrels.

The Siege of Seville, 1247 AD, appears to have been the first instance of cannon use in battle. (Certainly it is the first recorded instance this author could find.) In that battle, defenders of Seville used cannons firing stones against the enemy. Another recorded instance occurred in 1346 AD. At the Battle of Crecy, small artillery pieces were used by both sides. Almost certainly the projectiles were made of stone.

It is interesting to speculate about the invention of the sabot. Sabot is a French term, pronounced *say-boe*, which means wooden shoe. This is also the basis for our (evidently mispronounced) word, sabotage, which derived from the practice of tossing worn-out wooden shoes in the machinery in an effort to disrupt production.

The sabot addressed several of the difficulties and limitations associated with use of stone projectiles. First, use of a barrel-fitting wooden carrier for the stone improved ballistics, compared to the poor barrel seal afforded by a crudely fitted stone. Second, compared to stone, wood is considerably easier to shape. It was much faster and easier to whittle a piece of wood to fit the gun, then hollow it out to accept a crudely shaped stone. This certainly reduced the work required to achieve a good fit in the barrel. Further, if combined with use of a reduced diameter stone, it helped alleviate pressure problems while allowing potentially higher velocities, which equated to greater projectile range. That latter fact is why the sabot is once again on the cutting edge of ballistic technology. A subject we will return to.

As noted, in that era, the prime limitation of the gun was strength of the firing tube. The earliest firing tubes were fashioned of wood. Owing to wood's very limited tensile strength, these proved to have been rather weak. In an effort to strengthen this basic device, experimenters tried all manner of reinforcement.

At first various types of rope, leather and sinew were bound tightly around the tube. Later that practice gave way to iron banding—based upon the existing technology used in water barrel manufacture. Eventually the technology for casting barrels (first copper alloys and then iron alloys) was perfected. This advance allowed use of heavier projectiles and more powerful propellant charges.

However, these early cannons were by no means safe. It should be noted that throughout history and until quite recently cannoneers were more often than not capitol prisoners that were chained to the cannon: Unless "their side" was victorious in the battle, those men were apt to die at the hands of the "other side." (It seems as though it might be difficult to assign a favored side for a person in such a predicament.) Nevertheless, since early cannon barrels had an unknown but rather limited life cycle, the biggest threat to a typical cannoneer was barrel failure!

Regardless of strength and design limitations of the gun, projectile development was brisk. To place this in perspective, consider this historical note: Only a few centuries after the invention of the simplest gun, Leonardo da Vinci had designed a workable iron cannon ball of considerable sophistication. After traveling a timed distance into its ballistic flight that ball would explode; pieces generated from that explosion would scatter a short distance before exploding; finally, pieces from those secondary explosions would travel a short distance before exploding and creating tertiary shrapnel. Now that is sophistication!

Despite the potential, none of the earliest metallic projectiles were particularly successful. Production was simply too costly.

By the 14th century, with the development of effective small arms, lead bullets came into wide use. In that era improvements in founding technologies created a niche for iron spheres in medium-sized cannon. However, stones continued to find application in the largest cannons. Here we will leave iron and stone behind. The immediate future of bullets was then clearly defined—lead and its alloys.

Lead is a common element found in many locales worldwide. Most commonly it is an ore product of the mineral Galena (PbS). It has been widely known and available since the 8th century BC. Further, lead has long been comparatively inexpensive.

Several physical properties render lead an eminently suited base substance for use in small arms projectiles. First, lead is malleable—it deforms under stress without fracturing. This provides for proper bore obturation and eases the loading operation in muzzle-loading arms. Second, lead is chemically stable under atmospheric conditions. This provides for a long shelf life of premanufactured bullets. Third, lead melts at a comparatively

low temperature (it is easy to melt over an open wood flame). Fourth, lead is easy to cast into preshaped objects. These latter two characteristics allow a person with a bit of skill to produce high-quality bullets using only a few modest tools.

However, until the advent of rifling, in the late 1400s, lead bullets offered limited ballistic advantage. In fact, even the simple long bow had a much greater effective range! That a lead bullet would carry significant energy over a considerable distance was of little practical value: Unrifled guns were not capable of dependably delivering a bullet to an intended target at extended ranges. Spiraled rifling dramatically changed that situation.

The first rifling was not really rifling as we know it at all. In an effort to minimize deleterious effects of blackpowder fouling, early shoulder gun makers began to incorporate deep wide parallel grooves in barrels. These grooves had no twist. There were likely two basic versions of such rifling. The first was intended only as a system to collect fouling and minimize the deleterious effects of powder fouling in the bore. The idea seems to have been that the fouling would move into these grooves as the new bullet was seated. The second system used a bullet designed with a cicumferential rib. This rib was aligned with grooves in the barrel during the loading operation. This design was intended to prevent unintended bullet rotation. Perhaps this improved accuracy.

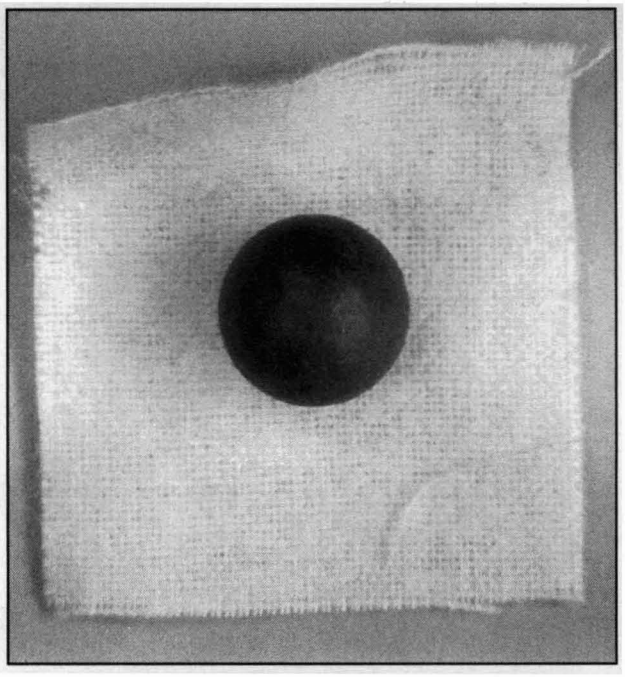
Soon, several enterprising geniuses had a better idea. In that era and for a long period before the development of the shoulder gun, the best cross-bow quarrels (and often long-bow arrows) incorporated a slight twist in the fletching. This modification had long been proven to improve long-range accuracy. It was easy to observe the effect this twisted fletching had on the projectile—rotation. It was certainly a small stretch of logic to suspect that rotation of a bullet might similarly improve its performance. Nevertheless, it seems truly unlikely that those early experimenters could have imagined the ultimate consequences of their invention!

In any case, it was a small step from the straight barrel flute to the twisted barrel flute, which became known as rifling. It is no small praise to those who developed this system that every sporting or military shoulder arm that features this device is now known as a rifle. That fact speaks volumes for the overwhelming success of this system.

With effective rifling came two significant improvements in gun performance. First, was an increase in accurate range of the simple round ball. Second, was the opportunity for accurate use of elongated projectiles. Both effects pushed the envelope of gun performance into an entirely new arena.

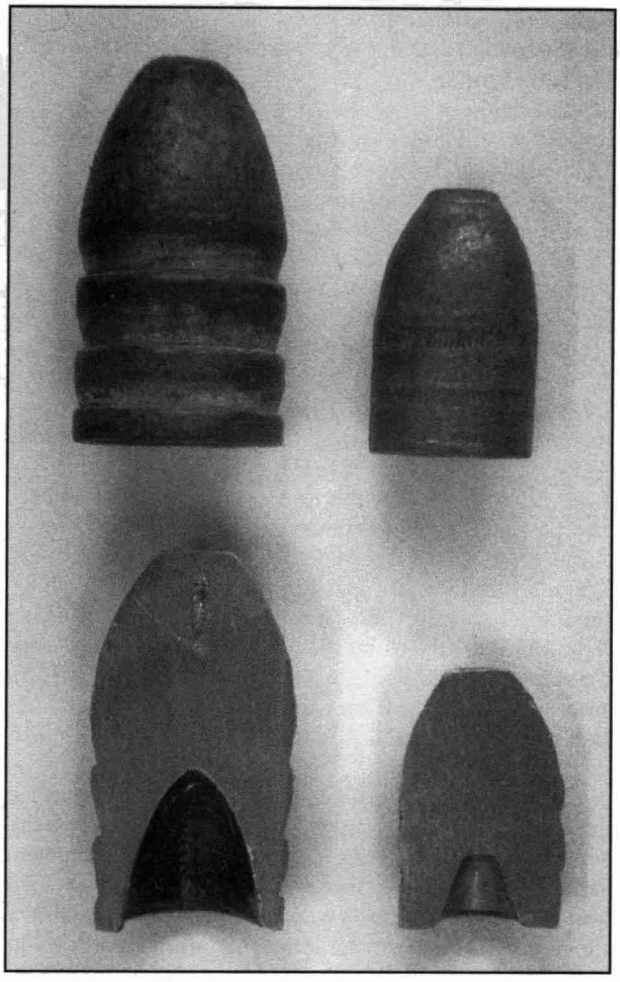
By the early 1500s, perhaps a bit earlier, the next major bullet related innovation was established. Despite the substantial advantages this innovation offered, several generations passed before this new technique was fully appreciated and embraced. What was this revolutionary invention? Nothing more than a simple piece of cloth!

Where shooters had formerly carried an iron ramrod and a heavy mallet, both necessary to drive the bore-fitting lead ball down a powder residue-fouled barrel, a simple wooden ramrod would now do the job quite nicely. Further, loading time was dramatically reduced. Best trained shooters can load a patched round ball into a typical muzzleloader in only a few seconds. The old system was a painfully slow process. Further, hammering a lead ball down a bore was wrought with problems. First, it deformed the ball, ruining its balance and potential accuracy. Second, it was bound to eventually damage the gun's bore, again ruining potential accuracy.



The patched round ball represents the first truly revolutionary single-projectile loading for use in shoulder guns. This device provided a plethora of advantages over the unpatched round ball. The most important include: Faster and easier loading, dramatically improved accuracy and improved external ballistics. Perfected in the early 1500s, the patched round ball is still an effective combination for many applications. In typical rifles it delivers all the accuracy the average shooter can utilize in offhand shooting.

Using proper lubricants (various animal fats were preferred) and patched round balls, an experienced shooter could fire and reload his muzzleloader a half-dozen times while the fastest reloaders using an unpatched ball got off only two shots. Further, the patched ball was intrinsically more accurate than the unpatched round ball, even under the best of loading conditions (the unpatched ball necessarily deformed into the rifling and therefore carried ballistics-limiting scars). Consider the magnitude of these differences. On the one side: A shooter firing two well-aimed shots who needs to get within about 100 yards to expect to hit a man-sized target most of the time. On the other side: A shooter firing at least six well-aimed shots who only needs to get within about 200 yards to expect to hit a man-sized target most of the time. One can readily see the sporting and military advantage the patched round ball offered—it is no stretch to call it a revolutionary development (also a delightful pun).



The next revolutionary innovation in small arms bullets is exemplified by the Minié ball. On the left is a 510-grain 58-caliber example. The circumferential grooves ease loading, collect and remove fouling and hold grease to soften blackpowder fouling. The hollow base provides for proper obturation, even if nearly pure lead is not used in the casting. In response to the powder's blast the bullet swells up to seal the bore and engage the rifling. The Minié ball is the fastest-loading muzzleloader projectile and has much better long-range performance, compared to the round ball. (Note the casting flaw near this dissected bullet's nose.) The basic Minié style is an effective design. It is still in use in several factory revolver loadings, as exemplified here by Winchester's 255-grain 45 Colt bullet (on the right).

The patched round ball was so effective that for hundreds of years after the invention of the rifled barrel (until about 1850) that combination remained *the* system of choice for almost all shoulder arm applications. This is a truly amazing fact. It is also good to keep in mind that the patched round ball is still an impressive projectile for hunting applications. Typical muzzleloaders will deliver these bullets somewhat past 100 yards with all the accuracy the average hunter can use in the average hunting situation. The patched round ball for a 75-caliber rifle (0.715-inch diameter—545 grains weight) can easily deliver 1500 foot pounds of energy at 100 yards.

As an aside, it is worth noting that the widely distributed lead-based bullet along with shoulder guns that were reasonably affordable had a critical role in the development of freedom for the masses. Prior to those developments, and throughout the development of so-called civilization, any monarch or other man of means could afford to have well-equipped and well-trained mercenaries that were effectively immune to both defensive and offensive efforts of the common man. The advent of the effective gun and bullet reduced the best trained man, suited in the most effective armor, to the equal of any citizen who had an hour to learn proper gun handling and usage. Samuel Colt affected the slogan but he was several generations late of the actual fact: "God created all men; Sam'l Colt made all men equal." I would suggest that those who do not believe that the second amendment to this nation's constitution was intended to, and still does, deter tyranny should consider this reality of history a bit more carefully.

James Watt's invention of a workable steam engine, in the late 1700s, made extensive underground mining feasible. With that advancement came the first occurrence of widely available lead at an affordable price. The specter of equality was thereupon loosed upon an unsuspecting world order.

Consider that blackpowder and lead were two of the chief imports in the New World Colonies. As noted, for many generations the pure lead ball was the projectile of choice. It worked well in both smoothbore and rifled guns. The raw material was affordable. It was malleable, easy to cast and stayed reasonably true in flight (accurate and predictable). In that era those wanting more power simply used a gun with a larger bore.

However, with the advent of rifling the possibilities of the bullet expanded into an entirely new dimension. The next significant innovation is epitomized by the Minié ball, a hollow-base elongated bullet named after C. E. Minié, a French officer born in 1814 and who died in 1879. His name was pronounced Min-e-yeh. Rather than chronicle all the contemporary competitive designs we will look at what the Minié ball was and what it does.

There were several problems associated with the use of elongated bullets. Foremost was the deleterious accuracy and reloading effects of fouling. Attempts to adapt the cloth patch to an undersize elongated bullet were bound to fail. Simple geometry demonstrates that a simple equal thickness patch cannot uniformly surround an elongated bullet shank in a gun's barrel.

The solution was to use a bullet that only loosely fit the gun's bore. When the powder charge exploded behind the projectile, the malleable lead upset. It thereby properly obturated the bore and engaged the rifling. This ameliorated the problems of fouling, eased the loading task, reduced dimensional control concerns and provided the requisite accuracy. The Minié ball also represented the fastest loading muzzleloader projectile. Not insignificantly, it also provided a useful increase in effective range. Compared to a round ball, it easily delivered more than three times the energy at the longest feasible ranges.

The basic design incorporated a hollow base cavity intended to reduce the force necessary to expand the bullet to fill the rifling. This feature also eased loading into slightly undersize or badly fouled barrels. It is worth noting that the purity of lead was a considerable issue. Had *very* pure lead been routinely available the Minié,'s hollow base would not have served any significant purpose.

As it was, the low alloys that were available were often hard enough that without the hollow cavity the ball was not certain to swell sufficiently to properly obturate the bore in response to the powder's explosion.

The second design feature shared by all Minié balls were concentric grooves in the shank. These served three significant purposes. First, they held grease, which softened powder fouling in the bore and eased seating by simple reduction of friction. Second, they reduced the force necessary to start an oversize bullet into the barrel—less contacting surface area and an area where bullet material could easily deform into. Third, they provided a place for some of the powder fouling to accumulate and thereby be removed from the bore as the bullet was fired. This type of bullet carried the bulk of applications through the advent of the self-contained cartridge, when other designs gained an edge as state-of-the-art projectiles.

We should note that several current factory smokeless loadings use what is essentially a Minié ball. An example is Winchester's 255-grain 45 Colt loading—in *many* quality revolvers this antique bullet design still delivers cutting-edge accuracy. I have seen several lots of 255-grain Winchester 45 Colt ammunition that easily produce ragged one-hole groups at 25 yards when fired from the best made revolvers. Woe be the novice handloader who tries to duplicate that accuracy with any typical cast or jacketed bullet. While it can be done, it is no simple task.

The next significant innovation was the paper patched bullet. While this design was tremendously successful in highly specialized muzzle-loading target rifles, it found limited practical use. With perfection of the metallic cartridge as a viable self-contained unit, paper patching gained a foothold. The first effective application involved precisely two layers of moistened rag paper, wrapped around the bullet's shank. A slight excess of paper behind the shank was twisted and folded over the bullet's base, or into a shallow hollow cavity in the bullet's base.

Loading a paper patched bullet into a cartridge case was quite simple and provided a robust round of ammunition that could deliver surprising accuracy, even by today's standards. There are several reasons the paper patched bullet then offered (and still does offer) superior accuracy potential. First, it eliminated the need for any complicating bullet features. With the paper patch, all that was required was a cylindrical section and a flat or slightly hollow base—good bullets were easier to cast. Second, such bullets could be swaged—swaged bullets can be more perfect, compared to cast bullets. Equally, the paper patched bullet offered superior ballistics. Necessary lubrication grooves on an unpatched bullet significantly increase a bullet's wind resistance. This both reduces effective range and increases windage and elevation judgment errors.

Entire books have been written on the subject of the paper patched bullet. Here, we will suffice to say that this design is still among the very best! Many shooters use modern magnums loaded with smokeless powder to propel heavy paper patched bullets to 3000 fps with sub-MOA accuracy. Nevertheless, the paper patched bullet has limitations. First, it is time-consuming to manufacture, and formerly the process did not lend itself to automation. (However, modern computer-controlled servo-based equipment could change that!) Second, exposed paper in a paper patched cartridge is vulnerable to handling damage and deterioration.

The advent of smokeless powder indirectly led to the general abandonment of the paper patched bullet. The problem did not relate to any particular limitation of the paper patch but, rather, to the fact that, for the first time, smokeless powder suggested a shelf life concern for the paper patch! Formerly, since blackpowder is notoriously hygroscopic, ammunition was not expected to survive years of storage. That fact explains the early adoption of headstamp date markings on military ammunition. The armorer had to know how old a cartridge was, a month and year stamp gave him that information. The fact that the month was included suggests just how long ammunition was expected to survive after production!

On the other hand, it was soon realized that smokeless powder loads could survive for many years, even decades, given only a reasonable measure of careful storage and handling. As an example of this fact, consider several lots of pre-WWI German 8x57mm ammunition that was recently tested: Ballistics and accuracy were essentially equivalent to the best modern 8x57mm ammunition. Fired from original military rifles, those loads generated practically the full rated 2880 fps with their 154 grain bullets.

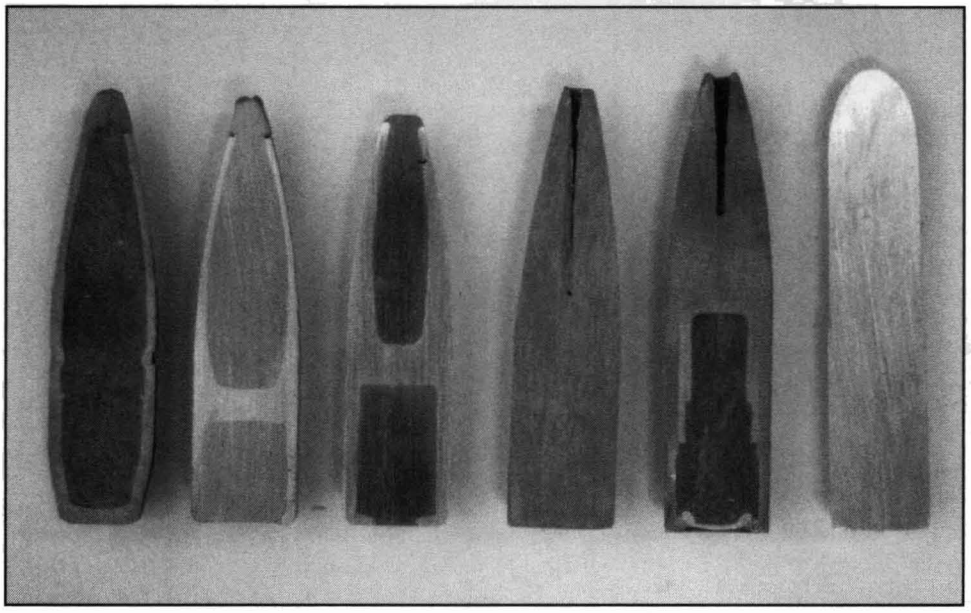
The realization of extended shelf life potential and the need for a more easily produced patched bullet drove the demand for an alternative. Simplicity, ease of production, accuracy potential and low cost suggested the unpatched lead ball. However, it was soon realized that no amount of alloying, oven hardening or other special treatments could render the unpatched lead bullet suitable for use in full-power smokeless cartridge loads. Barrel leading and loss of accuracy were the chief complaints.

Several harder and higher melting point malleable metals and alloys were tested as bullet jacket materials. That is an over simplification. Truth is, practically everything was tried. For several decades the two big problems in gun technology were: How to make barrels strong enough to withstand the pressures that smokeless powder can generate and effectively use in accelerating a bullet; how to make bullets that will function properly at that pressure level.

With the German invention of nickel steel late in the 1800s which resulted as an indirect consequence of prosperity the German industry gained from a patent on brilliant aniline-based fabric dyes), the first problem was solved. Where chamber pressures in the upper blackpowder regime, perhaps about 30,000 psi, had been the practical limit, nickel steel allowed working pressures safely exceeding 60,000 psi.

As noted, many metallic patching substances were used. However, a simple alloy of 95 percent copper and 5 percent zinc, known as gilding metal, won the day. This is still the primary material for use in small arms bullets of all types.

The gilding metal jacket is easy to produce and manufacture into finished bullets. The core material can be lead alloy, steel or some more exotic substance. Gilding metal provides an insulating layer between the bullet's core and the barrel steel. Metallic fouling is sufficiently reduced to



Various modern bullets, dissected to show structure, left to right: Conventional jacketed, Hornady 30-caliber 165-grain SPBT; conventional Nosler Partition 30-caliber 165-grain spitzer; bonded partitioned, Swift 30-caliber 165-grain Spitzer; expanding solid, Barnes 30-caliber 165-grain X bullet; expanding modified solid, Winchester 30-caliber 180-grain FS; non-expanding solid, Barnes 27-caliber 150-grain homogenous RN.

eliminate the necessity of barrel cleaning for most applications. Gilding metal also allows use of a bullet core that is very hard, in many instances even harder than the barrel, without bore damage. Finally, gilding metal is inexpensive.

The biggest problem with gilding metal patching was concentricity. Since gilding metal does not have the same density as the common materials used in typical bullet cores, any lack of concentricity results in a shift of the center of rotational mass. This results in the bullet turning around its longitudinal geometric center as it passes through the bore, then turning around its, different, longitudinal center of mass when it comes free of the bore.

The inevitable result of this effect is an ever widening spiral as the bullet generates ballistic flight. Accuracy suffers in direct proportion to the lack of concentricity. For generations, jacket concentricity significantly limited metallic jacketed bullet performance. Many long-range records set with paper patched lead bullets in the late 1800s stood through WWII. Concentricity is still a considerable factor in the production of quality bullets for both hunting and target applications.

Nevertheless, the modern sporting, military and target bullet is exemplified by the gilding metal jacketed lead-alloy cored design. Accuracy and hunting performance are sufficient to suggest this basic bullet as one of the all-time great innovations.

Another innovation in fouling reduction is also worthy of mention here. The impact-bonding of molybdenum disulfide followed by an application of carnauba wax provides a startling improvement in typical bullet performance. Bullets treated with this patented, moly-coat process will produce significantly less bore fouling. Other well-documented benefits include, dramatically increased barrel life, higher velocity potential and improved accuracy. The moly-coat process is also very inexpensive and is easily adapted to commercial production.

We have to mention several significant alterations to the basic copper-alloy jacketed bullet. In most hunting applications the hunter wants the bullet to open up upon impact and deliver the majority of its energy in the "boiler room." This suggests several significant limitations in the basic jacketed bullet design. First, there is the potential for the jacket to separate from the core. Second, there is the potential for the core to fragment. Third, and related to the first two problems, if the bullet features sufficiently strong construction to avoid separation or fragmentation, there is a high probability that it will fail to expand. This has always been a catch-22 situation. Nevertheless, mainstream manufacturers have perfected the art and bullet failures are quite rare—nevertheless, they do occasionally occur.

A particularly effective mitigation used by several hunting bullet manufacturers is quite basic. The bullet's core is literally soldered into the jacket. Combined with the use of a pure copper jacket and a low-alloy lead core, this technique produces a bullet that is more apt to expand on soft impacts but that is also less apt to disintegrate on the hardest impacts and will typically lose less weight while expanding the same amount. Use of pure copper for the bullet jacket does significantly increase metallic bore fouling but this seems a small price to pay for a superior hunting bullet. As is common with all hunting bullets, jacket thickness and several other characteristics are carefully controlled to maximize terminal performance.

A recent innovation is the plated bullet. Speer (and others) have perfected a process whereby a low percentage alloy copper jacket is electro-chemically plated onto a nearly pure lead core. Speer is using this design for all of their high-performance (Gold Dot) pistol and revolver bullets and a new 30-30 loading (Nytrex). The electro-chemically plated jacket design affords several advantages. First, it provides for innovative application of hollow-pointing, jacket nose pre-stressing and core precutting. This allows precise control of expansion characteristics with maximum dependability. Second, it practically eliminates the potential for any sort of jacket core separation. Third, it facilitates testing of new bullet designs with a minimum of expenses.

Norma Precision has adopted a bonded cone in a line of high-performance hunting bullets in factory ammunition. This new Oryx line is intended to provide the most

dependable hunting performance possible and at a price that is competitive with standard unbonded gilding jacketed hunting bullets.

One obvious method to mitigate the potential for failure to expand or failure to hold together is the partition bullet. The German H-Mantle was developed early in this century, it appears to have been the original partition bullet. In 1948, John Nosler produced the first of *his* now famous Partition bullets. The original design incorporated bronze and several manufacturing steps not common to the simple jacketed bullet. Modern production is quite advanced and Nosler Partition bullets offer an impressive combination of hunting performance, accuracy and economy. Several other manufacturers now offer partitioned bullets of various types.

Regardless of who makes it, the materials used or any manufacturing peculiarities, the Partition bullet incorporates one basic feature: A solid partition made of the same material as the bullet jacket which separates the nose section from the tail section. This feature is typically made of copper or gilding metal and is sufficiently thick to prevent any disruption of the bullet's nose section from propagating to and disrupting the bullet's tail section.

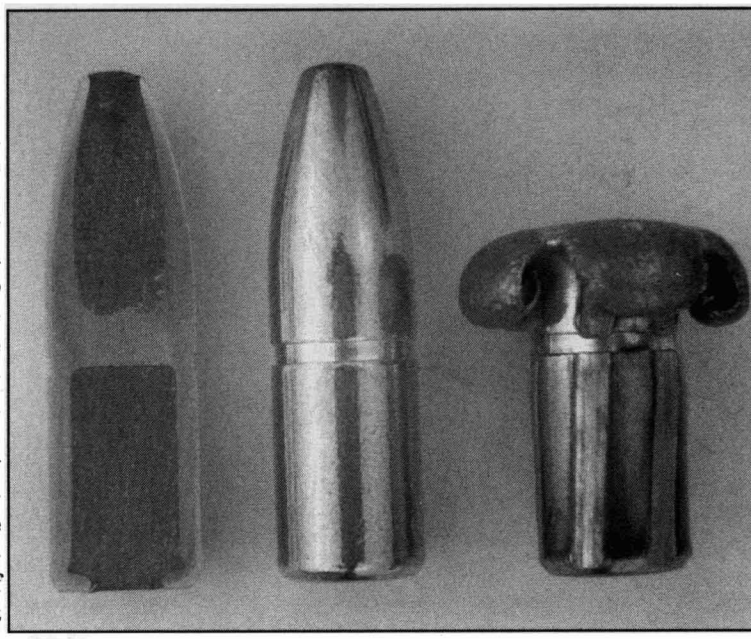
A typical partitioned bullet features a low-percentage alloyed (soft and malleable) lead nose core, a higher percentage alloyed (harder and less malleable) lead base core and a copper alloy jacket featuring specially controlled jacket thickness and heat treatments.

The partitioned bullet offers one significant benefit: It can be made soft enough in the nose section to practically guarantee a reasonable degree of expansion without the potential for complete failure. However, with this advantage comes a down side: Unless steps are taken to bond the nose core to the jacket and thereby minimize jacket fragmentation, the bullet's nose is very apt to substantially disintegrate during hard (heavy bone) impacts at high velocity.

One method of reducing this potential is now used in the Swift A-Frame bullet. A pure lead nose core is soldered into a pure copper partitioned jacket. Here we have a bullet that is practically immune to disintegration failure. At the same time the A-Frame can provide superior expansion potential, even in the "softest" of impacts. Like any other pure copper bullet, increased metallic bore fouling is an issue, albeit a small consideration to the dedicated hunter and one which moly-coating can eliminate.

The Swift Bullet Company set up shop in April 1984, when they produced their first A-Frame bullet. As was true of John Nosler's first production, this was a "basement operation." Original A-Frame bullets were made just as they are today, except for a slight difference in the finished partition. The original bullets had a small central opening; improved equipment allows elimination of that hole. The partition was also moved farther forward.

The original Swift A-Frame bullet was a 375-caliber, a logical choice since Nosler was not then offering a Partition bullet in 375. In an effort to find a superior hunting bullet for their new 416 Magnum, Remington tested Swift's 416 bullet, which is designed to open as fast as possible while limiting expansion and retaining almost 100 percent of its weight. Their results prompted Remington to choose the A-Frame for use in all Remington Safari grade ammunition loaded with expanding bullets.



The 375-caliber 300-grain bonded partitioned bullet was Swift's first offering. This bullet design combines reliable expansion and high weight retention. Use of pure copper and lead is fundamental to the success of the A-Frame bullet. These substances are more malleable than the alloys used in non-bonded bullets. Bonding is the key: without bonding, pure copper and lead are unlikely to withstand the stress of impact and bullet failure is likely. The copper supports the lead and the lead retains the copper!

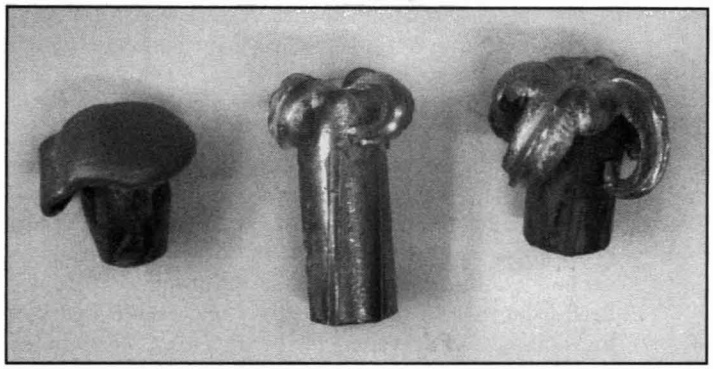
As we have seen, several innovations, intended to mitigate the limitations of the gilding jacketed lead-alloy cored bullet, have been developed to a high level. This fact suggests a limitation of this basic bullet design. Lead and its malleable alloys are simply not up to the task of withstanding the worst types of impacts with game animals.

While the target bullet is still a typical jacketed lead-alloy cored bullet, hunting bullets have moved beyond lead and its alloys. The solid copper or copper alloy hunting bullet, as exemplified by the Barnes X and the modern Barnes solid, promise new vistas in terminal performance.

The simplest of these bullets is the solid. The Barnes solid is representative of an entire genre of homogenous solid bullets. Typically these are lathe-turned out of brass. Compared to any of the jacketed non-expanding bullet designs, homogenous solids have one important advantage. Such a bullet is practically immune to deformation resulting from any impact with a dangerous game animal. Since these bullets will not deform or fragment, terminal performance is predictable.

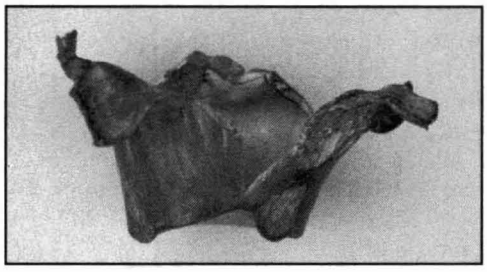
The Barnes X gets its name from the characteristic shape of the expanded bullet—when seen "nose on" it forms an obvious X. These expanding bullets are made of essentially pure copper with tightly controlled metallurgical properties and a specially shaped hollow point that includes precut internal flutes in the bullet's nose. These flutes facilitate expansion and are an important part of how the X bullet works.

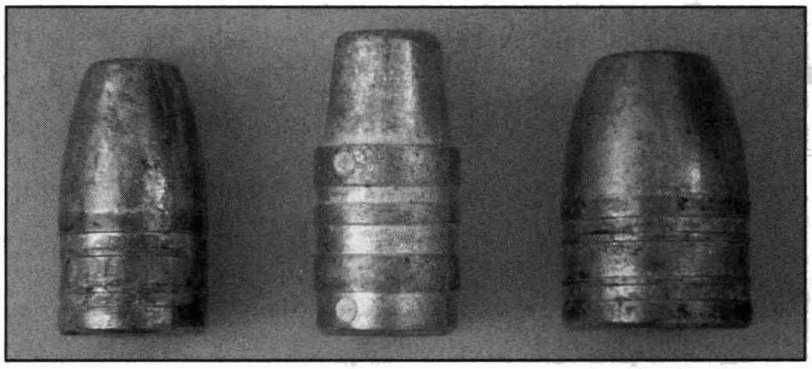
During manufacture, a length of copper wire is formed through a series of dies to the final shape. In the process,



Representative expanded bullets, left to right: Hornady 30-caliber 165-grain SPBT after high-velocity impact; Barnes 30-caliber 165-grain X after moderate-velocity impact; same bullet after high-velocity impact.

(Below) Zinc is useful for indoor shooting. It casts well and produces little metallic fouling, even at high velocity. Shown, left to right: 87-grain 38-caliber (from a mould that casts 140-grain lead-alloy bullets); 95-grain 38-caliber (from a mould that casts 158-grain lead-alloy bullets); 142-grain 45-caliber (from a mould that casts 230-grain lead-alloy bullets).





(Above) Jacket/core separations are quite common in conventional jacketed bullets. This 44 Magnum bullet jacket typifies one limitation of this bullet design. Rifle bullet manufacturers have incorporated all manner of modifications to reduce this tendency, and with good success. However, separations and fragmentation are endemic to the basic design.

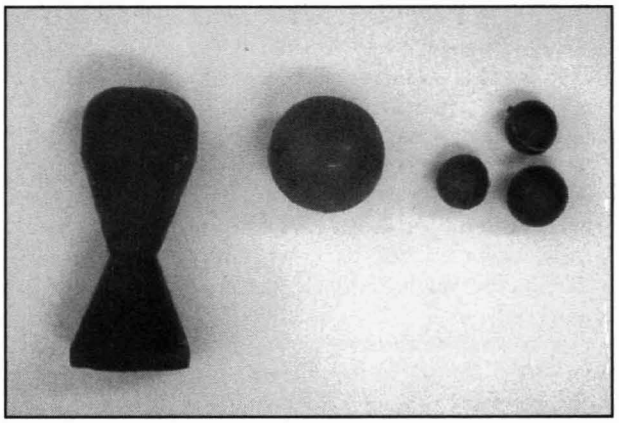
the nose is hollowed to the finished depth with a specially shaped fluted punch. The bullet nose is then reclosed to the final spitzer configuration. The formed hollow point typically reaches the full length of the bullet's ogival nose section.

As finished, the bullet has a tiny deep hollow point. The nose is solid on the outside but separated into (usually) four sections by parallel longitudinal cuts extending from the hollow point hole almost to the outside. Upon impact, hydraulic forces open the bullet's nose through bending.

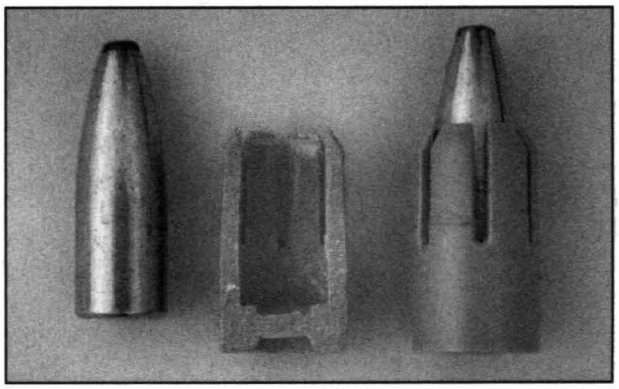
Compared to a conventional softpoint bullet, the physics of expansion is fundamentally different in the X bullet. In the former, the core and jacket have to expand through malleable deformation. In the latter, expansion is primarily achieved through the action of bending open the individual bullet nose petals. This is more than just a matter of semantics. Bending requires much less energy, compared to malleable deformation.

More importantly, this characteristic makes it possible for the X bullet to expand at lower velocities than a conventional deforming bullet will. Further, the relatively high strength and malleability of copper allows the X bullet to expand without failure at higher impact velocities than most conventional bullets can withstand. As a result the X bullet will expand reliably across a wider velocity range and against a wider range of resistance than any conventional bullet.

Further, the X will retain practically 100 percent of its impacting mass almost every time. Also, the X creates less frontal area for any given degree of maximum expansion (the areas between the petals is not included) while, at the same time, generating more length along that front. This



Rubber projectiles find application in riot control. These so-called non-lethal projectiles are quite dangerous and are offered in 12-gauge police loadings. (Left to right) 89-grain dart; 56-grain ball; 8.3-grain buck; 4.2-grain buck.



Remington 30-06 Accelerator bullet and sabot. The plastic sabot carries a 22-caliber 55-grain bullet. The fingers at the sabot's nose open at the muzzle and the sabot is stripped away from the bullet by wind resistance—an approach both old and new!

provides for superior penetration with greater wounding effect along every inch of penetration!

The latest advancement in bullet technology is the tungsten alloy cored target bullet, under development at Powell River Laboratory. These bullets offer two significant advantages. First the tungsten alloy core is harder than a lead core. This reduces the upset that occurs as a result of stresses imposed in the firing process. Second, the tungsten alloy core is significantly heavier (length-for-length) compared to a lead alloy core.

This latter effect provides for a reduction in velocity loss across any given range. For a variety of reasons it also dramatically reduces wind deflection. At long ranges this latter benefit is substantial. Owing chiefly to this advantage, it is very likely that despite the very high cost, these bullets will find increasing application in long-range target competitions. As an added bonus tungsten bullets also offer the potential for increased muzzle velocity with any given bullet weight. They occupy less room in the case and do not slug up as much in the barrel which reduces velocity-robbing bullet-to-bore friction.

Regarding recent developments, we find the muzzleloader revisited by modern bullet manufacturers. In this instance, we again find Barnes Bullets at the forefront. They have adapted a modification of their X bullet design for use in blackpowder muzzle-loading guns. These pure copper saboted bullets achieve startling ballistic uniformity and can bring a new level of performance to the old smokepole. Not the least of the advantages these bullets provide is a significant reduction in recoil for the level of terminal performance achieved.

As we close, we find ourselves getting back to where we started. The most sophisticated modern gun fires a non-rotating saboted quarrel-shaped bullet out of a smooth bore! These projectiles rely on aerodynamic stability to achieve accuracy. Some of the most effective projectiles fired from these guns rely entirely upon the delivery of huge doses of kinetic energy to do the job on the intended target. Other versions include sophisticated charges of high explosives.

Muzzle velocities can exceed 6000 fps. Some versions use a comparatively small diameter depleted-uranium dart. These slender projectiles can accurately deliver the vast majority of the muzzle energy across ranges exceeding one-mile. Upon impact with any hard object, bullets at that velocity create intense heating, which is often sufficient to indirectly destroy an armor-plated tank through ignition of munitions within.

If, as seems most likely, the first bullets were indeed simply quarrels borrowed from the crossbow and intended to puncture through armor plate, it is something of an irony that the latest high-technology bullets are essentially similar in design and purpose.

Chapter 17

U.S. MILITARY AMMUNITION (5.56 to 20mm)

(Current and Obsolete—Blackpowder and Smokeless)

MUCH OF this information was originally published in our Third Edition. Since then, we have had requests for a reprint of the data covering U.S. military cartridges. The information was compiled to provide a quick and easy to use reference source for the identification of the more modern U.S. military ammunition—that is, the post-World War II period. Many of the cartridges listed here are no longer in use, but have become collectors' items of increasing scarcity and value over a period of time.

The identification of armor piercing, incendiary or explosive type munitions is a matter of concern to collectors, to shooters of surplus military weapons, and also to police, firemen and others. The data provided here will enable the reader to identify the various types of U.S. military ammunition likely to be encountered on the surplus market or in use by the military. Insofar as the author is aware, this is the only popular publication that has published most of the information contained in this chapter, particularly the identifying color codes.

In addition to the standard military cartridges listed here, the various branches of the service also use a number of commercial cartridges such as the 22 Short and 22 Long Rifle; 22 Hornet; 32 ACP; 38 S&W; 38 S&W Special; 9mm Parabellum (now the official U.S. Military handgun cartridge); 45-70 blank; and the 410 bore, 12- and 10-gauge shotgun shells. Details of all these are not provided in this chapter, but are covered elsewhere in this book. There are a number of new ammunition developments in the U.S. military not listed here, but most of these are experimental or in the developmental stage and have not been officially adopted. The cartridges listed here are those that have been standardized and are or were in official use.

This material was, to a large extent, abstracted from two out-of-print government publications: *Small Arms and Small Arms Ammunition, Vol. 2,* Office of the Chief of Ordnance, Washington D.C.; and *Small Arms Ammunition Pamphlet 23-1,* Dept. of the Army Frankford Arsenal, Philadelphia, PA. Don't write to the author or publisher asking where you can get copies of these. We don't know! Such things as industrial or manufacturing codes and drawing numbers have been omitted because they would not be of interest to the great majority of readers of CARTRIDGES OF THE WORLD.

Note: The second figure that appears with some of the data, particularly the weights and pressures, is a manufacturing tolerance and was left in so that the reader will understand that some variations can be expected between different lots and manufacture of ammunition. Also, it should be understood that in some instances the powder type given has been changed from tubular to ball powder in recent years. As an example, 56-2 grs. means a standard weight of 56 grains with no more than a 2-grain variation (±1 gr.) being acceptable. The rest of the data is more or less self-explanatory.

5.56x45MM AMMUNITION

Cartridge, 5.56mm, Ball, M193

Weapon:	Rifle, 5.56mm, M16; M16E1	
Ballistic Perf.:		
Velocity:	3250 ±40 fps at 15 feet; Std. Dev.40 fps max.	
Pressure:	52,000 psi max. avg.; avg. pressure plus 3 Std. Dev. 58,000 psi max.	
Port Pres.:	15,000 psi 2,000 psi	
Accuracy:	2.00″ mean radius max. avg. at 200 yards	
Cartridge:	182 - 14 grs.	
Case:	94 - 5 grs.	
Bullet:	56 - 2 grs.	
Primer, Perc.:		
Prim. Wt:	4.0 grs. approx.	
Compos.:	Lead styphnate	
Propellant:		
Brand:	IMR8208M	WC846
Type:	Single Base	Double Base
	Tubular	Spheroidal
Weight:	25.5 grs.	28.5 grs.
Ident.:	Plain tip	

Cartridge, 5.56mm, Ball, M855A1

Weapon: Rifle, 5.56mm, M16A2, M249
Ballistic Perf.:
Velocity: 3020 ±40 fps
Pressure: 52,000 psi max. avg.; avg. pressure plus 3 Std. Dev.: 58,000 psi max.
Port Pres.: 15,000 psi 2,000 psi
Accuracy: 2.00″ mean radius max. avg. at 200 yards
Cartridge: 187 - 14 grs.
Case: 94 - 5 grs.
Bullet: 62 - 2 grs.
Primer, Perc.:
Prim. Wt: 4.0 grs. approx.
Compos.: Lead styphnate
Propellant:

Brand:	IMR8208M	WC846
Type:	Single Base Tubular	Spheroidal

Weight:
Ident.: Green tip

Cartridge, Grenade; 5.56mm, M195

Weapon: Rifle, 5.56mm, XM16E1; M16
Ballistic Perf.:
Velocity: 140 to 165 fps at 5′6″ (Grenade 1.56 .01 lbs) No individual shot below 140 fps
Cartridge: 127.5 - 4 grs.
Case: 98 - 3 grs.
Primer, Perc.:
Prim. Wt: 4.0 grs. approx.
Compos.: Lead Styphnate
Propellant:
Brand: IMR4475
Type: Single Base, Tubular
Weight: 25.0 grs.
Wad: .5 grs. max., Cardboard, Royal Satin coated (both sides) Booklined Yellow
Ident.: Case mouth closed with 7 petal rose crimp red tip

Cartridge, 5.56mm, Tracer, M196

Weapon: Rifle, 5.56mm, M16; XM16E1
Ballistic Perf.:
Velocity: 3200 ±40 fps at 15 feet; Std. Dev. 40 fps max.
Pressure: 52,000 psi max. avg./avg. pressure plus 3 Std. Dev. 58,000 psi max.
Port Pres.: 15,000 psi 2,000 psi
Accuracy: 5.00″ mean radius max. avg. at 200 yards
Trace: The trace shall be visible from a point not greater than 75 yards from the the muzzle of weapon to a point not less than 500 yards from the muzzle.
Cartridge: 177 - 11 grs.
Case: 94 - 5 grs.
Bullet: 54 - 2 grs.
Point Filler: 28 - .5 grs.—lead-antimony
Base Clos.: Vinyl
Tracer: 2.7 grs. approx.
Ign.: 1.0 gr.
Sub Ign. .05 gr.
Primer, Perc.:
Prim. Wt: 4.0 grs. approx.
Compos.: Lead Styphnate
Propellant:
Brand: IMR 8208M
Type: Single Base Tubular
Weight: 25.3 grs.
Ident.: Red Tip

Cartridge, 5.56mm, Test, High Pressure, M197

Weapon: Used to proof test barrels and weapons (not a service cartridge)
Ballistic Perf.:
Pressure: 70,000 3,000 psi, max. Std. Dev. 3500 psi
Cartridge: 174 - 11 grs.
Case: 94 - 5 grs.
Bullet: C10524197—56 - 2 grs.
Primer: 4.0 grs. approx.
Propellant:
Brand: HPC 3
Type: Double Base Flake
Weight: 20.0 grs.
Ident.: Case Stannic Stained or Nickel Plated

Cartridge, 5.56mm, Tracer, M856A1

Weapon: Rifle, 5.56mm, M16A2, M249
Ballistic Perf.:
Velocity: 2795 ±40 fps
Pressure: 52,000 psi max. avg./ avg. pressure plus 3 Std. Dev. 58,000 psi max.
Port Pres.: 15,000 psi 2,000 psi
Accuracy: 5.00″ mean radius max. avg. at 200 yards
Trace: The trace shall be visible from a point not greater than 75 yards from the muzzle of the weapon to a point not less than 500 yards from the muzzle.
Cartridge: 177 - 11 grs.
Case: 94 - 5 grs.
Bullet: 63.8 grs.
Primer, Perc.:
Prim. Wt: 4.0 grs. approx.
Compos.: Lead Styphnate
Propellant:
Brand:
Type:
Weight:
Ident.: Orange tip

Dummy Cartridge, 5.56mm, M199

Weapon: Rifle, 5.56mm, XM16E1; M16—Training
Cartridge: 150 - 7 grs.
Case: 94 - 7 grs.
Bullet: 56 - 2 grs.
Primer: None
Propellant: None
Ident.: Impressed upon the case, 6 corrugations, approx. .030-inch deep equally spaced about the periphery.

Cartridge, 5.56mm, Blank, XM200

Weapon: Rifle, 5.56mm, M16; XM16E1 with blank firing attachment, M13
Ballistic Perf.:
Screen pert: No perforations in paper screen at 15 ft.
Cyclic Rate: Min. 550 rds. per minute, max. 800 rds. per minute
Cartridge: 109.5 - 4 grs.
Case: 98 - 3 grs.
Bullet: None, Case Mouth closed with 7-petal rose crimp
Primer, Perc.:
Prim. Wt: 4.0 grs. approx.
Compos.: Lead Styphnate
Propellant: HPC 13
Type: Double Base, Flake
Weight: 7.0 grs.
Wad: None
Ident.: Cannelure approx $\frac{1}{2}$″ from head and mouth closed with 7 petal rose crimp

Dummy Cartridge, 5.56mm, Inert Loaded, M232

Weapon: Rifle, 5.56mm, XM16E1, M16
Cartridge: 181.5 - 7.0 grs.
Case: 94 - 5 grs.

Bullet:	56 - 2 grs.
Primer:	None
Propellant:	31 grs. Sodium Carbonate Monohydrate
Ident.:	Cartridge, chemical black

Dummy Cartridge, 5.56mm, Inert Loaded, M857

Weapon:	Rifle, 5.56mm, M16A2, M249
Cartridge:	187.5 - 7.0 grs.
Case:	94 - 5 grs.
Bullet:	61 - 2 grs.
Primer:	None
Propellant:	31 grs. Sodium Carbonate Monohydrate
Ident.:	Cartridge, chemical black

.30 CALIBER CARBINE

Cartridge, Cal .30, Carbine, Ball, M1

Weapon:	Carbine, Caliber .30, M1; Carbine., Caliber .30, M2	
Ballistic Perf.:		
Velocity:	1900 ±30 fps	
Pressure:	40,000 psi, max. avg.	
Accuracy:	1.5″ mean radius max. avg. at 100 yards	
Cartridge:	146 - 13 grs. (with gilding metal jacketed bullet) 193 - 13 grs. (with gilding metal clad steel jacketed bullet)	
Case:	71 - 6 grs.	
Bullet:	111 - 3 grs. (with gilding metal jacket) 108 - 3 grs. (with gilding metal clad steel jacket)	
Primer, Perc.:	Lead Styphnate	
Propellant:		
Brand:	WC820	HPC5
Type:	Double Base Spheroidal	Double Base Flake
Weight:	13 grs.	13 grs.
Point Ident.:	Plain Tip	

Cartridge, Cal .30, Carbine, M13

Weapon:	Carbine Cal .30, M1; Carbine, Caliber .30, M2
Ballistic Perf.:	None
Cartridge:	177 grs.
Case:	66 grs.
Bullet:	111 - 3 grs.—108 - 3 grs.
Ident.:	Drilled case, no primer

Cartridge, Cal .30, Carbine, Rifle Grenade, M6

Weapon:	Carbine, Caliber .30, M1; Carbine, Caliber .30, M2
Ballistic Perf.:	
Velocity:	Shall propel grenade (AT, Practice, M11A3) with velocity of 145 ±15 fps at 5 feet
Cartridge:	103 grs.
Case:	77 grs.
Wad:	Pressed Paper, Commercial
Primer, Perc.:	
Propellant:	
Brand:	IMR 4809 and Black Powder
Weight:	21 grs.
Ident.:	Case Mouth closed with 5-petal rose crimp

Cartridge, Cal .30, Carbine, Test, High Pressure, M18

Weapon:	Carbine, Caliber .30 M1; Carbine, Caliber .30, M2
Ballistic Perf.:	
Pressure:	47,500 2,500 psi max. avg.
Cartridge:	233 grs. approx.
Case:	71 - 6grs.
Bullet:	152 - 3 grs.
Primer, Perc.:	
Propellant:	
Brand:	HPC-5
Type:	Double Base, Flake
Weight:	14 grs.
Ident.:	Case is stannic stained

Cartridge, Cal .30, Carbine, Tracer, M27

Weapon:	Carbine, Caliber .30, M1; Carbine, Caliber .30, M2	
Ballistic Perf.:		
Velocity:	1800 ±30 fps	
Pressure:	40,000 psi, max. avg.	
Trace:	Bright Trace from 100 to 400 yards	
Accuracy:	3.5″ mean radius max. avg. at 100 yards	
Cartridge:	191 - 13 grs.	
Case:	B6200957, 71 - 6 grs.	
Bullet:	103 - 4 grs.	
Tracer:	5.5 grs. approx.	
Igniter:	0.5 gr. approx.	
Primer, Perc.:		
Propellant:		
Brand:	HPC-5	WC 820
Type:	Double Base Flake	Double Base Spheroidal
Weight:	13 grs.	13 grs.
Point Ident.:	Orange Tip	

7.62MM, NATO, AMMUNITION (308 WIN.)

Cartridge, 7.62mm, NATO, Ball, M59

Weapon:	Gun, Machine, 7.62mm, M60; M73 Rifle, 7.62mm, M14	
Ballistic Perf.:		
Velocity:	2750 ±30 fps at 78 feet	
Pressure:	50,000 psi, max. avg.	
Accuracy:	Carton or Clip Pack—5″ mean radius at 600 yards Link Pack—7½″ mean radius at 600 yards	
Cartridge:	393 - 27 grs.	
Case:	190 - 20 grs.	
Bullet:	150.5 - 6.5 grs. (cut cannelure) 150.5 - 5.5 grs. (knurled cannelure)	
Core:	55 - 2 grs.—steel	
Fill., Pt.:	24 - 1 grs.—lead-antimony	
Fill., Base:	14.5 - 1 grs.—lead-antimony	
Primer, Perc.:		
Prim. Wt:	5.430 - 0.520 grs.	
Pellet Wt:	.600 - .120 grs.	
Compos.:	Lead Styphnate	
Propellant:		
Brand:	WC 846	IMR 4475
Type:	Double Base Spheroidal	Single Base Tubular
Weight:	46 grs.	41 grs.
Point Ident.:	Plain tip	

Cartridge, 7.62mm, NATO, Test, High Pressure, M60

Weapon:	Used to proof test barrels and weapons (Not a service cartridge)
Ballistic Perf.:	
Pressure:	67,500 2,500 psi, avg.
Cartridge:	412.0 - 23.5 grs.
Case:	190 - 20 grs.
Bullet:	174.5 - 3.0 grs.
Primer, Perc.:	
Prim. Wt:	5.43 - 0.52 grs.
Pellet Wt:	0.60 - 0.12 grs.
Compos.:	FA-956, Lead Styphnate
Propellant:	
Brand:	IMR 4475
Type:	Single Base Tubular
Weight:	41 grs.
Ident.:	Stannic Stained Case

Cartridge, 7.62mm, NATO, AP, M61

Weapon:	Gun, Machine, 7.62mm, M60; M73 Rifle, 7.62mm, M14

Ballistic Perf.:
Velocity: 2750 fps ±30 fps at 78 feet
Pressure: 50,000 psi, max. avg.
Accuracy: 7.5″ mean radius at 600 yards
Cartridge: 393 - 27 grs.
Case: 190 - 20 grs.
Bullet: C7553740—150.5 - 6.5 grs. (cut cannelure); 150.5 - 5.5 grs. (knurled cannelure)
Core: 55 - 2 grs.—steel
Fill., Pt: 24 - 1 grs.—Lead Antimony
Primer, Perc.:
Prim. Wt: 5.430 - 0.520 grs.
Pellet Wt: .600 - .120 grs.
Compos.: FA-956, Lead Styphnate
Propellant:

Brand:	IMR 4475	WC 846
Type:	Single Base Tubular	Double Base Spheroidal
Weight:	41 grs.	46 grs.

Point Ident.: Black Lacquer

Cartridge, 7.62mm, NATO, Tracer, M62

Weapon: Gun, Machine, 7.62mm, M60; M73 Rifle, 7.62mm, M14
Ballistic Perf.:
Velocity: 2750 ±30 fps at 78 feet
Pressure: 50,000 psi, max. avg.
Accuracy: 15″ mean radius, max. avg., at 600 yards
Trace: Visible trace between 100 and 850 yards, min.
Cartridge: 383 - 29 grs.
Case: 190 - 20 grs.
Bullet: 142 - 4 grs.
Fill., Pt: 72.0 - 1.5 grs.—Lead Antimony
Tracer: 6.5 grs.approx.
Ign.: 1.0 grs. approx.
Sub-ign.: 1.0 grs. approx.
Primer, Perc.:
Prim. Wt: 5.43 - 0.52 grs.
Pellet Wt: 0.60 - 0.12 grs.
Compos.: FA-956, Lead Styphnate
Propellant:
Type: Double Base Spheroidal
Weight: 46 grs.
Point Ident.: Orange Lacquer

Cartridge, 7.62mm, NATO, Tracer, M62 (Overhead Fire Application)

Weapon: Gun, Machine, 7.62mm, M60; M73 Rifle, 7.62mm, M14
Ballistic Perf.:
Velocity: 2680 ±30 fps at 78 feet
Pressure: 50,000 psi, max. avg.
Accuracy: 9″ mean radius, max. avg. at 600 yards
Extreme Spread, Max. per target: 45 inches
Trace: Visible trace between 100 and 850 yards, min.
Cartridge: 387 - 29 grs.
Case: 190 - 20 grs.
Bullet: 146 - 4 grs.
Fill., Pt: 72 - 1.5 grs.—Lead Antimony
Base Seal: None
Tracer: 6.5 grs. approx.
Igniter: 1.0 grs. approx.
Sub-ign.: 1.0 grs. approx.
Primer Perc.:
Prim. Wt: 5.43 - 0.52 grs.
Pellet Wt: 0.60 - 0.12 grs.
Compos.: FA-956, Lead Styphnate
Propellant:
Type: Double Base Spherical
Weight: 46 grs.
Ident.: Red Lacquer

Dummy Cartridge, 7.62mm, NATO, M63

Weapon: Gun, Machine, 7.62mm, M60; M73 Rifle, 7.62mm, M14
Requirements: Training and Gun Functioning
Bullet Pull: 175 lb. min.
Cartridge: 258 - 21.5 grs.
Case: 190 - 20 grs.
Bullet: 68 - 1.5 grs.
Ident.: 6 corrugations spaced equally around periphery of case

Cartridge, 7.62mm, NATO, Grenade, Rifle, M64

Weapon: Rifle, 7.62mm, M14
Ballistic Perf.:
Velocity: Cartridge shall propel a grenade weighing 1.56 .01 lbs., 160 ±5 fps at 5.6 feet beyond the forward end of the grenade when fully positioned for launching.
Cartridge: 233 - 21 grs. (HPS 4 Propellant)
Case: 236 - 21 grs. (IMR8097 Propellant)
241 - 21 grs. (WC830 Propellant)
190 - 20 grs.—Copper Alloy
Primer, Perc.:
Prim. Wt: 5.430 - 0.520 grs.
Pellet Wt: .600 - .120 grs.
Compos.: FA-956, Lead Styphnate
Propellant:

Brand:	HPC4	1MR8097	WC830
Type:	Double Base Tubular	Single Base Tubular	Double Base Spherical
Weight:	37 grs.	40 grs.	45 grs.

Wad: Pressed Paper
Ident.: Rosette Crimp

Cartridge, 7.62mm, NATO, Ball, M80

Weapon: Gun, Machine, 7.62mm, M60; M73 Rifle, 7.62mm, M14
Ballistic Perf.:
Velocity: 2750 ±30 fps at 78 feet
Pressure: 50,000 psi, max. avg.
Accuracy: Carton or Clip Pack—″ mean radius, max. avg. at 600 yards
Link Pack—7.5″ mean radius, max. avg. at 600 yards
Cartridge: 392 - 31 grs.
Case: 190 - 20 grs.
Bullet: 149 - 3 grs.
Primer, Perc.:
Prim. Wt: 5.43 - 0.52 grs.
Pellet Wt: 0.60 - 0.12 grs.
Compos.: FA-956, Lead Styphnate
Propellant:

Type:	Double Base Spheroidal	Single Base Tubular	Single Base Tubular
Weight:	46 grs.	41.5 grs.	41 grs.

Ident.: Plain Tip

Cartridge, 7.62mm, NATO, Ball, M80 (Overhead Fire Application)

Weapon: Gun, Machine, 7.62mm, M60; M73 Rifle, 7.62mm, M14
Ballistic Perf.:
Velocity: 2750 ±30 fps at 78 feet
Pressure: 50,000 psi, max. avg.
Accuracy: 5″ mean radius, max. avg. at 600 yards; Extreme Spread, max. per target—25 inches
Cartridge: 393 - 31 grs.
Case: 190 - 20 grs.
Bullet:
Primer, Perc.:
Prim. Wt: 5.43 - 0.52 grs.
Pellet Wt: 0.60 - 0.12 grs.
Compos.: FA-956, Lead Styphnate
Propellant:

Brand:	WC 846	IMR 8138	MIMR4475
Type:	Double Base Spheroidal	Single Base Tubular	Single Base Tubular
Weight:	46 grs.	41.5 grs.	41 grs.

Point Ident.: Plain Tip

Cartridge, 7.62mm, NATO, Blank, M82

Weapon: Rifle, 7.62mm, M14, Machine Gun, M60; M73 with blank firing attachment

Ballistic Perf.:
- Screen Perf.: Perforations in paper screen shall be less than 0.1-inch in diameter at 15 ft. from muzzle of gun

Cartridge: 222 - 225 grs. approx.
- Case: 201 grs. approx.
- Wad: .030-inch tagboard or chipboard
- Primer, Perc.:
- Prim. Wt: 5.430 - 0.520 grs., 5 grs. approx.
- Compos.: Lead Styphnate—FA-956; FA-1023
- Propellant:

Brand:	SR4759	HPC-2	WC818
Type:	Single Base Tubular	Double Base Flake	Double Base Spheroidal
Weight:	17.5 grs.	14.5 grs.	14.5 grs.

- Ident.: No bullet, crimped mouth, double tapered neck and orifice sealed with red lacquer

Cartridge, 7.62mm, Match, M118

Weapon: Rifle, 7.62mm, M14 (National Match)

Ballistic Perf.:
- Velocity: 2550 ±30 fps at 78 feet
- Pressure: 50,000 psi, max. avg.
- Accuracy: 3.5″ mean radius, max. avg. at 600 yards

Cartridge: 390 grs. approx.
- Case: 190 - 20 grs.
- Bullet: 175.5 - 3.0 grs.
- Primer, Perc.:
- Prim. Wt: 5.43 - 0.52 grs.; 5.3 grs. approx.; 5 grs. approx.
- Pellet Wt: 0.60 - 0.12 grs.; 0.7 - 0.2 grs.; .58 -.08 grs.
- Compos.: FA-956 FA-961 FA-1023
- Type: Lead Styphnate
- Propellant:

Brand:	WC 846	IMR 4895
Type:	Double Base Spherical	Single Base Tubular
Weight:	44 grs.	42 grs.

- Ident.: Special head stamping-Match stamped on head of case or "NM" stamped on head of case of cartridges for National Matches

Cartridge, 7.62mm, Match, M852

Weapon: Rifle, 7.62mm, M14 (National Match)

Ballistic Perf.:
- Velocity: 2550 ±30 fps at 78 feet
- Pressure: 50,000 psi, max. avg.
- Accuracy: 3.5″ mean radius, max. avg. at 600 yards

Cartridge: 383 grs. approx.
- Case: 190 - 20 grs.
- Bullet: 168 grs. Hollow point boat-tail
- Primer, Perc.:
- Prim. Wt: 5.43 - 0.52 grs.; 5.3 grs. approx.; 5 grs.approx.
- Pellet Wt: 0.60 - 0.12 grs.; 0.7 - 0.2 grs.; .58 -.08 grs.
- Compos.: FA-956 FA-961 FA-1023
- Type: Lead Styphnate
- Propellant:
- Brand: IMR 4895
- Type: Single Base Tubular
- Weight: 42 grs.
- Ident.: Special head stamping-Match stamped on head of case or "NM" stamped on head of case of cartridges for National Matches

Cartridge, 7.62mm, Ball, Frangible, M160

Weapon: Gun, Machine, 7.62mm, M73

Ballistic Perf.:
- Velocity: 1320 ±50 fps
- Accuracy: 4.0″mean radius max. avg. at 100 yards
- Perf.: The bullet of the cartridge shall not perforate a $^{3}/_{16}$″ thick plate Dural .2024 T4 (or equal) with a Brinell hardness of 105 to 125 under a 500 kilogram load at a range of 25 yards.

Cartridge: 315 - 24 grs.
- Case: 190 - 20 grs.
- Bullet: 108.5 - 3 grs., Bakelite, Natural and powdered lead
- Primer, Perc.:
- Prim. Wt: 5.43 - 0.52 grs.
- Compos.: FA-956
- Propellant:

Brand:	SR8074	HPC-8	WC140
Type:	Single Base Tubular	Double Base Flake	Single Base Spheroidal
Weight:	10.5 grs.	8.3 grs.	11.4 grs.

- Ident.: Green tip; White annulus

Dummy, Cartridge, 7.62mm, Inert Loaded, M172

Weapon: Gun, Machine, M60, Testing Metallic Link Belts and Gun Function

Requirements:
- Bullet Extr.: The force required to extract the bullet from the cartridge case shall not be less than 173 lbs.

Cartridge: 385 - 23 grs.
- Case: 190 - 20 grs.
- Bullet: 149 - 3 grs.
- Filler: Sodium Carbonate Monohydrate or equal
- Ident.: Cartridge, black oxide, no primer or primer vent hole

Cartridge, 7.62mm, NATO, Ball, Duplex, M198

Weapon: Rifle, 7.62mm, M14

Ballistic Perf.:
- Velocity: Front Bullet—2750 ±30 fps at 78 feet Rear Bullet—2200 fps min. indiv. at 78 feet
- Pressure: 52,000 psi, max. avg.
- Accuracy: (Front Bullet) 2″mean radius, max. avg. at 100 yards
- Dispersion: (Rear Bullet) between 5 and 10 inches CEP at 100 yards

Cartridge: 411 - 31 grs.
- Case: 190 - 20 grs.
- Bullet: (Front) 84 - 4 grs. (Rear) 85-4grs.
- Primer, Perc.:
- Prim. Wt: 5.43 - 0.52 grs.
- Compos.: FA-956, Lead Styphnate
- Propellant:
- Type: Double Base Spheroidal
- Weight: 45.5 grs.
- Point Ident.: Green Lacquer

CALIBER .30 AMMUNITION (30-06)

Cartridge, Cal .30, Tracer M1

Weapon: Gun, Machine, Cal .30, M37; Gun, Machine, Cal .30 Browning M1919A4; Gun, Machine, Cal .30, M1919A6; Rifle, U.S. Cal .30, M1

Ballistic Perf.:
- Velocity: 2700 ±30 fps at 78 feet GM Bullet 2665 ±30 fps for GMCS Bullet
- Pressure: 52,000 psi, max. avg.
- Accuracy: 18″mean radius max. avg. at 600 yards
- Tracer: Visible Light from Muzzle to 900 yards

Cartridge: 408 - 27 grs. (GM Bullet) 399 - 27 grs. (GMCS Bullet)
Case: 200 - 20grs.
Bullet: 152.5 - 3.5 grs.
143.5 - 3.5 grs.
Tracer: 13 grs. approx.
Igniter: 3 grs. approx.
Primer, Perc.:
Prim. Wt: 5.43 - 0.520 grs.—Lead Styphnate
Propellant:
Type: Double Base, Spheroidal—IMR4895
Weight: 50 grs.
Point Ident.: Red tip

Cartridge, Caliber .30, Test, High Pressure, M1

Weapon: (For Proof Testing all Caliber .30 Weapons)
Ballistic Perf.:
Pressure: 67,500 psi, max. avg.
Cartridge: 432 - 24 grs.
Bullet: 173 - 3 grs.
Primer, Perc.:
Prim. Wt: 5.5 grs.
Compos.: FA961—Lead Styphnate
Propellant:
Brand: IMR 4198
Type: Single Base, Tubular
Weight: 52 grs.
Ident.: Stannic Stained (tinned) Case

Cartridge, Caliber .30, Ball, M2

Weapon: Gun, Machine, Cal .30, M37; Gun, Machine, Cal .30, Browning, M1919A4; Gun, Machine, Cal .30, M1919A6; Rifle, U.S. Cal .30, M1
Ballistic Perf.:
Velocity: 2740 ±30 fps at 78 ft
Pressure: 50,000 psi, max. avg.
Accuracy: 7.5″mean radius max. avg. at 600 yards
Cartridge: 408 - 23 grs.
Case: 200 - 20 grs.
Bullet: 152 - 3 grs.
Primer, Perc.:
Prim. Wt: 5.43
Compos.: Lead Styphnate
Propellant:

Brand:	IMR4895	WC852	CMR-100
Type:	Single Base Tubular	Double Base Spheroidal	Single Base Tubular
Weight:	50 grs.	50 grs.	45 grs.

Point Ident.: Plain Tip

Cartridge, Caliber .30, Ball, M2 (Overhead Fire Application)

Weapon: Guns, Machine, Caliber .30; M37, Browning M1919A4 and M1919A6
Ballistic Perf.:
Velocity: 2740 ±30 fps at 78 feet
Pressure: 50,000 psi maximum average
Accuracy: 5.0″mean radius maximum average at 600 yards
Cartridge: 408 - 23 grs.
Case: 200 - 20 grs.
Bullet: 152 - 3 grs.
Primer, Perc.:
Prim. Wt: 5.43
Compos.: FA956—Lead Styphnate
Propellant:

Brand:	IMR4895	WC852	CMR-100
Type:	Single Base Tubular	Double Base Spheroidal	Single Base Tubular
Weight:	50 grs.	50 grs.	45 grs.

Point Ident.: Plain Tip

Cartridge, Caliber .30, Armor Piercing, M2

Weapon: Gun, Machine, Cal .30, M37; Gun, Machine, Cal .30, Browning, M1919A4; Gun, Machine, Cal .30, M1919A6; Rifle, U.S. Cal .30, M1
Ballistic Perf.:
Velocity: 2715 ±30 fps at 78 feet
Pressure: 54,000 psi, max. avg.
Accuracy: 10″mean radius max. avg. at 600 yards
Cartridge: 424 - 28 grs.
Case: 200 - 28 grs.
Bullet: 166 - 7.5 grs.
Primer, Perc.:
Prim. Wt: 5.43
Compos.: Lead Styphnate
Propellant:

Brand:	WC852	IMR 4895
Type:	Double Base Spheroidal	Single Base Tubular
Weight:	55 grs.	55 grs.

Point Ident.: Black tip

Cartridge, Caliber .30, Rifle Grenade, M3

Weapon: Rifle, U.S. Caliber .30, M1
Ballistic Perf.:
Velocity: Shall propel Grenade (Practice, M11A2) with a velocity of 180 ±15 fps at 5.5ft
Cartridge: 246 - 20 grs.
Case: 200 - 20 grs.
Wad: Paper
Primer, Perc.:
Prim. Wt: 5.43 - 0.520 grs.
Compos.: Lead Styphnate
Propellant:
Type: Single Base, IMR 4895
Weight: 40 grs. + 5.0 1.0 gr. Black powder
Ident.: Case mouth closed with 5-petal rose crimp and sealed with red lacquered disc

Cartridge, Cal .30, API, M14

Weapon: Gun, Machine, Cal .30, M37 (Tank) Gun, Machine, Cal .30, Browning, M1919A4; Gun, Machine, Cal .30, 1919A6; Rifle, U.S. Cal .30, M1
Ballistic Perf.:
Velocity: 2780 ±30 fps at 78 feet
Pressure: 54,000 psi, max. avg.
Accuracy: 15″mean radius max. avg. at 600 yards
Incend: Shall produce flash when fired against steel target at 175 yards
Penetra: Avg. penetration depth of .42″when fired against steel plate at 100 yards
Cartridge: 407 - 30 grs.
Case: 200 - 20 grs.
Bullet: 151 - 6 grs.
Primer, Perc.:
Compos.: Lead Styphnate
Propellant:

Brand:	WC 852	IMR 4895
Type:	Double Base Spheroidal	Single Base Tubular
Weight:	50 grs.	50 grs.

Point Ident.: Aluminum

Cartridge, Cal .30, Frangible, Ball, M22

Weapon: Gun, Machine, Cal .30, M37; Gun, Machine, Cal .30, Browning, M1919A4; Rifle, U.S. Cal .30, M1
Ballistic Perf.:
Velocity: 1320 ±30 fps at 53 feet 1500 fps, max. individual at 53 feet
Accuracy: 2.0″ mean radius max. avg. at 100 yards
Perf.: Shall not perforate aluminum plate at 25 yards $^{3}/_{16}$″ Dural 2024 T4 with Brinell Hardness of 105 to 125 under 500 Kilogram load
Cartridge: 320 - 24 grs.
Case: 220 - 20 grs.
Bullet: 108.3 grs. Bakelite

Primer, Perc.:
Prim. Wt: 5.5 grs.
Compos.: Lead Styphnate
Propellant:
Brand: SR 4759
Type: Single Base, Tubular
Weight: 11 grs.
Point Ident.: Green and white tip

Cartridge, Cal .30, Tracer, M25

Weapon: Gun, Machine, Cal .30 Browning, M1917A1
Gun, Machine, Cal .30, M37 (Tank)
Gun, Machine, Cal .30 Browning, M1919A4
Gun, Machine, Cal .30 Browning, M1919A6 Rifle, U.S. Cal .30 M1

Ballistic Perf.:
Velocity: 2665 ±30 fps at 78 feet
Pressure: 50,000 psi, max. avg.
Trace: Bright Trace, 75 to 900 yards

Cartridge: 401 - 25 grs.
Case: 200 - 20 grs.
Bullet: 145.5 - 4 grs.
Primer Perc.:
Prim. Wt: 5.430 - 0.520 grs.
Compos.: Lead Styphnate—FA956
Propellant:

Brand:	WC 852	IMR 4895
Type:	Double Base Spheroidal	Single Base Tubular
Weight:	50 grs.	50 grs.

Point Ident.: Orange tip

Cartridge, Cal .30, Tracer, M25 (Steel Case)

Same as Cartridge, Tracer, Cal .30, M25, except:
Case: Steel, 180 - 20 grs.

Cartridge, Cal .30, Dummy, M40

Weapon: For training purposes in all caliber .30 weapons
Ballistic Perf.: None
Cartridge: 268 - 21.5 grs.
Case: 200 - 20 grs.
Bullet: 68 - 1.5 grs.
Ident.: Corrugated case—no primer

Cartridge, Cal .30, Match, M72

Weapon: Rifle, U.S. Caliber .30, M1 National Match

Ballistic Perf.:
Velocity: 2640 ±30 fps at 78 feet
Pressure: 50,000 psi, max. avg.
Accuracy: 3.5″mean radius max. avg. at 600 yards

Cartridge: 425 grs. approx.
Case: 200 - 20 grs.
Bullet: 175.5 - 3 grs.
Primer Perc.:
Prim. Wt: 5 to 5.6 grs.
Compos.: FA961 or FA1023—Lead Styphnate
Propellant:
Brand: IMR 4895
Type: Single Base, Tubular
Weight: 50 grs.
Ident.: "MATCH" stamped on head of case, and "NM" stamped on head of case of cartridges for National Matches

Cartridge, Caliber, 30 Blank, M1909

Weapon: Gun, Machine, Cal .30, Browning M1919A4; Gun, Machine, Cal .30 M1919A6; Rifle, U.S. Cal .30, M1
Ballistic Perf.: None
Cartridge: 218 - 20 grs.
Case: 200 - 20 grs.
Primer Perc.:
Propellant:

Brand:	WC Blank	SR 4990
Type:	Double Base Spheroidal	Single Base Flake
Weight:	12 grs.	12 grs.

Wad: Paper 25 grs.
Ident.: No bullet, mouth sealed with red lacquered disc

Cartridge, Blank, Cal .30, M1909 (Steel Case)

Same as Cartridge, Blank, Cal .30, M1909 except:
Case: Steel, 180 - 20 grs.

CALIBER 9MM AMMUNITION

Cartridge, Caliber 9mm, Ball, NATO, M882

Weapon: Pistol, Automatic, Cal 9mm, M9, M11
Ballistic Perf.:
Velocity: 1251 25 fps at 16 meters
Pressure: 27,000 psi, max. avg.
Accuracy:

Cartridge: 179 grs.
Case: 42 grs.
Bullet: 124 grs. Copper Alloy
Primer, Perc.:
Propellant:

Brand:	HPC 26	
Type:	Double Base	Flake
Weight:	5 grs.	6 grs.

Point Ident.: Plain tip

Cartridge, Caliber 9mm Test, High Pressure, M905

Weapon: Used to proof test barrels and weapons (Not a service cartridge)
Ballistic Perf.:
Pressure: 50,000 psi, max. avg.

Cartridge: 179 grs.
Case: 42 grs.
Bullet: 124 grs.
Primer, Perc.: Lead Styphnate
Propellant:
Brand: WC 370
Type: Double Base Ball
Weight: 7.5 grs.
Ident.: Tinned Case, HPT headstamp

Cartridge, Caliber 9mm, Practice Tracer, M939

Weapon: AT-4 Subcaliber Trainer
Ballistic Perf.:
Velocity: 885 ±25 fps at 25.5 feet
Pressure: 27,000 psi, max. avg.
Trace: Visible trace to match AT-4 rocket trajectory

Cartridge:
Case: Aluminum
Bullet: Brass
Tracer:
Ignit.:
Primer, Perc.: Lead Styphnate
Propellant:
Brand:
Type:
Weight:
Point Ident.: Red Lacquer over Blue Tip

Cartridge, Caliber 9mm, Dummy M917

Weapon: Pistol, Automatic, Cal 9mm, M9, M11
Ballistic Perf.: Not applicable
Cartridge: 179 grs. approx.
Bullet: 124 grs.
Ident.: Hole in side wall of case

CALIBER .45 AMMUNITION

Cartridge, Caliber .45, Ball, M1911

Weapon: Pistol, Automatic, Cal .45, M1911A1
Gun, Submachine, Cal. 45, M3A1

Ballistic Perf.:
Velocity: 855 25 fps at 25.5 feet
Pressure: 19,000 psi, max. avg.
Accuracy: 7.46″diagonal (max. avg.) at 50 yards

Cartridge: 331 - 17 grs.
Case: 87 - 10 grs.
Bullet: 234 - 6 grs. Copper Alloy
.231 grs. Gilding Metal Clad Steel
Primer, Perc.:
Propellant:

Brand:	SR 7970	HPC 1
Type:	Single Base	Double Base
Flake	Flake	
Weight:	5 grs.	5 grs.

Point Ident.: Plain tip

Cartridge, Caliber .45, Ball, M1911, Steel Case

Weapon: Pistol, Automatic, Cal .45, M1911A1
Gun, Submachine, Cal .45, M3A1

Ballistic Perf.:
Velocity: 855 ±25 fps at 25.5 feet
Pressure: 19,000 psi, max. avg.
Accuracy: 7.46″diagonal (max. avg.) at 50 yards

Cartridge: 321 - 20 grs.
Case: 82 - 10 grs.
Bullet: 234 - 6 grs.
Primer Perc.:
Propellant:

Brand:	SR 7970	HPC 1
Type:	Single Base	Double Base
Flake	Flake	
Weight:	5 grs.	5 grs.

Cartridge, Caliber .45, Ball, M1911, Match Grade

Weapon: Pistol, Automatic, Cal .45, M1911A1
National Match

Ballistic Perf:
Velocity: 855 ±25 fps at 25.5 feet
Pressure: 19,000 psi, max. avg.
Accuracy: 3″ diagonal (max. avg.) at 50 yards

Cartridge: 334 - 17 grs.
Case: 87 - 10 grs.
Bullet: 234 - 6 grs.
Primer Perc.:
Propellant:

Brand:	SR 7970	HPC 1
Type:	Single Base	Double Base
Flake	Flake	
Weight:	5 grs.	5grs.

Ident.: Special head stamping—"Match"—stamped on head of case, and "NM" stamped on head of case of cartridges for National Matches

Cartridge, Caliber .45 Test, High pressure, M1

Weapon: Used to proof test barrels and weapons (Not a service cartridge)

Ballistic Perf.:
Pressure: 22,000 psi, max. avg.

Cartridge: 332-16 grs.
Case: 87 - 10 grs.
Bullet: 234 - 6 grs.
Primer, Perc.: Lead Styphnate
Propellant:

Brand:	SR 7970	HPC 1
Type:	Single Base Flake	Double Base Flake
Weight:	7 grs.	

Ident.: Stannic Stained Case

Cartridge, Caliber .45, Blank, M9

Weapon: Pistol, Automatic, Cal .45, M1911A1

Ballistic Perf.:
Screen Perf.: 0.1″ dia. max. perforations in paper screen at 15 feet

Cartridge: 104 grs. approx.
Wad:
Primer, Perc.: Lead Styphnate
Propellant:
Brand: SR 4990
Type: Single Base Flake
Weight: 10 grs.
Ident.: No bullet, case mouth tapered and sealed with red lacquered disc

Cartridge, Blank, Cal .45, M9 (Steel Case)

Same as Cartridge, Blank, Cal .45, M9, except: ctg. weight 91 grs.
Case: Steel, 85 - 10 grs.
Propellant: 7 grs.

Cartridge, Caliber .45, Tracer, M26

Weapon: Pistol, Automatic, Cal .45, M1911A1
Gun, Submachine, Cal .45, M3A1

Ballistic Perf.:
Velocity: 885 ±25 fps at 25.5 feet
Pressure: 19,000 psi, max. avg.
Trace: Visible trace between 15 and 150 yards, min.

Cartridge: 331 - 17 grs.
Bullet: 203 grs. approx.
Tracer: 3 grs. approx.
Ignit.: 2.5 grs. approx.
Primer, Perc.: Lead Styphnate
Propellant:

Brand:	SR 7970	HPC 1
Type:	Single Base	Double Base
Flake	Flake	
Weight:	5 grs.	5 grs.

Point Ident.: Red Lacquer

Cartridge, Tracer, Cal .45, M26 (Steel Case)

Same as Cartridge, Cal .45, M26, except:
Case: Steel, 82 - 10 grs.

Cartridge, Caliber .45, Blank Line Throwing M32

Case: Brass
Primer: Non-mercuric, non-corrosive
Propellant: Commercial

Ballistics:
Pressure: 20,000 psi
Ident.: No bullet, rimmed long case, ".45 M32" stamped on head of case

Note: This cartridge used with Lyle life saving gun, Cal 45/70.

Cartridge, Caliber .45, Match, Wad Cutter (Commercial)

Weapon: Pistol Automatic Cal .45, M1911A1, National Match

Ballistics:
Velocity: The mean velocity of 10 rds. at 15 ft. from the muzzle of the gun shall be 765 ±45 fps
Pressure: The mean pressure of 10 rds. shall not exceed 18,000 psi. The extreme variation shall not exceed 6200 psi.
Accuracy: Average extreme spread of 5-5 shot targets at 50 yards shall not exceed 3.0 inches

Cartridge:
Case: Brass
Bullet: 185 grains Gilding Metal
Propellant: Commercial
Primer: Commercial Lead Styphnate
Ident.: Head stamp in accordance with commercial practice

Cartridge, Caliber .45, Dummy M1921

Weapon: Pistol, Automatic, Cal .45, M1911A1
Gun, Submachine, Cal .45, M3A1
Ballistic Perf.: Not applicable
Cartridge: 313 grs. approx.
Bullet: 234 - 6 grs.
Ident.: Hole in side wall of case

Cartridge, Caliber .45, Dummy, M1921 (Steel Case)

Same as Cartridge, Dummy, Cal .45, M1921, except:
Ctg. weight 301 grs. approx.
Case: Steel, 82 - 10 grs.

CALIBER .50 AMMUNITION

Cartridge, Cal .50, Tracer, M1

Weapon: Gun, Machine, Caliber .50, Browning, M2 Heavy Barrel (Turret Type); Gun, Machine, Caliber .50, Browning, M2, Heavy Barrel (Flexible); Gun, Machine, Caliber .50, Tank, M85
Ballistic Perf.:
Velocity: 2700 ±40 fps at 78 feet
Pressure: 52,000 psi, max. avg.
Trace: Bright trace from 250 to 1600 yards
Cartridge: 1785 - 68 grs.
Case: 850 - 50 grs.
Bullet: 676 - 17 grs.
Tracer 65 grs.
Ignit. Comp. 10 grs.
Primer, Perc.:
Prim. Wt.: 18.5 grs. approx.
Propellant:
Brand: IMR 5010
Type: Single Base, Tubular
Weight: 240 grs.
Point Ident.: Red tip

Cartridge, Caliber .50, Test, High-Pressure, M1

Weapon: For proof testing all caliber .50 weapons
Ballistic Perf.:
Pressure: 65,000 psi, max. avg.
Cartridge: 2108 - 62 grs.
Bullet: 999 - 11 grs.
Primer, Perc.:
Prim. Wt: 18.5 grs. - Styphnate Cloride
Propellant: WC 860
Type: Double Base, Spheroida/
Weight: 240 grs.
Ident.: Stannic stained case

Cartridge, Cal .50, Incendiary, M1

Weapon: Gun, Machine, Caliber .50, Browning, M2, Heavy Barrel (Turret Type); Gun, Machine, Caliber .50, Browning, M2, Heavy Barrel (Flexible); Gun, Machine, Caliber .50, Tank, M85
Ballistic Perf.:
Velocity: 2950 ±30 fps at 78 feet
Pressure: 54,000 psi, max. avg.
Cartridge: 1704 grs. approx.
Bullet: 633 - 26 grs.
Incend.: 34 - 2 grs.
Primer, Perc.:
Prim. Wt: 18.5 grs.
Propellant:
Brand: WC860
Type: Double Base Spheroidal
Weight: 240 grs.
Point Ident.: Blue tip

Cartridge, Blank, Caliber .50, M1

Weapon: Gun, Machine, Caliber .50, Browning, M2, Heavy Barrel (Flexible)
Ballistic Perf.: None
Cartridge: 891 grs. approx.
Propellant:
Brand: WC-150
Weight: 46 grs.
Type: Double Base, Spheroidal
Wad: 1.5 grs. approx.-Fiberlic No. 2 Kraftboard, or equal (commercial); 256 grs. approx.—Strawboard covered with thin red paper (commercial)
Primer, Perc.:
Prim. Wt: 18.5 grs. approx.
Ident.: No bullet-mouth sealed with vermilion lacquered wad

Cartridge, Cal .50, Armor Piercing, M2

Weapon: Gun, Machine, Caliber .50, Browning, M2, Heavy Barrel (Turret Type); Gun, Machine, Caliber .50, Browning, M2, Heavy Barrel (Flexible); Gun, Machine, Caliber .50, Tank, M85
Ballistic Perf.:
Velocity: 2810 ±fps at 78 feet
Pressure: 53,000 psi, max. avg.
Accuracy: 10.0″mean radius max. avg. at 600 yards
Cartridge: 1812 - 73 grs.
Case: 850 - 80 grs.
Bullet: 708 - 22 grs.
Primer Perc.:
Prim. Wt: 18.5 grs. approx.
Propellant:

Brand:	WC 860	IMR 5010
Type:	Double Base Spherodial	Single Base Tubular
Weight:	235 grs.	235 grs.

Point Ident.: Black tip

Cartridge, Dummy, Cal. 50, M2

Weapon: All Caliber .50 Weapons—for training personnel and testing weapon mechanism
Cartridge: 1215 - 60 grs. (GMCS Bullet Jacket); 1248 - 60 grs. (GM Bullet Jacket)
Ident.: Three holes in case, no primer

Cartridge, Caliber .50, Ball, M2

Weapon: Gun, Machine, Caliber .50, Browning, M2, Heavy Barrel (Turret Type); Gun, Machine, Caliber .50, Browning, M2, Heavy Barrel (Flexible)
Ballistic Perf.:
Velocity: 2810 ±0 fps at 78 feet
Pressure: 55,000 psi, max. avg.
Accuracy: 9″ mean radius max. avg. at 600 yards
Cartridge: 1813 - 73 grs.
Case: 850 - 50 grs.
Bullet: 709.5 - 22 grs.
Primer Perc.:
Prim. Wt: 18.5 grs.
Propellant:
Brand: WC 860
Type: Double Base, Spheroidal
Weight: 235 grs.
Ident.: Plain tip

Cartridge, Cal .50, Armor Piercing Incendiary, M8

Weapon: Gun, Machine, Caliber .50, Browning, M2, Heavy Barrel (Turret Type); Gun, Machine, Caliber .50, Browning, M2, Heavy Barrel (Flexible); Gun, Machine, Caliber .50, Tank, M85
Ballistic Perf.:
Velocity: 2910 ±30 fps at 78 feet
Pressure: 55,000 psi, max. avg.
Accuracy: 12″mean radius max. avg. at 600 yards

Incen. Fl.:	Incendiary flash must be capable of initiating combustion of flammable liquids
Penetrat.:	Bullet or core must completely perforate ?/‴ armor plate at 100 yards
Cartridge:	1764.5 - 78.5 grs.
Bullet:	662.5 - 27 grs.
Primer Perc.:	
Prim. Wt:	18.5 grs. approx.
Propellant:	
Brand:	WC 860 / IMR 5010
Type:	Double Base Spheroidal / Single Base Tubular
Weight:	233 grs. / 233 grs.
Point Ident.:	Aluminum

Cartridge, Armor Piercing Incendiary, Cal .50, M8, Steel Case

Same as Cartridge, Cal .50, Armor-Piercing Incendiary, M8 except:

Case:	Steel, 800 - 50 grs.

Cartridge, Cal .50, Tracer, M10

Weapon:	Gun, Machine, Caliber .50, Browning, M2 Heavy Barrel (Turret Type); Gun, Machine, Caliber .50, Browning, M2 Heavy Barrel (Flexible); Gun, Machine, Caliber .50, Tank, M85
Ballistic Perf.:	
Velocity:	2860 ±40 fps at 78 feet
Pressure:	54,000 psi, max. avg.
Trace:	Bright trace from 225 to 1600 yards
Cartridge:	1752 - 68 grs.
Bullet:	643 - 17 grs.
Tracer:	65 grs.
Ignit.:	11 grs.
Primer Perc.:	
Prim. Wt:	18.5 grs.
Propellant:	
Brand:	IMR 5010
Type:	Single Base, Tubular
Weight:	240 grs.
Point Ident.:	Orange tip

Cartridge, Cal .50, Tracer, M17

Weapon:	Gun, Machine, Caliber .50, Browning, M2 Heavy Barrel (Turret Type); Gun, Machine, Caliber .50, Browning, M2 Heavy Barrel (Flexible); Gun, Machine, Caliber .50, Tank, M85
Ballistic Perf.:	
Velocity:	2860 ±40 fps at 78 feet
Pressure:	54,000 psi, max. avg.
Trace:	Bright trace from 100 to 1600 yards
Cartridge:	1737 - 68 grs.
Bullet:	643 - 17 grs.
Ignit.:	11 grs.
Tracer:	40 grs.
Primer Perc.:	
Prim. Wt:	18.5 grs.
Propellant:	
Brand:	IMR 5010
Type:	Single Base, Tubular
Weight:	225 grs.
Point Ident.:	Brown tip

Cartridge, Cal .50, Armor-Piercing, Incendiary, Tracer, M20

Weapon:	Gun, Machine, Caliber .50, Browning, M2 Heavy Barrel (Turret Type); Gun, Machine, Caliber .50, Browning, M2 Heavy Barrel (Flexible); Gun, Machine, Caliber .50, Tank, M85
Ballistic Perf.:	
Pressure:	55,000 psi
Incend. Fl.:	Incendiary flash must be capable of initiating combustion of flammable liquids
Penetra.:	Bullet or core must completely penetrate 7/8″ armor plate at 100 yards
Trace:	Must exhibit visible trace from 100 to 1600 yards
Cartridge:	1718 - 76.5 grs.
Bullet:	619 - 25 grs.
Primer Perc.:	
Prim. Wt:	18.5 grs.
Propellant:	
Brand:	IMR 5010
Type:	Single Base, Tubular
Weight:	230 grs.
Point Ident.:	Red tip, aluminum

Cartridge, Armor Piercing Incendiary, Tracer Cal .50, M20, Steel Case

Same as Cartridge, Cal .50, Armor-Piercing, Incindiary, Tracer, M20 except:

Case:	Steel, 800 - 50 grs.

Cartridge, Cal .50, Tracer, Headlight, M21

Weapon:	Gun, Machine, Caliber .50, Browning, M2 Heavy Barrel (Turret Type); Gun, Machine, Cal .50, Browning, M2 Heavy Barrel (Flexible); Gun, Machine, Cal .50, Tank, M85
Ballistic Perf.:	
Velocity:	2840 ±40 fps at 78 feet
Pressure:	55,000 psi, max. avg.
Trace:	Bright trace from 200 to 500 yards
Cartridge:	1808 - 68 grs. (with gilding metal jacket bullet) 1775 - 68 grs. (with gilding metal clad steel jacket bullet)
Case:	850-50grs.
Bullet:	699 - 17 grs. (with gilding metal jacket); 666 - 17 grs. (with gilding metal clad steel jacket)
Primer Perc.:	
Prim. Wt:	18.5 grs. approx.
Propellant:	
Brand:	IMR 5010
Type:	Single Base, Tubular
Weight:	240 grs.
Point Ident.:	Red tip

Cartridge, Cal .50, Incendiary, M23

Weapon:	Gun, Machine, Caliber .50 Browning, M2 Heavy Barrel (Turret Type); Gun, Machine, Cal .50, Browning, M2 Heavy Barrel (Flexible); Gun, Machine, Cal .50, Tank, M85
Ballistic Perf.:	
Velocity:	3400 ±30 fps at 78 feet
Pressure:	58,000 psi, max. avg.
Incend. Fl.	Incendiary flash must be capable of initiating combustion of flammable liquids
Cartridge:	1581 grs. approx.
Case:	850 - 50 grs.
Bullet:	512 - 24 grs.
Incen.:	90 grs. Max.
Primer Perc.:	
Prim. Wt:	18.5 grs. approx.
Propellant;	
Brand:	IMR 4831
Type:	Single Base, Tubular
Weight:	237 grs. approx.
Point Ident.:	Medium blue tip, slight blue annulus

Cartridge, Cal .50, Ball, M33

Weapon:	Gun, Machine, Caliber .50 Browning, M2, Heavy Barrel (Turret Type); Gun Machine, Caliber .50, Browning, M2, HeavyBarrel (Flexible); Gun, Machine, Caliber .50, Tank, M85

Ballistic Perf.:
Velocity: 2910 30 fps at 78 feet
Pressure: 55,000 psi, max. avg.
Cartridge: 1762.5 - 76.5 grs.
Case 850 - 5Ogrs.
Bullet: 661.5 - 25 grs.
Primer Perc.:
Prim. Wt: 18.5 grs.
Propellant:

Brand:	WC860	IMR5010
Type:	Double Base Spheroidal	Single Base Tubular
Weight:	235 grs.	235 grs.

Ident.: Plain tip

Cartridge, Cal .50, Spotter-Tracer, M48

Weapon: Rifle, Spotting, Caliber .50, M8C
Ballistic Perf.:
Velocity: 1850 20 fps at 78 feet
Accuracy: 10″ mean radius at 600 yards
Trace: Bright trace from 100 to 1500 yards
Pressure: 35,000 psi max. avg.
Spotting: Must flash and produce smoke upon impact
Cartridge: 1651 grs.
Bullet: 827 - 18 grs.
Primer M26:
Primer Perc.:
Prim. Wt: 18.5 grs. approx.
Propellant:
Brand: IMR 4831
Type: Single Base, Tubular
Weight: 120 grs.
Point Ident. Yellow tip, red annulus

Cartridge, Cal .50, Spotter-Tracer, M48A1

Weapon: Rifle, Spotting, Caliber .50, M8C
Ballistic Perf.:
Velocity: 1745 20 fps at 78 feet
Trace: Bright trace from 100 to 1500 yards
Pressure 38,000 psi max. avg.
Impact: Must flash and produce smoke upon impact against steel plate at 175 yards
Cartridge: 1744 - 71 grs. (with GMCS flash tube or steel flash tube), 1714 - 71 grs. (with Al—alloy flash tube)
Case: 740 - 50 grs.
Bullet: 827 - 18 grs.
Primer Perc.:
Primer Wt: 18.5 grs. approx.
Propellant:
Type: Single Base, Tubular
Weight: 110 grs.
Point Ident. Yellow tip, red annulus

Cartridge, Cal .50, Spotter-Tracer, M48A2

Weapon: Rifle, Spotting, Caliber .50, M8C
Ballistic Perf.:
Velocity: 1745 20 fps at 78 feet
Pressure: 38,000 psi max. avg.
Cartridge: 1744 - 71 grs. (with GMCS flash tube or steel flash tube); 1714 - 71 grs. (with Al—alloy flash tube)
Case: 740 - 50 grs.
Bullet: 828 - 18 grs.
Primer Perc.:
Prim. Wt: 18.5 grs. approx.
Propellant: 110 grs. approx.
Type: Single Base, Tubular
Point Ident.: Yellow tip, red annulus

Dummy Cartridge, Cal .50, Inert Loaded, XM176

Weapon: All caliber .50 weapons
Ballistic Perf.: None
Cartridge: 1752 - 82 grs.
Bullet: 661.5 - 27 grs.
Primer: No primer
Inert Prop. Sodium Carbonate—Monohydrate, 5 grs.
Ident.: Cartridge coated with black chemical finish

Cartridge, Cal .50, Practice, T249E2

Weapon: Rifle, Spotting, Caliber .50, M8C
Ballistic Perf.:
Velocity: 1745 20 fps at 78 feet
Pressure: 38,000 max. avg.
Accuracy: 5″ mean radius at 600 yards
Cartridge: 1738 - 61 grs. (with GMCS or steel flash tube); 1708 - 61 grs. (with Al—alloy Flash Tube)
Bullet: 817 4 grs.
Primer Perc.:
Prim. Wt: 18.5 grs. approx.
Propellant;
Brand: IMR 7383
Type: Single Base, Tubular
Weight: 110 grs. approx.
Point Ident.: Green tip

Cartridge, Cal .50, Armor Piercing Incendiary, T49

Weapon: Gun, Machine, Caliber .50, Browning, M2 Heavy Bane] (Turret Type); Gun, Machine, Caliber .50, Browning, M2, Heavy Barrel (Flexible); Gun, Machine, Caliber .50, Tank, M85
Ballistic Perf.:
Velocity: 3400 30 fps at 78 feet
Pressure: 58,000 psi, max. avg.
Accuracy: 10″ mean radius at 600 yards
Cartridge: 1597 grs. approx.
Bullet: 501 grs.
Primer Perc.:
Prim. Wt: 18.5 grs.
Propellant:
Brand: WC 860
Weight: 252 grs.
Type: Double Base, Spheroidal
Point Ident.: Blue tip, silver annulus

Cartridge, Caliber .50, Test, High Pressure, T251

Weapon: Rifle, Spotting, Caliber .50, M8C
Ballistic Perf.:
Pressure 55,000 psi, max. avg.
Cartridge: 1902 - 50 grs.
Case: 740 - 50 grs.
Bullet: 999-11 grs.
Primer Perc.:
Primer Wt: 18.5 grs. approx.
Propellant:
Brand: IMR 4831
Type: Single Base Tubular
Weight: 142 grs.
Ident.: Stannic Stained Case

20 MM AMMUNITION

Dummy Cartridge, Caliber 20mm, M51A1B1

Weapon: Guns, Automatic, 20mm, M39, M61, XM168 and GAU-4 (XM130)
Requmts: Projectile extraction: The cartridge assembly shall withstand a 3900 pound tension force without separation of the projectile from the cartridge case.
Cartridge: 3850 grains, min.
Bullet: Steel, 1520 30 grains
Ident.: Cartridge chromate finish, marking opaque, color black

Cartridge, 20mm Armor Piercing Incendiary Tracer, M52E1 (USAF)

Weapon: Gun, Automatic, 20mm, M39, M61 and GAU-4 (XM130)

Ballistic Perf.: (Single shot—test barrel)
Velocity: 3380 ±50 fps at 78 feet
Pressure: Not to exceed 60,500 psi
Accuracy: 15 inches mean radius—600 yards
Cartridge: 3900 grains approx.
Case: M103, Brass
Prim. Elec: 22 grs.
Propellant: WC 870, weight to meet ballistic requirements
Projectile: 1530 grains approx. Rotating
Blank: 133 grains approx. Gilding Metal
Ident.: Projectile black and red—marking opaque; color Orange

Cartridge, 20mm, Armor Piercing Incendiary, M53 (USAF)

Weapon: Guns, Automatic, 20mm, M39, M61 and GAU-4 (XM 130)
Ballistic Perf.: Single shot—test barrel
Velocity: 3380 "50 fps at 78 feet
Pressure: Not to exceed 60,500 psi
Accuracy: 15 inches mean radius max. avg. at 600 yards
Cartridge: 3980 grains approx.
Case: 2150 grs.
Prim. Elec: 22 grs.
Propellant: WC 870, weight to meet ballistic requirements
Projectile: 1540 35 grs. Rotating
Blank: 133 grains approx., Gilding Metal
Nose: 100 grains approx., Aluminum Alloy
Ident.: Projectile black and band, red marking, opaque color red

Cartridge, 20mm, High Pressure Test, M54A1 (USAF)

Weapon: For use in Proofing Guns, Automatic, 20mm, M39, M61, XM168 and GAU-4 (XM130)
Ballistic Perf.:
Pressure: Shall equal or exceed 62,500 psi and shall not exceed 72,500 psi
Cartridge: 4392 grains approx.
Case: M103, Brass, 2150 grs.
Prim. Elec.: 22 grs.
Propellant: WC 870 or IMR 7013. Weight to meet ballistic requirements
Projectile: 1965 10 grains
Ident.: Projectile, Purple marking, black opaque

Cartridge, 20mm, Target Practice, M55A2 (USAF)

Weapon: Guns, Automatic, 20mm, M39, M61, and XM168 and GAU-4 (XM130)
Ballistic Perf.: (Single shot-test barrel)
Velocity: 3380 ±50 fps at 78 feet
Pressure: Not to exceed 60,500 psi
Accuracy: 15 inches mean radius, max. avg. at 600 yards
Cartridge: 3935 grains approx.
Case: 2150 grs.
Prim. Elec.: 22 grs.
Propellant: WC 870, weight to meet ballistic requirements
Projectile: 1521 30 grs.
Ident.: Projectile, Blue, opaque black marking

Cartridge, 20mm, High Explosive Incendiary, M6A3 (USAF)

Weapon: Guns, Automatic, 20mm, M39, M61, and GAU-4 (XM130)
Ballistic Perf.: (Single shot—test barrel)
Velocity: 3380 "50 fps at 78 feet
Pressure: Not to exceed 60,500 psi
Accuracy: 15 inches mean radius at 600 yards
Function: The projectile shall function with high order detonation upon impact.
Cartridge: 2965 grs. approx.
Case: Brass, 2150 grs.
Prim. Elec.: 22 grs.
Propellant: WC 870, weight to meet ballistic requirements
Projectile: 1565 grs. approx.
Charged Proj.: 1230 grs.approx.
Charge: 165 grs. min.
Rotating
Blank: 133 grs. approx. (Gilding Metal)
Ident.: Projectile-yellow—black opaque marking

Cartridge, 20mm, High Explosive Incendiary, M97A2 (USAF)

Weapon: Guns, Automatic, 20mm, M24 and M24A1
Ballistic Perf.: (Single shot—test barrel)
Velocity: 2680 ±50 fps at 78 feet
Pressure: Shall not exceed 51,000 psi
Accuracy: 15 inches mean radius at 600 yards
Function: Projectile shall detonate high order on impact with the target plate.
Cartridge: 4000 grs. approx.
Case: Brass, 1520 grs.
Prim. Elec.: 22 grs.
Propellant: IMR 7013, WC 875-weight to meet ballistic requirements
Projectile: HEI-2000 40 grs.
Fuze: Point Detonating
Ident.: Projectile yellow, marking black opaque

Cartridge, 20mm, Target Practice, M99A1 (USAF)

Weapon: Guns, Automatic, 20mm, M24 and M24A1
Ballistic Perf.: (Single shot—test barrel)
Velocity: 2680 ±50 fps at 78 feet
Pressure: Shall not exceed 51,000 psi
Accuracy: 15 inches mean radius at 600 yards
Cartridge: 4000 grs. approx.
Case: Brass, 1520 grs.
Prim. Elec.: 22 grs.
Projectile: 2000 35 grs.
Ident.: Projectile blue, marking black opaque

Cartridge, 20mm, Target Practice, M204

Weapon: Gun, Automatic, 20mm, M3
Ballistic Perf.: (Single shot—test barrel)
Velocity: 2680 ±50 fps at 78 feet
Pressure: Shall not exceed 51,000 psi
Accuracy: 15 inches mean radius at 600 yards
Cartridge: 4000 grs. approx.
Case: Brass, 1520 grs.
Prim. Perc.: 26 grs.
Propellant: 4814, IMR 7013 or WC 875—Weight to meet ballistic requirements
Projectile: TP, M99A1—2000 - 35 grs.
Ident.: Projectile blue, marking black opaque

Cartridge, 20mm, Target Practice—Tracer, M206

Weapon: Gun, 20mm, Automatic Gas Operated, Manual or Electric Fired, M139
Ballistic Perf.:
Velocity: 3460 ±50 fps at muzzle
Pressure: 49,500 psi max. avg.
Cartridge: 317 Grams approx.
Case: 134 5.8 Grams, Steel
Primed: 145 Grams
Primer Perc.: 10 Grams
Propellant: 50 Grams, approx.
Projectile: 120 2 Grams
Ident.: Projectile blue, red T's, black letters

Cartridge, 20mm, Target Practice—Tracer, M206E1

Weapon: Gun, 20mm, Automatic Gas Operated, Manual or Electric Fired, M139
Ballistic Perf.:
Velocity: 3460 ±50 fps
Pressure: 49,500 psi max. avg.
Cartridge:
Primer Perc.: 29 grs.
Ident.: Projectile blue, red T's, black letters

Cartridge, 20mm, High Explosive Incendiary M210

Weapon: Gun, Automatic, 20mm, M3
Ballistic Perf.:
Velocity: 2680 ±50 fps at 78 ft.
Pressure: Shall not exceed 51,000 psi
Cartridge: 4000 grains approx.
Case: Brass—1520 grs.
Primer Perc.: 26 grs.
Propellant: IMR 7013,4815 or WC 875; Weight to meet ballistic requirements
Projectile: 2000 40 grains

Cartridge, 20mm, Armor Piercing Incendiary—Tracer, M601

Weapon: Gun, 20mm, Automatic, Gas operated, Man ual or Electric Fired, M139
Ballistic Perf.:
Velocity: 3610 ±50 fps
Pressure: 49,500 psi max. avg.
Cartridge: 310 grains
Case: 134 5.8 Grams, Steel
Primed: 145 Grams
Primer Perc. 10 Grams
Propellant: 53 Grams, approx.
Projectile: 111 2 Grams
Ident.: Projectile black, orange T's, red tip and white letters

Cartridge, 20mm, Armor Piercing Incendiary—Tracer, M601E1

Weapon: Gun, 20mm, Automatic, Gas operated, Manual or Electric Fired, M139
Ballistic Perf.:
Velocity: 3610 ±50 fps
Pressure: 49,500 psi max. avg.
Cartridge:
Primer Perc.: 29 grs.
Propellant: To meet ballistic requirements
Projectile: 112.5 Grams
Ident.: Projectile black, orange T's, red tip and white letters

Cartridge, 20mm, High Pressure Test, MK101 Mod O (USN)

Weapon: Gun, 20mm, chambered to fire MK100 series 20mm ammunition
Ballistic Perf.:
Pressure: Not to exceed 72,500 psi
Cartridge: 4285 50 grs.
Case: 1880 grs. (Steel)
Prim. Elec.: 22 grs.
Propellant: Tubular or ball, nitrocellulose, weight to meet ballistic requirements
Projectile: 1700 grs., inert
Ident.: Green or blue projectile with brown nose and ¼"black letters reading "High Pressure Test Round"

Cartridge, 20mm, Low Pressure Test, MK102 Mod O (USN)

Weapon: Gun, 20mm, chambered to fire MK100 series ammunition
Ballistic Perf.:
Pressure:
Cartridge: 4285 50 grs.
Case: 1880 grs. (Steel)
Prim. Elec.: 22 grs.
Propellant: Tubular or ball, nitrocellulose, weight to meet ballistic requirements
Projectile: 1700 grs., inert
Ident.: Blue or green projectile with brown nose and ¼"black letters reading "Low Pressure Test Round"

Cartridge, 20mm, Dummy, MK103 Mod O (USN)

Inert round. Has empty primer pocket and holes in case; or when made up from rejected service case, has primer pocket plugged with brass or empty primer cup staked with three equally spaced crimps. Case may be empty or loaded with inert material. Projectile is usually brass or bronze plated.

Cartridge, 20mm, Target Practice, MK105 Mod O (USN)

Weapon: Guns, Automatic, 20mm, MK11 and MK12
Ballistic Perf.: (Single shot—test barrel)
Velocity: 3350 fps at muzzle
Pressure: 60,000 psi
Accuracy: 15 inch mean radius at 600 yards
Cartridge: 4285 50 grs.
Case: 1880 grs. (Steel) 20mm, MK5 Mod O
Prim. Elec.: 22 grs., MK47 Mod O
Propellant: Tubular or ball, nitrocellulose, 650 grs. approx.
Projectile: 1700 grs., inert
Ident.: Green or blue projectile with black lettering or blue projectile with brown nose and black lettering

Cartridge, 20mm, High Explosive Incendiary MK106 Mod O and 1 (USN)

Weapon: Guns, Automatic, 20mm, MK11 and MK12
Ballistic Perf.: (Single shot—test barrel)
Velocity: 3350 fps at muzzle
Pressure: 60,000 psi
Accuracy: 15-inch mean radius at 600 yards
Cartridge: 4285 50 grs.
Case: 1880 grs. (Steel) 20mm, MK5 Mod O
Prim. Elec.: 22 grs., MK47 Mod O
Propellant: Tubular or ball, nitrocellulose, 650 grs. approx.
Projectile: 1700 50 grs., Impact detonating
Ident.: Unpainted fuze, red and yellow projectile

Cartridge, 20mm, Armor Piercing-Incendiary, MK107 Mod O (USN)

Weapon: Guns, Automatic, 20mm, MK11 and MK12
Ballistic Perf.: (Single shot—test barrel)
Velocity: 3350 fps at muzzle
Pressure: 60,000 psi
Accuracy: 15 inch mean radius at 600 yards
Cartridge: 4285 50 grs.
Case: 1880 grs. (Steel) 20mm, MK5 Mod O
Prim. Elec.: 22 grs., MK47 Mod O
Projectile: 1700 50 grs.
Ident.: No fuze. Nose of projectile blue or brown with red band. Body of projectile black with white lettering

Cartridge, 20mm, Armor Piercing-Tracer, MK108 Mod O (USN)

Weapon: Guns, Automatic, 20mm, MK11 and MK12
Ballistic Perf.: (Single shot—test barrel)
Velocity: 3350 fps at muzzle
Pressure: 60,000 psi
Accuracy: 15 inch mean radius at 600 yards
Cartridge: 4285 50 grs.
Case: 1880 grs. (Steel) 20mm, MK5 Mod O
Projectile: 1700 50 grs.
Ident.: No fuze. Hollow windshield. Brown or yellow nose, black projectile body with white lettering

Designation	Description
M1	Cartridge, Ball, Carbine, Caliber .30
M1	Cartridge, Blank, Caliber .50 (T40)
M1	Cartridge, Incendiary, Caliber .50
M1	Cartridge, Test, High Pressure, Caliber .50
M1	Cartridge Test, High Pressure, Caliber .45
M1	Cartridge Test, High Pressure, Caliber .30
M1	Cartridge, Tracer, Caliber .30
M1	Cartridge, Tracer, Caliber .50 (AN-MI)
M1E1	Cartridge, Incendiary, Caliber .50 (M1 loaded to 3100 f/s)
M1911	Cartridge, Ball, Caliber .45
M1911	Cartridge, Ball, Match Grade, Caliber .45
M1909	Cartridge, Blank, Caliber .30
M1921	Cartridge, Dummy, Caliber .45
M2	Cartridge, AP, Caliber .50
M2	Cartridge, AP, Caliber .30
M2	Cartridge, Ball, Caliber .50 (AN-M2)
M2	Cartridge, Ball, Caliber .30
M2	Cartridge Dummy, Caliber .50
M2	Cartridge, 12 Gage
M3	Cartridge, Grenade, Rifle, Caliber .30
M3	Cartridge, Igniter, Caliber .38 (for Igniter, Grenade, Frangible M3
M6	Cartridge, Grenade Carbine, Caliber .30 (T6)
M7	Cartridge, Grenade, Auxiliary (T18)
M8	Cartridge, Armor-Piercing-Incendiary, Caliber .50 (T16)
M8E1	Cartridge, Armor-Piercing Incendiary, Caliber .50, Loaded with Double Base Powder to a Higher Velocity
M9	Cartridge, Blank, Caliber .45 (T31)
M10	Cartridge, Tracer, Caliber .50 (T12)
M10E1	Cartridge, Tracer, Caliber .50, Loaded to an Increased Velocity with Double Base Powder
M12	Cartridge, Shot, Caliber .45 (T23)
M13	Cartridge, Dummy, Carbine, Caliber .30
M14	Cartridge, Armor-Piercing-Incendiary, Caliber .30 (T15)
M14A1	Cartridge, Armor-Piercing-Incendiary, Caliber .30 (T15 with T1E48 Bullet)
M15	Cartridge, Shot, Caliber .45 (T29)
M16	Cartridge, Tracer, Carbine, Caliber .30 (T24)
M17	Cartridge, Tracer, Caliber .50 (T9)
M18	Cartridge, High Pressure Test, Carbine, Caliber .30 (T27)
M19	Shell, Shot Gun (All Brass), 12 Gage - 00 Buck
M20	Cartridge, Armor-Piercing-Incendiary-Tracer, Caliber .50 (T28)
M21	Cartridge, Tracer, Headlight, Caliber .50 (T1E1)
M22	Cartridge, Ball, Frangible, Caliber .30 (T44)
M23	Cartridge, Incendiary, Caliber .50 (T48)
M24	Cartridge, Ball, Caliber .22, Long Rifle (T42)
M25	Cartridge, Tracer, Caliber .30 (T10)
M26	Cartridge, Tracer, Caliber .45 (T30)
M27	Cartridge, Tracer, Carbine, Caliber .30 (T43)
M32	Cartridge, Blank, Line Throwing, Caliber .45 (T124)
M33	Cartridge, Ball, Caliber .50 (T122)
M33E1	Cartridge, Ball, Caliber .50
M33E2	Cartridge, Ball, Caliber .50
M35	Shell, Shot Gun .410 (T135)
M39	Cartridge, Ball, Caliber .22 (Hornet) (T200)
M40	Cartridge, Dummy, Caliber .30
M41	Cartridge, Ball, Caliber .38, Special
M48	Cartridge, Spotter-Tracer, Caliber .50 (T189E1)
M48A1	Cartridge, Spotter-Tracer, Caliber .50 (T189E3)
M48A1E1	Cartridge, Spotter-Tracer
M51	Cartridge, Dummy, 20mm
M51E3	Cartridge, Dummy, 20mm
M51E5	Cartridge, Dummy, 20mm (T272E4)
M51E6	Cartridge, Dummy, 20mm
M52	Cartridge, Armor-Piercing, Incendiary Tracer, 20mm (T230)
M53	Cartridge, Armor-Piercing Incendiary, 20mm (T221E3)
M54	Cartridge, High Pressure Test, 20mm
M55	Cartridge, Ball, 20mm (T199E1)
M56	Cartridge, High Explosive Incendiary, 20mm(T198E1)
M58	Cartridge, High Explosive Incendiary, 20mm(T241)
M59	Cartridge, 7.62mm, NATO, Ball (T104E2)
M60	Cartridge, 7.62mm, NATO, High Pressure Test(T17E1)
M61	Cartridge, 7.62mm, NATO, Armor-Piercing (T93E2)
M62	Cartridge, 7.62mm, NATO, Tracer (T102E2)
M62	Cartridge, 7.62mm, NATO, Tracer (Overhead Fire Application)
M63	Cartridge, 7.62mm, NATO, Dummy (T70E5)
M64	Cartridge, 7.62mm, NATO, Grenade, Rifle (T116E1)
M65	Cartridge, Ball, Caliber .22 Hornet (T200E1)
M72	Cartridge, Match, Caliber .30 (T291)
M80	Cartridge, 7.62mm, NATO, Ball, (T233)
M80	Cartridge, 7.62mm, NATO, Ball, (Overhead Fire Application)
M80E1	Cartridge, 7.62mm, NATO, Ball (Canadian C1)
M82	Cartridge, 7.62mm, NATO, Blank
M95	Cartridge, Armor-Piercing Tracer, 20mm
M96	Cartridge, Incendiary, 20mm
M97E2	Cartridge, High Explosive Incendiary, 20mm
M97A1	Cartridge, High Explosive Incendiary, 20mm
M99A1	Cartridge, Target Practice, 20mm
M118	Cartridge, 7.62 Match
M160	Cartridge, 7.62mm, Ball, Frangible
M172	Cartridge, Dummy, 7.62mm (Inert Loaded)
M181	Cartridge, 14.5mm (with fuze sec) Tracer Low Charge
M182	Cartridge, 14.5mm (with fuze 6 sec) Used with M3l Field
M183	Cartridge, 14.5mm (with fuze PD) Used with M31 Field
M193	Cartridge, 5.56mm Ball
M196	Cartridge, 5.56mm Tracer
M197	Cartridge, 5.56mm High Pressure Test
M198	Cartridge, 7.62mm Ball Duplex
M199	Cartridge, Dummy 5.56mm
M200	Cartridge, 5.56mm Blank
M204	Cartridge, 20mm Target Practice
M206E1	Cartridge, 20mm Target Practice Tracer
M210	Cartridge, 20mm High Explosive Incendiary
M274	Cartridge, 12 Gage Shotgun, No. 4, Hard Chilled Shot
M601El	Cartridge, 20mm Armor Piercing Incendiary Tracer
M855A1	Cartridge, 5.56mm, Ball
M856A1	Cartridge, 5.56mm, Tracer
M857	Cartridge, 5.56mm, Dummy
M882	Cartridge, 9mm, Ball
M905	Cartridge, 9mm, High Pressure Test
M917	Cartridge, 9mm, Dummy
M939	Cartridge, 9mm, Practice Tracer
M852	Cartridge, 7.62mm, Match

EXPERIMENTAL (XM) SERIES U.S. MILITARY CARTRIDGES

XM75	Cartridge, Spotter, 10mm
XM101	Cartridge, Spotting, 20mm
XM106	Cartridge, Practice, 20mm
XM107	Cartridge, High Pressure, 20mm
XM108	Cartridge, Spotter, 15mm
XM108E1	Cartridge, Spotter, 15mm
XM115	Cartridge, 7.62mm, Ball
XM142	Cartridge, Caliber .38 Special, Ball
XM147	Dummy Cartridge, 20mm
XM156	Cartridge, Caliber .50 Spotter-Tracer
XM157	Cartridge, Spotter-Tracer, 15mm
XM162	Cartridge, 12 Gage Shotgun; Plastic #00 Buckshot
XM170	Cartridge, Ball, 15mm
XM171	Cartridge, High Presure Test, 15mm
XM176	Dummy Cartridge, Cal. .50, Inert Loaded
XM177	Dummy Cartridge, 15mm
XM178	Cartridge, 7.62mm, Ball, Overhead Fire
XM179	Cartridge, 7.62mm, Tracer, Overhead Fire
XM180	Cartridge, 7.62mm, Tracer, Overhead Fire
XM192	Cartridge, 7.62mm Blank (Short Case)
XM195	Cartridge, 5.56mm, Grenade
XM202	Cartridge, 8.94mm Select
XM205	Cartridge, 20mm High Explosive Incendiary
XM207	Cartridge, 20mm Armor Piercing
XM220	Cartridge, 20mm Target Practice Tracer
XM232	Dummy Cartridge, 5.56mm Inert Loaded
XM239	Cartridge, 20mm High Pressure Test
XM240	Dummy Cartridge, 20mm
XM242	Cartridge, 20mm High Explosive Incendiary Tracer
XM243	Cartridge, 20mm High Explosive Incendiary Tracer
XM244	Cartridge, 20mm High Explosive Incendiary Tracer
XM246E3	Cartridge, 20mm High Explosive Incendiary Tracer
XM254	Dummy Cartridge, 20mm, Plastic
XM257	Cartridge, Shotshell, 12 Gage No. 4B Special

Designation	Description
XM552	Cartridge, 20mm Heat Dual Purpose
XM554	Cartridge, 30mm Practice
XM599	Cartridge, 20mm High Explosive Incendiary Tracer

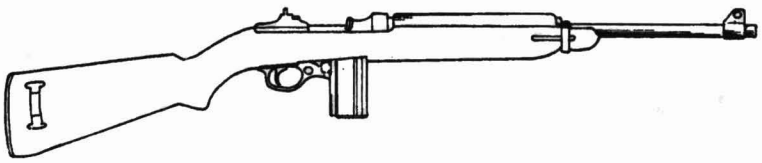
EXPERIMENTAL (T) SERIES U.S. MILITARY CARTRIDGES

T1	Cartridge, Explosive, Caliber .50
T1	Cartridge, Armor-Piercing, Caliber. 276
T1	Cartridge, Tracer, Caliber .30
T1E1	Cartridge, Tracer, Headlight, Caliber .50 (M21)
T1E2	Cartridge, Tracer, Headlight, Caliber .50
T5	Cartridge, Armor-Piercing, Anti-Tank, Caliber .30
T6	Cartridge, Grenade, Carbine, Caliber .30 (M6)
T7	Cartridge, Grenade, Carbine, Caliber .30 (Long Case)
T8	Cartridge, Tracer, Caliber .50 - 1000 yds.
T9	Cartridge, Tracer, Caliber .50 - 2500 yds. (M17)
T10	Cartridge, Tracer, Night, Caliber .30 (Dim Igniter) (M25)
T12	Cartridge, Tracer, Caliber .50 (M10)
T13	Cartridge, Tracer, Caliber .30 Delay
T14	Cartridge, Tracer, Caliber .50
T15	Cartridge, Armor-Piercing-Incendiary, Caliber .30 (M14)
T15E1	Cartridge, Armor-PiercingIncendiary Caliber .30
T16	Cartridge, Armor-Piercing-Incendiary, Caliber.50 (M8)
TI7	Cartridge, Tracer, Caliber .30 (Clad Steel Jacketed for Improved Accuracy)
T18	Cartridge, Auxiliary, Grenade (M7)
T19	Cartridge, Explosive, Caliber .60
T19E1	Cartridge, Explosive, Caliber .60
T19E2	Cartridge, Explosive, Caliber .60
T19E3	Cartridge, Explosive, Caliber. 60
T19E4	Cartridge, Explosive, Caliber .60
T20	Cartridge, Tracer, Caliber .50 (Spot) 500 yds.
T21	Cartridge, Tracer, Caliber .50 (Spot) 1000 yds.
T22	Cartridge, Ball, Caliber .30 with Steel Case (M2 Alternate)
T23	Cartridge, Shot, Caliber .45 (M12)
T24	Cartridge, Tracer, Carbine, Caliber .30 (M16)
T25	Cartridge, Ball, Caliber .50 with Steel Case (M2 Alternate)
T26	Cartridge, Igniter, Caliber .38 (Component for Igniter, Grenade, Frangible, M3)
T27	Cartridge, Carbine, High Pressure Test, Caliber .30 (M18)
T28	Cartridge, Armor-Piercing-Incendiary-Tracer, Caliber .50 (M20)
T28E1	Cartridge, Armor-Piercing-Incendiary-Tracer, Caliber .50 (Dim Igniter)
T29	Cartridge, Shot, Caliber .45 (M15)
T30	Cartridge, Tracer, Caliber .45 (M26)
T31	Cartridge, Blank, Caliber .45 (M9)
T32	Cartridge, Ball, Caliber .60-1196 grain bullet
T32E1	Cartridge, Ball, Caliber .60 - 1137 grain bullet
T32E2	Cartridge, Ball, Caliber .60
T33	Cartridge, High Pressure Test, Caliber .60
T33E1	Cartridge, High Pressure Test, Caliber .60 (T33 with M36A1 Primer)
T34	Cartridge, High Explosive Incendiary, Caliber .50
T35	Cartridge, Dummy, Caliber .60
T35E1	Cartridge, Dummy, Caliber .60
T36	Cartridge, Incendiary, Caliber .60
T36E1	Cartridge, Incendiary, Caliber .60
T36E2	Cartridge, Incendiary, Caliber .60 (With #28 Primer)
T36E3	Cartridge, Incendiary, Caliber .60 (T36E2 with M36A1 Percussion Primer)
T37	Cartridge, Tracer, Caliber .50 with trajectory to match 3.5 inch Forward Firing Rocket
T38	Cartridge, Armor-Piercing-Tracer, Caliber .50
T38E1	Cartridge, Armor-Piercing-Incendiary, Caliber .50
T39	Cartridge, Armor-Piercing-Incendiary, Caliber .60
T39E1	Cartridge, Armor-Piercing-Incendiary, Caliber .60 (T39 with M36A1 Percussion Primer)
T39E2	Cartridge, Armor-Piercing-Incendiary, Caliber .60
T39E3	Cartridge, Armor-Piercing-Incendiary, Caliber .60
T39E4	Cartridge, Armor-Piercing-Incendiary, Caliber .60
T39E5	Cartridge, Armor-Piercing-Incendiary, Caliber .60
T39E6	Cartridge, Armor-Piercing-Incendiary, Caliber .60
T40	Cartridge, Blank, Caliber .50 (M1)
T41	Cartridge, Incendiary, High Velocity, Caliber .60
T41E1	Cartridge, Incendiary, High Velocity, Caliber .60
T42	Cartridge, Ball, Caliber .22, Long Rifle Jacketed Bullet (M24)
T43	Cartridge, Tracer, Carbine, Caliber .30 (M27)
T44	Cartridge, Ball, Frangible, Caliber .30 (M22)
T44E1	Cartridge, Ball, Frangible, Caliber .30
T45	Cartridge, Armor-Piercing, Caliber .60
T45E1	Cartridge, Armor-Piercing, Caliber .60
T46	Cartridge, Armor-Piercing-Tracer, Caliber .60
T46E1	Cartridge, Armor-Piercing-Tracer, Caliber .60
T47	Cartridge, High Explosive, Incendiary, Caliber .60
T48	Cartridge, Incendiary, Caliber .50 (500 grain bullet) M23
T48E1	Cartridge, Incendiary, Caliber .50 (500 grain bullet)
T48E2	Cartridge, Incendiary, Caliber .50 (500 grain bullet)
T49	Cartridge, Armor-Piercing-Incendiary, Caliber .50 (500 grain bullet)
T50	Cartridge, Incendiary, Caliber .60 - .50
T51	Cartridge, Armor-Piercing-Incendiary, Caliber .60-.50
T52	Cartridge, Tracer, Caliber .60 - .50
T53	Cartridge, Tracer, Caliber .30
T54	Cartridge, Tracer, Caliber .50
T55	Cartridge, Tracer, Caliber .60
T56	Cartridge, Blank, Caliber .50 with Electric Primer
T57	Cartridge, Grenade, Auxiliary, High Pressure Test
T58	Cartridge, Incendiary, Caliber .50 (White Phosphorus Loading)
T59	Cartridge, Carbine, Spotting, Caliber .30
T60	Cartridge, Armor-Piercing-Incendiary-Tracer, Caliber .60
T60E1	Cartridge, Armor-Piercing-Incendiary-Tracer, Caliber .60 (T60 with M36A1 Percussion Primer)
T61	Cartridge, Antenna Erecting
T62	Cartridge, Armor-Piercing, Carbine, Caliber .30
T63	Cartridge, Armor-Piercing-Incendiary-Tracer, Caliber .50 (500 grain) R. V.
T64	Cartridge, Tracer, Caliber .50 (Rocket Fire Control, 2000 100 yds; Dim 500 yds bright)
T65	Cartridge, Ball, Caliber .30, Short Case (7.62mm NATO)
T65E1	Cartridge, Ball, Caliber .30, Short Case
T65E2	Cartridge, Ball, Caliber .30 (for Light Rifle)
T65E3	Cartridge, Ball, Caliber .30 (for Light Rifle)
T65E4	Cartridge, Ball, Caliber .30, Short Case, 10 Caliber, 145 grain, Minimum Boattail
T66	Cartridge, Incendiary-Tracer, Caliber .60, Light Weight Bullet, High Velocity
T67	Cartridge, Grenade, Caliber .45
T68	Cartridge, High Explosive Incendiary, Caliber .60, Light Weight Bullet
T69	Cartridge, Ball, Frangible, Caliber .30 (Carbine Case, Ball Frangible Bullet) (Velocity 1300 30f/s at 78ft)
T70	Cartridge, Dummy, Caliber .30, Short Case (to match Cartridge, Ball, Caliber .30, T65)
T70E1	Cartridge, Dummy, Caliber .30 (FAT1El Case, .030 Wall Ball Bullet)
T70E2	Cartridge, Dummy, Caliber .30 (FAT1El Case, 020 Wall Ball Bullet)
T70E3	Cartridge, Dummy, Caliber .30 (FAT1El Case and Based Tracer Jacket)
T70E4	Cartridge, Dummy, Caliber .30 (FAT1E3 Case, 20 Wall Ball Bullet)
T70E5	Cartridge, Dummy, Caliber .30 (M63)
T71	Cartridge, Test, High Pressure, Caliber .30, Short Case (To match Cartridge, Ball, Caliber .30, T65)
T71El	Cartridge, Test, High Pressure, Caliber .30 (T71 with case, brass, FAT1E3; 183 grains approx.) (M60)
M72	Cartridge, Tracer, Caliber .30 (25 yds dim igniter trace)
M72E1	Cartridge, Tracer, Caliber .30
T73	Cartridge, Signal, Caliber .45
T73E1	Cartridge, Signal, Caliber .45
T73E2	Cartridge, Signal, Caliber .45
T74	Cartridge, Frangible, Caliber .30, Loaded with SR-4990 Powder (Point Identification is Green with Tan Tip)
T75	Cartridge, Armor-Piercing-Incendiary, Caliber .50/.60 Assembled w/Bullet, Armor-Piercing-Incendiary, Caliber .50, T49
T76	Cartridge, Armor-Piercing-Incendiary-Tracer, Caliber .60 with Bright Igniter

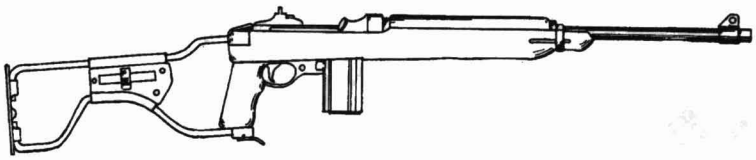
Designation	Description
T76E1	Cartridge, Armor-Piercing-Incendiary-Tracer, Caliber .60 (T60 with Primer, Percussion,M36A1
T77	Cartridge, Ball, Caliber .60
T77E1	Cartridge, Ball, Caliber .60 (T77 w/Primer, Percussion, M36A1)
T78	Cartridge, Incendiary, Caliber .30, Assembled with Bullet, Incendiary, Caliber .30
T79	Cartridge, Blank, Carbine, Caliber .30
T80	Cartridge, Ball, Caliber .60 (T77 Assembled with M52A3 Electric Primer)
T80E1	Cartridge, Ball, Caliber .60 (T77 Assembled with FAT38 Electric Primer)
T80E2	Cartridge, Ball, Caliber .60 (T77E1 with Cut Cannelure in Sabot)
T81	Cartridge, Incendiary, Caliber .60 (T36E2 Assembled w/Remington T41 Electric Primer)
T81El	Cartridge, Incendiary, Caliber .60 (T36E2 with Electric Primer, M52A3 and Double Crimp)
T82	Cartridge, Armor-Piercing-Incendiary, Caliber .60 (T39 Assembled with Remington T41 Electric Primer)
T82E1	Cartridge, Armor-Piercing-Incendiary, Caliber .60 (T39E1 with Electric Primer, M52A3 and Double Crimp)
T83	Cartridge, Armor-Piercing-Incendiary-Tracer, Caliber .60 (T60 Assembled with Remington T41 Electric Primer)
T83E1	Cartridge, Armor-Piercing-Incendiary-Tracer, Caliber .60 (T60 Assembled with M52A3 Primer)
T84	Cartridge, Armor-Piercing-Incendiary-Tracer, Caliber .60 (T76 Assembled with Remington T41 Electric Primer)
T84E1	Cartridge, Armor-Piercing-Incendiary-Tracer, Caliber .60 (T76 Assembled with Remington T41 Electric Primer)
T85	Cartridge, High Pressure Test, Caliber .60 (T33 Assembled with Remington T41 Electric Primer)
T85E1	Cartridge, High Pressure Test, Caliber .60 (T33 Assembled with Remington T41 Electric Primer)
T86	Cartridge, Lachrymatory, Caliber .50 (T78 Bullet Charged with LI#2)
T87	Cartridge, Incendiary, Caliber .50 (T78 Bullet Charged with White Phosphorus)
T88	Cartridge, Incendiary, Caliber .30 (Prototype of T87 Charged with White Phosphorus)
T89	Cartridge, Tracer, Caliber .30 (Headlight)
T90	Cartridge, Armor-Piercing, Caliber .30 (Short Case)
T91	Cartridge, High Explosive-Incendiary, Caliber .60
T92	Cartridge, Signal, Caliber .45 (National Fireworks)
T92E1	Cartridge, Signal, Caliber .45 (National Fireworks)
T93	Cartridge, Armor-Piercing, Caliber .30 (140-5 grains AP Bullet for Light Rifle)
T93E1	Cartridge, Armor-Piercing, Caliber .30 (T93 with Case, Brass, 183 grains approx.)
T93E2	Cartridge, Armor-Piercing, Caliber .30 (T93E1 with Bullet, AP, Caliber .30) (M61)
T94	Cartridge, Ball, Caliber .50 (Ball M2 w/aluminum case)
T96	Cartridge, Signal, Carbine, Caliber .30 (National Fireworks)
T97	Cartridge, Armor-Piercing-Incendiary, Caliber .60 (5.25 radius Ogive)
T98	Cartridge, Tracer, Smoke, Caliber .50
T99	Cartridge, Observing, Caliber .30
T100	Cartridge, Release, Life Vest
T101	Cartridge, Armor-Piercing-Incendiary, Caliber .30 (Light Rifle)
T101E1	Cartridge, Armor-Piercing-Incendiary, Caliber .30 (T101 w/Case, Brass, 183 grains approx)
T101E2	Cartridge, Armor-Piercing-Incendiary, Caliber .30 (T101E1 with 10 Caliber Ogive Bullet)
T102	Cartridge, Tracer, Caliber .30 (Light Rifle)
T102E1	Cartridge, Tracer, Caliber .30 (T102 with Case, Brass, 183 grains approx)
T102E2	Cartridge, Tracer, Caliber .30 (T102E1 with10 Caliber Ogive Bullet) (M62)
T103	Cartridge, Observing, Caliber .30 (Light Rifle)
T103E1	Cartridge, Observing, Caliber .30 (T103 with Case, Brass, 183 grains approx)
T103E2	Cartridge, Observing, Caliber .30 (T103 with Case, Brass, 183 grains approx)
T104	Cartridge, Ball, Caliber .30 (Light Rifle)
T104E1	Cartridge, Ball, Caliber .30 (T104 with Case, Brass, 183 grains approx)
T104E2	Cartridge, Ball, Caliber .30 (T104E1 with 10 Caliber Ogive Bullet) (M59)
T106	Cartridge, Ball, Caliber .60 (High Velocity)
T107	Cartridge, Multiple Bullet, Caliber .30
T116	Cartridge, Grenade, Rifle, Caliber .30
T116E1	Cartridge, Grenade, Rifle, Caliber .30
T116E2	Cartridge, Grenade, Rifle, Caliber .30
T117	Cartridge, Ball, Caliber .35 Pistol
T117E1	Cartridge, Ball, Caliber .35 Pistol
T118	Cartridge, Tracer, Caliber .50 (Short Dim Igniter)
T119	Cartridge, Armor-Piercing-Incendiary, Caliber .30 (Tungsten Carbide Core)
T119E1	Cartridge, Armor-Piercing-Incendiary, Caliber .30 (T119 w/Cast, Brass, FAT 1E2, 183gr approx)
T120	Cartridge, Ball, Caliber .60
T122	Cartridge, Ball, Caliber .50 (M33)
T124	Cartridge, Blank, Line Throwing, Caliber .45
T128	Cartridge, Guard, Caliber .30
T130	Cartridge, Practice, 20mm (T118 Gun)
T131	Cartridge, High Pressure Test, 20mm, (T118Gun)
T132	Cartridge, Dummy, 20mm, Inert Loaded
T133	Cartridge, Armor-Piercing-Incendiary, 20mm (T118 Gun)
T134	Cartridge, High Explosive, 20mm (T118 Gun)
T135	Shell, Shot Gun, .410 Aluminum Case #6 Shot (M35)
T136	Shell, Shot Gun Slug, .410, 220 Grain Slug
T137	Cartridge, Spotting. Caliber .50 (Winchester Centrifugal Armed)
T138	Cartridge, Spotting, Caliber .50 (Winchester Imertia Armed)
T139	Cartridge, Tracer, Caliber .50 (BAT Rifle)
T140	Cartridge, Spotting, Caliber .30 (BAT Rifle)
T142	Cartridge, Practice, 27mm
T143	Cartridge, Dummy, 27mm
T144	Cartridge, High Explosive, 27mm
T145	Cartridge, High Pressure Test, 27mm
T147	Cartridge, Incendiary, 27mm
T148	Cartridge, High Explosive-Incendiary, 20mm (Percussion Primer; 1600 grain shell)
T148E1	Cartridge, High Explosive-Incendiary, 20mm (Percussion Primer; 1600 grain shell)
T149	Cartridge, High Explosive-Incendiary, 20mm (Electric Primer; 1600 grain shell)
T150	Cartridge, Armor-Piercing-Incendiary, 20mm (Percussion Primer; 1600 grain shell)
T150E1	Cartridge, Armor-Piercing-Incendiary, 20mm (Percussion Primer; 1600 grain shell)
T151	Cartridge, Armor-Piercing-Incendiary, 20mm (Electric Primer; 1600 grain shell)
T152	Cartridge, Dummy, 20mm (1600 grain shell)
T53	Cartridge, Practice, 20mm (Percussion Primer; 1600 grain Projectile)
T153E1	Cartridge, Practice, 20mm (Percussion Primer; 1600 grain Projectile)
T154	Cartridge, Practice, 20mm (Electric Primer; 1600 grain shell)
T155	Cartridge, High Pressure Test, 20mm (Percussion Primer; Modified M99 Projectile)
T155E1	Cartridge, High Pressure Test, 20mm (Percussion Primer; Modified M99 Projectile)
T156	Cartridge, High Pressure Test, 20mm (Electric Primer; Modified M99 Projectile)
T158	Cartridge, Practice, 30mm (Velocity 2000 f/s; 4220 grains; HF1070 grains; pressure 40,000 psi - T121 Gun)
T159	Cartridge, Dummy, 30mm
T160	Cartridge, High Explosive-Incendiary, 30mm w/Shell, T239E6
T160E1	Cartridge, High Explosive-Incendiary, 30mm with Shell, T239E7
T161	Cartridge, High Pressure Test, 30mm
T162	Cartridge, Incendiary, 30mm
T163	Cartridge, High Explosive-Incendiary, 20mm (Length 7.190 in.; T39E3 Projectile)
T164	Cartridge, Armor-Piercing-Incendiary, 20mm
T165	Cartridge, Practice, 20mm
T166	Cartridge, Ball, 20mm using T114 Projectile
T167	Cartridge, Test, High Pressure, 20mm
T168	Cartridge, Dummy, 20mm
T169	Cartridge, Test, Low Pressure, 20mm
T170	Cartridge, Warning Flash
T170	Cartridge, Warning Flash

Designation	Description
T170E1	Cartridge, Photoflash
T172	Cartridge, Ball, Caliber .30 (T65E3 with 172 grain M1 Bullet)
T173	Cartridge, Ball, Caliber .30 (T65E3 with all-steel serrated bullet)
T174	Cartridge, Ball, Caliber .30 (Standard Caliber .30 Round with all-steel serrated bullet)
T175	Cartridge, Spotting, Caliber .50 (Used with BAT weapon)
T176	Cartridge, Spotting Caliber .50 (Used with BAT weapon)
T177	Cartridge, Tracer, Caliber .50 (Used with BAT weapon)
T178	Cartridge, Practice, Caliber .50 (Used with BAT weapon)
T185	Cartridge, Bomb Release
T188	Cartridge, Tracer, Caliber .50
T189	Cartridge, Spotter-Tracer, Caliber .50
T189E1	Cartridge, Spotter-Tracer, Caliber .50 (M48)
T189E2	Cartridge, Spotter-Tracer, Caliber .50
T189E3	Cartridge, Spotter-Tracer Caliber .50 (M48A1)
T190	Cartridge, Spotting, Caliber .50
T191	Cartridge, Spotting, Caliber .50
T192	Cartridge, Tracer, Caliber .50
T193	Cartridge, Tracer, Caliber .50
T194	Cartridge, Practice, Caliber .50
T195	Cartridge, Spotter-Tracer, Caliber .50
T196	Cartridge, Spotter-Tracer, Caliber. 50
T197	Cartridge, Spotter-Tracer, Caliber .50
T198	Cartridge, High Explosive-Incendiary, 20mm
T198E1	Cartridge, High Explosive-Incendiary, 20mm (M56)
T199	Cartridge, Practice, 20mm
T199E1	Cartridge, Practice, 20mm (M55)
T200	Cartridge, Ball, Caliber .22 (M39)
T200E1	Cartridge, Ball, Caliber .22 (M65)
T201	Cartridge, Ball, Caliber .60
T202	Cartridge, Armor-Piercing-Incendiary, Caliber .60
T203	Cartridge, Incendiary, Caliber .60
T204	Cartridge, Practice, 30mm
T205	Cartridge, Dummy, 30mm
T206	Cartridge, High Explosive-Incendiary, 30mm
T206E10	Cartridge, High Explosive-Incendiary, 30mm
T206E11	Cartridge, High Explosive-Incendiary, 30mm
T206E12	Cartridge, High Explosive-Incendiary, 30mm
T206E13	Cartridge, High Explosive-Incendiary, 30mm
T206E14	Cartridge, High Explosive-Incendiary, 30mm
T207	Cartridge, Test, High Pressure, 30mm
T208	Cartridge, Incendiary, 30mm
T221	Cartridge, Armor-Piercing-Incendiary, 20mm(with anvil)
T221E1	Cartridge, Armor-Piercing-Incendiary, 20mm (without anvil)
21E2	Cartridge, Armor-Piercing-Incendiary, 20mm
T221E3	Cartridge, Armor-Piercing-Incendiary, 20mm (M53)
T222	Cartridge, High Explosive-Incendiary, 30mm
T223	Cartridge, Test, High Pressure, 30mm
T224	Cartridge, Target Practice, 30mm
T225	Cartridge, Dummy, 30mm
T228	Cartridge, Dummy, 20mm (M51)
T230	Cartridge, Armor-Piercing-Incendiary-Tracer, 20mm (M52)
T232	Cartridge, Armor-Piercing-Incendiary-Tracer, 20mm
T233	Cartridge, Ball, Caliber .30 (Light Rifle) (M80)
T239	Cartridge, Ball, 30mm
T239E1	Cartridge, Ball, 30mm
T240	Cartridge, High Explosive-Incendiary, 30mm
T241	Cartridge, High Explosive-Incendiary, 20mm (M58)
T249	Cartridge, Practice, Caliber .50 (Used w/BAT weapon)
T249E1	Cartridge, Practice, Caliber .50 (Used w/BAT weapon)
T249E2	Cartridge, Practice, Caliber .50 (Used w/BAT weapon)
T251	Cartridge, High Pressure Test, Caliber .50 (Used w/BAT weapon)
T252	Cartridge, Dummy, Caliber .50 (Used w/BAT weapon)
T252E1	Cartridge, Dummy, Caliber .50 (Used w/BAT weapon)
T252E2	Cartridge, Dummy, Caliber .50 (Used w/BAT weapon)
T253	Cartridge, Test, High Pressure, 30mm
T266	Cartridge, High Explosive-Incendiary, 30mm
T267	Cartridge, Test, High Pressure, 30mm
T268	Cartridge, Ball, 30mm
T269	Cartridge, Dummy, 30mm
T270	Cartridge, High Explosive-Incendiary, 30mm
T271	Cartridge, Ball, 9mm
T272	Cartridge, 20mm, Dummy
T272E1	Cartridge, 20mm, Dummy
T272E2	Cartridge, 20mm, Dummy
T272E3	Cartridge, 20mm, Dummy
T272E4	Cartridge, 20mm, Dummy
T275	Cartridge, 7.62mm, Ball, NATO
T275E1	Cartridge, 7.62mm, Ball, NATO
T275E2	Cartridge, 7.62mm, Ball, NATO
T276	Cartridge, Caliber .38, Special
T283	Cartridge, 20mm, Armor-Piercing-Incendiary-Tracer
T291	Cartridge, Caliber .30, Match (M72)
T334	Cartridge, Practice, 30mm
MK101 Mod 0	Cartridge, 20mm, High Pressure Test
MK102 Mod 0	Cartridge, 20mm, Low Pressure Test
MK103 Mod 0	Cartridge, 20mm, Dummy
MK105 Mod 0	Cartridge, 20mm, Target Practice
MK106 Mod 0 and Mod 1	Cartridge, 20mm. High Explosive Incendiary
MK107 Mod 0	Cartridge, 20mm, Armor Piercing-Incendiary
MK108 Mod 0	Cartridge, 20mm, Armor Piercing-Tracer

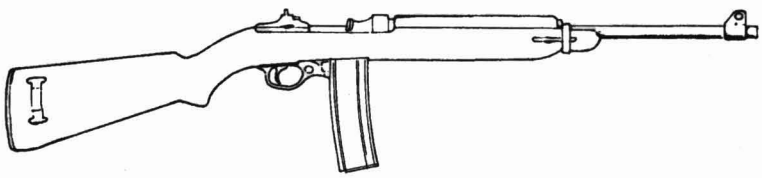
U.S. MILITARY 30-CALIBER RIFLES AND CARBINES



CARBINE M 1
Caliber: ...Carbine .30 M1 Length .....35½"
Shots: .....15 Weight: .....4¾ lbs.
Action: Gas—Semi Auto
UNITED STATES

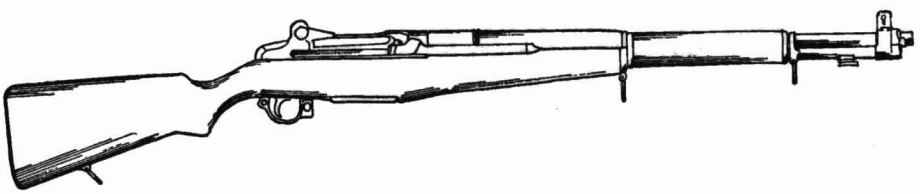


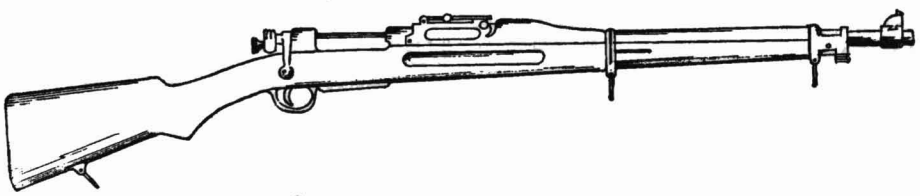
CARBINE M 1 A1
Caliber: ....Carbine .30 M1 Length: .....35½"
Shots: .....15 Weight: ....4½ lbs.
Action: Gas—Semi Auto
UNITED STATES



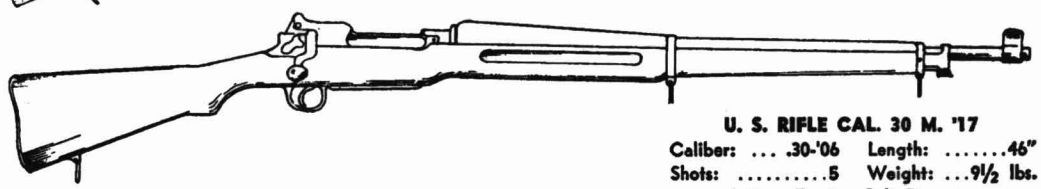
U. S. CARBINE M 2
Caliber: .....30 M1 Weight: .....5 lbs.
Shots: .....30 Length: .....35½"
Action: Gas—Full and Semi Auto
UNITED STATES

U. S. RIFLE CAL. 30 M1 (GARAND)
Caliber:... .30-'06 Length: .....42"
Shots: .....8 Weight: ..9½ lbs.
Action: Gas—Semi Auto
UNITED STATES



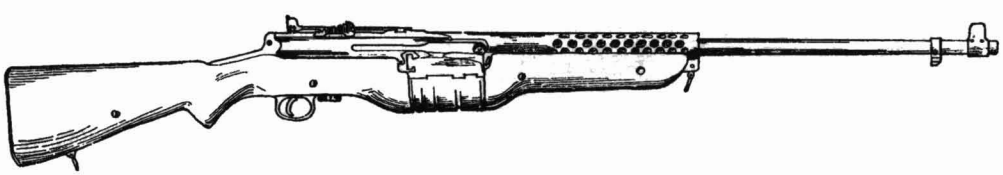


U. S. RIFLE CAL. 30 M'03 A1 (SPRINGFIELD)
Caliber: .30-'06 Length: ..43½"
Shots: .....5 Weight: 8¾ lbs.
Action: Turning Bolt Repeater
UNITED STATES



U. S. RIFLE CAL. 30 M. '17
Caliber: ... .30-'06 Length: .....46"
Shots: .....5 Weight: ...9½ lbs.
Action: Turning Bolt Repeater
UNITED STATES

JOHNSON RIFLE TYPE R
Caliber: .30-'06 Length: 45½"
Shots: .....11 Wgt.: 9½ lbs.
Action: Short Recoil Semi Auto
NETHERLANDS INDIES



Chapter 18

CARTRIDGE IDENTIFICATION BY MEASUREMENT

THE PURPOSE OF this table is to help the cartridge collector, and other interested persons, to identify unknown cartridges or cartridge cases, based upon dimensional information. This chart contains all cartridges found in this book organized in order of increasing bullet diameter, then increasing case length. With only minor variations, these dimensions are constant within any specific cartridge type. Once these dimensions are known, other details will allow identification of the unknown cartridge or case. Those details (rim type, neck diameter, base diameter, shoulder diameter and cartridge length) are listed in separate columns.

By measuring and eliminating options, the collector can rapidly learn the proper name of the cartridge or case in hand. Once the name is known he can look up the page or pages where that cartridge is discussed by using the Index.

We will follow a hypothetical identification. We take the case or cartridge in hand and measure bullet diameter or case neck internal diameter (assuming a fired case that is not damaged this will usually be no more than about 0.004″ larger than the bullet). This measurement is easily accomplished to about 0.001″ accuracy with a dial caliper. We look in the third column and find the approximate bullet diameter. This limits our search to a reasonable number of cartridges.

Next we note the length of the case, again measured with sufficient accuracy using a dial caliper. In most instances this will narrow the search to one or, at most, a few choices. We will then review rim type and other aspects of the cartridge's design in order to eliminate options. Eventually only one choice remains.

As a specific example of this process, consider the following. We have a loaded cartridge which has a military headstamp. The exposed bullet measures about 0.244″. We cannot be certain of exact bullet diameter. Nevertheless, we can narrow our search to those listings with bullets of 0.243″, 0.244″ and 0.245″—the bullet is clearly larger than 0.228″ and smaller then 0.249″. The case measures about 2.35″ in length. This narrows our search to only two possibilities (in this range of bullet diameters)—6x62mm Freres and 6mm Lee Navy. The base of the case measures about 0.445″. This eliminates the 6x62mm Freres (0.474″). Further, the rim is about the same diameter as the base (rimless, case type C). We are satisfied with our identification—6mm Lee Navy.

Cartridge	Case Type	Bullet Diam.	Case Length	Rim Diam.	Neck Diam.	Shoulder Diam.	Base Diam.	Ctge. Length	Twist	Primer	RWS/ Kynoch Primer #
2.7mm Kolibri	D	0.107	0.37	0.140	0.139		0.140	0.43	?	B	
3mm Kolibri	D	0.120	0.32	0.150	0.150		0.150	0.43	?	B	
14-222	C	0.144	1.70	0.375	0.165	0.356	0.375	1.92	10	S	
4.25mm Liliput	D	0.167	0.41	0.198	0.198		0.198	0.56	?	B	
17 Ackley Bee	A	0.172	1.35	0.408	0.201	0.341	0.350	1.78	10	S	
17 Ackley Hornet	A	0.172	1.39	0.345	0.195	0.290	0.295	1.47	10	S	
17-222	C	0.172	1.69	0.375	0.199	0.355	0.375	1.82	10-12	S	
17 Remington	C	0.172	1.79	0.377	0.198	0.355	0.374	1.86	9	S	
4.85 British	C	0.197	1.925	0.376	0.220	0.353	0.375	2.455	?	B	
5mm Clement Automatic	C	0.202	0.71	0.281	0.223	0.277	0.281	1.01	?	B	
5mm Bergmann	D	0.203	0.59	0.274	0.230		0.273	0.96	?	B	
5.45x18mm Soviet	C	0.210	0.700	0.300	0.220		0.300	.98	?	S-B	
5.7x28mm FN	C	0.220	1.13	0.310	0.249	0.309	0.310	1.71	?	B	
5.45mm Soviet	C	0.221	1.56	0.394	0.246	0.387	0.395	2.22	?	B	
5.6x33mm Rook	C	0.222	1.31	0.326	0.248	0.318	0.325	1.62	?	.177	1584
5.6x33Rmm Rook	A	0.222	1.31	0.366	0.248	0.318	0.325	1.64	?	.177	1584
5.6x35Rmm Vierling	A	0.222	1.40	0.297	0.241	0.278	0.300	1.62	16	.177	1584
297/230 Morris Extra Long	A	0.223	1.125	0.248	0.240	0.274	0.296	1.45			
22 Remington Jet	A	0.223	1.28	0.440	0.247	0.350	0.376	1.58	10	S	
222 Rimmed	A	0.223	1.682	0.462	0.349	0.352	0.374	2.144	14	S	
22 Super Jet	A	0.224	1.266	0.440	0.248	0.372	0.379	1.75	16	S	
5.7mm MMJ	C	0.224	1.29	0.356	0.253	0.332	0.353	1.65	14	L	
218 Mashburn Bee	A	0.224	1.34	0.408	0.241	0.340	0.349	1.75	16	S	
224 Harvey Kay-Chuk	A	0.224	1.35	0.347	0.243	0.293	0.294	1.60	10-15	S	
218 Harvey Bee	A	0.224	1.35	0.408	0.241	0.331	0.349	1.68	16	S	
22 Waldog	C	0.224	1.375	0.441	0.245	0.431	0.440	1.820	14	S	
22 Kilbourn Hornet	A	0.224	1.39	0.345	0.242	0.286	0.294	1.70	14-16	S	
22 Hornet	A	0.224	1.40	0.345	0.242	0.274	0.294	1.72	16	S	
221 Fire Ball	C	0.224	1.40	0.375	0.251	0.355	0.375	1.82	14	S	
22 BR Remington	C	0.224	1.502	0.468	0.245	0.450	0.466	2.00	14-16	S	
22 PPC	C	0.224	1.52	0.441	0.245	0.430	0.440	1.96	12-14	S	
224 R-C Maxi	A	0.224	1.576	0.431	0.252	0.354	0.375	2.048	14	S	
2R Lovell	A	0.224	1.63	0.382	0.246	0.295	0.315	1.80	16	S	
222 Remington	C	0.224	1.70	0.375	0.253	0.355	0.375	2.15	14	S	
219 Donaldson Wasp	A	0.224	1.71	0.497	0.251	0.402	0.418	2.10	14	L	
223 Remington	C	0.224	1.76	0.375	0.249	0.349	0.373	2.10	10-12	S	
5.56mm NATO	C	0.224	1.76	0.375	0.249	0.349	0.373	2.26	9	Bx	
222 Remington Magnum	C	0.224	1.85	0.375	0.253	0.355	0.375	2.21	14	S	
22-250 Remington	C	0.224	1.91	0.470	0.254	0.412	0.466	2.33	14	L	
224 Weatherby Magnum	E	0.224	1.92	0.425	0.247	0.405	0.413	2.44	14	L	
225 Winchester	A	0.224	1.93	0.473	0.260	0.406	0.422	2.50	14	L	
226 JDJ	A	0.224	1.93	0.473	0.256	0.410	0.419	—	9	L	
5.6x50mm Magnum	C	0.224	1.97	0.376	0.254	0.355	0.375	2.21	13	?	?
5.6x50Rmm Magnum	A	0.224	1.97	?	0.254	0.355	0.375	2.21	13		
22 Cheetah	C	0.224	2.00	0.470	0.250	0.451	0.466	2.36	14	S	
22-30-30 Improved	A	0.224	2.03	0.502	0.253	0.391	0.422	2.48	14	L	
22-303	A	0.224	2.031	0.540	0.254	0.4085	0.455	2.48	14	L	
22-243	C	0.224	2.045	0.471	0.260	0.454	0.471	V**	9-14	L	
220 Swift	G	0.224	2.20	0.472	0.260	0.402	0.443	2.68	14	L	
220 Wotkyns-Wilson Arrow	G	0.224	2.205	0.472	0.261	0.402	0.443	2.70	14	L	
220 Weatherby Rocket	G	0.224	2.21	0.472	0.260	0.430	0.443	2.68	14	L	
5.6x57mm RWS	C	0.224	2.24	0.470	0.281	0.436	0.469	2.54	10	?	?
5.6x57Rmm RWS	A	0.224	2.24	?	0.281	0.436	0.469	2.54	10	?	
297/230 (Morris) Short	A	0.225	0.58	0.347	0.240	0.274	0.294	0.83	?	.177	69
297/230 (Morris) Long	A	0.225	0.80	0.345	0.240	0.274	0.295	1.01	?	.177	69
5.5mm Velo Dog	B	0.225	1.12	0.308	0.248		0.253	1.35	8.2	S-B	
224 Clark	C	0.225	2.237	0.470	0.275	0.455	0.471	3.075	9	L	
22-15-60 Stevens	B	0.226	2.01	0.342	0.243		0.265	2.26	12	S	
5.6x61mm Vom Hofe (SE)	C	0.227	2.39	0.480	0.259	0.468	0.476	3.13	?	.217	5603
5.6x61Rmm Vom Hofe	A	0.227	2.39	0.533	0.260	0.470	0.479	3.13	?	.217	5603
22 Extra Long (Maynard)**	B	0.228	1.17	0.310	0.252		0.252	1.41	16	S-O***	
22 WCF	A	0.228	1.39	0.342	0.241	0.278	0.295	1.61	16	S	
5.6x52Rmm	A	0.228	2.05	0.500	0.252	0.360	0.416	2.51	10 1/2	.217	5603
22 Savage High Power	A	0.228	2.05	0.500	0.252	0.360	0.416	2.51	10 1/2	L	
22 Newton	C	0.228	2.23	0.474	0.356	0.420	0.471	2.85	14-16	L	
228 Ackley Magnum	C	0.228	2.25	0.473	0.265	0.445	0.470	2.55	12	L	
5.6x29.5Rmm Stahl	A	0.243	1.16	0.370	0.262	0.301	0.320	1.44	?	.177	1584
6mm PPC	C	0.243	1.50	0.442	0.260	0.450	0.441	2.12	10-12	S	
6mm Bench Rest Remington	C	0.243	1.52	0.468	0.263	0.457	0.466	2.19	12	S	
6mm TCU	C	0.243	1.74	0.378	0.265	0.354	0.376	2.25	12	S	
6mm-223	C	0.243	1.76	0.378	0.266	0.354	0.376	2.26	10-12	S	
6mm SAW	C	0.243	1.779	0.410	0.273	0.382	0.410	2.58	?	Bx	
6mm-47mm	C	0.243	1.81	0.373	0.267	0.348	0.372	2.31	12	L	
6mm-222 Magnum	C	0.243	1.81	0.373	0.267	0.348	0.372	2.31	12	L	
6mm JDJ	A	0.243	1.905	0.470	0.272	0.415	0.421	2.65	V	LR	
6mm-250 Walker	C	0.243	1.91	0.470	0.274	0.420	0.468	2.21	12	L	

Cartridge	Case Type	Bullet Diam.	Case Length	Rim Diam.	Neck Diam.	Shoulder Diam.	Base Diam.	Ctge. Length	Twist	Primer	RWS/ Kynoch Primer #
6mm-30-30 Improved	A	0.243	2.03	0.502	0.275	0.392	0.422	2.55	9-10	L	
243 Winchester	C	0.243	2.05	0.470	0.276	0.454	0.470	2.71	10	L	
6mm Remington	C	0.243	2.23	0.472	0.276	0.429	0.470	2.90	9	L	
244 Remington	C	0.243	2.23	0.472	0.276	0.429	0.470	2.825	12	L	
6x57mm Mauser	C	0.243	2.23	0.476	0.284	0.420	0.475	2.95	?	.217	5603
244 (6mm) Halger Magnum	A	0.243	2.25	0.519	0.287	0.435	0.467	3.04	?	.217	5603
6x58mm Forster	C	0.243	2.26	0.468	0.285	0.437	0.470	3.08	?	.217	5603
6x58Rmm Forster	A	0.243	2.26	0.532	0.284	0.437	0.471	3.06	?	.217	5603
6x62mm Freres	C	0.243	2.42	0.470	0.271	0.451	0.474	3.13	?	.217	?
6x62Rmm Freres	A	0.243	2.42	?	0.271	0.451	0.474	3.13	?	.217	?
240 Weatherby	E	0.243	2.50	0.473	0.271	0.432	0.453	3.06	10	L	
6mm Lee Navy	C	0.244	2.35	0.448	0.278	0.402	0.445	3.11	7 1/2	L	
244 Magnum (H & H)	E	0.244	2.78	0.532	0.263	0.445	0.508	3.55	?	.217	60
240 Magnum Rimless	E	0.245	2.49	0.467	0.274	0.403	0.450	3.21	?	.217	81
240 Magnum Flanged	A	0.245	2.50	0.513	?	0.402	0.448	3.25	?	?	
242 Rimless Nitro-Express	C	0.249	2.38	0.465	0.281	0.405	0.465	3.20	?	.217	59
297/250 Rook Rifle	A	0.250	0.82	0.343	0.267	0.294	0.295	1.06	?	.177	69
6.5x40Rmm	B	0.250	1.58	0.451	0.290		0.396	2.07	?	?	?
25 Automatic	D	0.251	0.62	0.298	0.276		0.277	0.91	16	SP	
246 Purdey Flanged	A	0.253	2.24	0.544	0.283	0.401	0.474	2.98	?	?	?
242 Rimless	C	0.253	2.38	0.465	0.281	0.405	0.465	3.20		.217	K-59
255 Rook	A	0.255	1.15	0.401	0.274	0.328	0.344	1.43	?	?	?
25 Ackley Krag Short	A	0.257	2.24-2.31	0.540	0.293	0.415	0.457	V**	10	L	
25 Ackley Krag Long	A	0.257	2.31	0.540	0.293	0.415	0.457	V	10	L	
6.5x27Rmm	A	0.257	1.06	0.428	0.284	0.348	0.379	1.54	?	.177	1584
256 Winchester Magnum	A	0.257	1.30	0.440	0.283	0.370	0.378	1.53	14	SP	
25-20 Winchester	A	0.257	1.33	0.405	0.274	0.329	0.349	1.60	13-14	S	
25-20 Single Shot	A	0.257	1.63	0.378	0.275	0.296	0.315	1.90	12-15	S	
25 Ugalde	C	0.257	1.76	0.375	0.275	0.368	0.373	2.27	10	S	
6 JDJ	A	0.257	1.905	0.500	0.288	0.415	0.421	2.81	?	L	
257 JDJ	A	0.257	1.905	0.500	0.288	0.415	0.421	2.81	10	L	
250/3000 Improved	C	0.257	1.91	0.473	0.284	0.445	0.467	2.52	10	L	
250 Savage	C	0.257	1.91	0.470	0.286	0.413	0.468	2.515	14	L	
25 Remington	C	0.257	2.04	0.421	0.280	0.355	0.420	2.54	10	L	
6.5x52Rmm (25-35 Win.)	A	0.257	2.04	0.506	0.280	0.355	0.420	2.53	8	.217	5603
25-21 Stevens	B	0.257	2.05	0.376	0.280		0.300	2.30	14	S	
6.3x53Rmm Finnish	A	0.257	2.09	0.565	0.286	0.463	0.486	2.51	10	?	?
25-36 Marlin	A	0.257	2.12	0.499	0.281	0.358	0.416	2.50	9	S	
25/303	A	0.257	2.22	0.541	0.294	0.400	0.455	3.05	10	L	
257 Roberts (+P)	C	0.257	2.23	0.473	0.290	0.430	0.468	2.74	10-12	L	
257 Improved	C	0.257	2.23	0.474	0.288	0.457	0.471	2.78	10	L	
25-25 Stevens	B	0.257	2.37	0.376	0.282		0.323	2.63	14	S	
25-06 Remington	C	0.257	2.49	0.471	0.287	0.441	0.470	3.00	10-12	L	
257 Weatherby Magnum	E	0.257	2.55	0.530	0.285	0.490	0.511	3.25	12	L	
6.5x48Rmm Sauer	B	0.260	1.88	0.495	0.284		0.433	2.43	?	.217	5603
6.5mm Arisaka	G	0.263	2.00	0.471	0.293	0.425	0.455	2.98	7.9	B	
6.5x54mm MS	C	0.263	2.09	0.450	0.287	0.424	0.447	3.02	7.8	B/L	5603
6.5x54Rmm MS	A	0.263	2.09	?	0.287	0.424	0.447	3.02	7.8	B	5603
6.5x53.5mm Daudeteau	G	0.263	2.09	0.524	0.298	0.466	0.490	3.02	?	B	?
6.5 Dutch & Romanian	A	0.263	2.10	0.526	0.297	0.423	0.450	3.03	9.8	B	
6.5 Remington Magnum	E	0.263	2.17	0.532	0.300	0.493	0.511	2.80	9	L	
6.5x55mm Swedish	C	0.2638	2.165	0.479	0.2972	0.435	0.477	3.15	7.87	.217	1680
6.5mm Bergmann	C	0.264	0.87	0.370	0.289	0.325	0.367	1.23	?	B	
6.5mm Whisper	C	0.264	1.36	0.375	0.286	0.357	0.372	V	V	SR	
6.5mm JDJ	A	0.264	1.93	0.467	0.293	0.410	0.419	V	8-9	LR	
6.5 JDJ #2	A	0.264	2.00	0.502	0.292	0.450	0.466	V	9	LR	
6.5mm JDJx30	A	0.264	2.03	0.497	0.285	0.409	0.419	V	9	LR	
6.5x54mm Mauser	C	0.264	2.12	0.463	0.289	0.432	0.468	2.67	?	.217	5603
6.5mm Remington Magnum	E	0.264	2.17	0.582	0.300	0.490	0.571	2.80	9	L	
6.5x57mm Mauser	C	0.264	2.23	0.474	0.292	0.430	0.471	3.16	?	.217	5603
6.5x57Rmm Mauser	A	0.264	2.24	0.521	0.292	0.430	0.470	3.16	?	.217	5603
6.5x58mm Portuguese	C	0.264	2.28	0.465	0.293	0.426	0.468	3.22	7.8	B/.217	5603
6.5x58mm Mauser	C	0.264	2.28	0.465	0.293	0.426	0.468	3.22	?	.217	5603
6.5x58Rmm Krag-Jorgensen	A	0.264	2.29	0.575	0.300	0.460	0.500	3.25	?	.217	5603
6.5x58Rmm Sauer	B	0.264	2.30	0.501	0.291		0.433	3.08	?	.217	5603
6.5x61mm Mauser	C	0.264	2.40	0.479	0.297	0.452	0.477	3.55	?	.217	5603
6.5x61Rmm Mauser	A	0.264	2.40	0.532	0.296	0.452	0.477	3.55	?	.217	5603
256 (6.5mm) Newton	C	0.264	2.44	0.473	0.290	0.430	0.469	3.40	10	L	
6.5-06 (256/06)	C	0.264	2.50	0.473	0.300	0.439	0.471	2.80	9-10	L	
264 Winchester Magnum	E	0.264	2.53	0.532	0.289	0.490	0.515	3.29	9	L	
6.5x65mm RWS	C	0.264	2.56	0.470	0.296	0.430	0.474	3.15	?	?	?
6.5x65Rmm RWS	A	0.264	2.56	0.531	0.296	0.430	0.475	3.15	?	?	
6.5mm Carcano	C	0.265	2.05	0.448	0.295	0.430	0.445	3.02	19.3-8.3	B	
256 Gibbs Magnum	E	0.265	2.17	0.476	0.298	-0.427	0.473	3.05	?	?	?
6.5x68mm Schuler	C	0.265	2.66	0.510	0.295	0.481	0.520	3.27	?	.238	1698
6.5x68Rmm Schuler	A	0.265	2.66	?	0.295	0.481	0.520	3.27	?	.238	1698

Cartridge	Case Type	Bullet Diam.	Case Length	Rim Diam.	Neck Diam.	Shoulder Diam.	Base Diam.	Ctge. Length	Twist	Primer	RWS/ Kynoch Primer #
26 Rimless (BSA)	C	0.267	2.39	0.530	0.306	.0445	0.513	3.13	?	.217	59
270 Savage	C	0.277	1.88	0.470	0.308	0.450	0.470	2.62	10	L	
270 JDJ	A	0.277	1.905	0.467	0.305	0.415	0.421	2.875	7	L	
270 Winchester	C	0.277	2.54	0.470	0.307	0.440	0.468	3.28	10	L	
270 Weatherby Magnum	E	0.277	2.55	0.530	0.305	0.490	0.511	3.25	12	L	
7mm Nambu	C	0.280	0.78	0.359	0.296	0.337	0.351	1.06	12.5	B	
280 British	C	0.283	1.71	0.473	0.313	0.448	0.470	2.54	?	B	
7x33mm Finnish/SAKO	C	0.284	1.30	0.390	0.307	0.365	0.388	1.73	?	?	?
7mm Whisper	C	0.284	1.36	0.375	0.306	0.357	0.372	V	V	SR	
7mm Bench Rest	C	0.284	1.502	0.470	?	?	0.471	?	?	S	
7mm TCU	C	0.284	1.74	0.375	0.302	0.350	0.373	2.28	10	S	
7 JDJ	A	0.284	1.905	0.473	0.312	0.415	0.421	2.735	?	L	
7mm JDJ #2	A	0.284	2.00	0.502	0.313	0.450	0.466	V	9	LR	
7mm-30 JDJ	A	0.284	2.03	0.497	0.306	0.409	0.419	V	9	LR	
7mm-08 Remington	C	0.284	2.035	0.473	0.315	0.454	0.470	2.80	9	L	
7-30 Waters	A	0.284	2.04	0.506	0.306	0.399	0.4215	2.52	9½	L	
7mm International R	A	0.284	2.04	0.502	0.311	0.402	0.422	2.52	10	L	
7mm Shooting Times Easterner	A	0.284	2.10	0.502	0.315	0.353	0.467	2.54	10	L	
284 Winchester	I	0.284	2.17	0.470	0.312	0.465	0.495	2.75	10	L	
7mm Mauser	C	0.284	2.235	0.474	0.320	0.4294	0.470	3.06	8-10	L/.217	5603
7x57Rmm	A	0.284	2.235	0.521	0.320	0.4294	0.470	3.07	8-10	.217	5603
275 Rigby	C	0.284	2.24	0.475	0.324	0.428	0.474	3.07	?	?	?
276 Enfield	C	0.284	2.35	0.521	0.321	0.460	0.528	3.25	9	B	
7x61 Sharpe & Hart Super	E	0.284	2.40	0.532	0.320	0.478	0.515	3.27	12	L	
275 No. 2 Magnum (7mm Rigby Mag.)	A	0.284	2.49	0.524	0.315	0.406	0.456	3.24		.241	K-34
7mm Remington Magnum	E	0.284	2.50	0.525	0.315	0.490	0.511	3.24	9	L	
275 Holland & Holland Magnum	E	0.284	2.50	0.532	0.318	0.375	0.513	3.30	9½	L	
275 Flanged Magnum	A	0.284	2.50	0.582	0.318	0.450	0.510	3.26	9½	?	
275 Belted Magnum	E	0.284	2.50	0.532	0.325	0.454	0.513	3.30	?	.217	81
7mm Dakota	C	0.284	2.50	0.544	0.314	0.531	0.545	3.33	10	L	
7x64mm Brenneke	C	0.284	2.51	0.468	0.305	0.422	0.463	3.21	?	L	
7x65Rmm Brenneke	A	0.284	2.53	0.521	0.308	0.422	0.463	3.21	?	?	
7 JRS	C	0.284	2.525		0.312	0.454	0.470	3.455	10	L	
280 Remington	C	0.284	2.54	0.472	0.315	0.441	0.470	3.33	10½	L	
285 OKH	C	0.284	2.55	0.472	0.315	0.442	0.470	3.35	10	L	
7mm Weatherby Magnum	E	0.284	2.55	0.530	0.312	0.490	0.511	3.25	12	L	
7x66mm Vom Hofe (SE)	C	0.284	2.58	0.510	0.316	0.485	0.543	3.25	?	.217	?
7mm Canadian Magnum	I	0.284	2.83	0.532	0.322	0.530	0.544	3.60	9-12	LR	
7x72Rmm	B	0.284	2.84	0.482	0.311		0.425	3.48	?	.217	5603
7mm Shooting Times Westerner	E	0.284	2.86	0.530	0.315	0.487	0.508	3.68	10	L	
7x73mm Vom Hofe Belted	E	0.284	2.87	0.533	0.315	0.483	0.527	3.88	?	.217	5603
7x75Rmm Vom Hofe (SE)	A	0.284	2.95	0.519	0.318	0.416	0.468	3.68	?	.217	?
276 Pedersen	C	0.285	2.02	0.451	0.314	0.389	0.449	2.85	?	Bx	
28-30-120 Stevens	B	0.285	2.51	0.412	0.309		0.357	2.82	14	L	
280 Flanged	A	0.287	2.41	0.607	0.316	0.423	0.535	3.62	?	.217	60
7mm Rigby Magnum	A	0.287	2.49	0.528	0.315	0.406	0.470	3.25	?	?	?
280 Ross	G	0.287	2.59	0.556	0.317	0.404	0.534	3.50	?	.217	59
280 Jeffery	C	0.288	2.46	0.538	0.317	0.504	0.542	3.38	?	.217	59
7.62mm Nagant (Russian)	B	0.295	1.53	0.388	0.286		0.335	1.53	9.5	B	
7.35mm Carcano	C	0.298	2.01	0.449	0.323	0.420	0.445	2.98	10	B	
300 (295) Rook Rifle	B	0.300	1.17	0.369	0.317		0.319	1.38	?	.177	69
300 Sherwood	B	0.300	1.54	0.370	0.318		0.320	2.02	?	.177	69
7.65mm Roth-Sauer	D	0.301	0.51	0.335	0.332		0.335	0.84	14.2	B	
7x60Rmm	A	0.304	2.49	0.607	0.336	0.507	0.517	3.20		?	?
7.62mm Russian Tokarev	C	0.307	0.97	0.390	0.330	0.370	0.380	1.35	?0	B	
30 Borchardt	C	0.307	0.99	0.390	0.331	0.370	0.385	1.34	?	S-B	
30 (7.65mm) Luger	C	0.308	0.75	0.391	0.322	0.374	0.388	1.15	9.8	S-B	
7.63mm (7.65mm) Mannlicher	D	0.308	0.84	0.334	0.331		0.332	1.12	10	B	
7.62 Micro-Whisper	C	0.308	0.846	0.392	0.328	0.382	0.389	V	V	SP/SR	
7.63 Mini-Whisper	C	0.308	0.985	0.385	0.329	0.375	0.381	V	V	SP/SR	
30 (7.63mm) Mauser	C	0.308	0.99	0.390	0.332	0.370	0.381	1.36	7.9	S-B	
30 M1 Carbine	D	0.308	1.29	0.360	0.335		0.355	1.65	16	S/Bx	
30 Kurz	C	0.308	1.29	0.473	0.334	0.443	0.470	1.65	12	L	
300 Whisper	C	0.308	1.50	0.375	0.330	0.369	0.375	2.575	V	SR	
308x1.5-Inch	C	0.308	1.50	0.470	0.338	0.450	0.466	2.05	10-12	L	
30 Herrett	A	0.308	1.61	0.505	0.329	0.405	0.421	2.01	14	L	
30-30 Wesson	A	0.308	1.66	0.440	0.329	0.330	0.380	2.50	12	L	
300 Savage	C	0.308	1.87	0.470	0.339	0.4466	0.470	2.62	12	L	
7.62x51 NATO	C	0.308	2.015	0.470	0.344	0.454	0.470	2.75	12	Bx	
308 Winchester	C	0.308	2.015	0.470	0.344	0.454	0.470	2.75	12	L	
307 Winchester	G	0.308	2.015	0.506	0.344	0.454	0.470	2.56	12	L	
30 Remington	C	0.308	2.03	0.421	0.328	0.402	0.420	2.54	12	L	
30 American	A	0.308	2.03	0.502	0.328	0.402	0.4215	2.53	?	S	
7.62x51Rmm	A	0.308	2.039	0.502	0.328	0.402	0.4215	2.53	?	?	?
30-30 Winchester	A	0.308	2.039	0.502	0.328	0.402	0.4215	2.53	12	L	
30-30 Ackley Improved	A	0.308	2.04	0.502	0.328	0.419	0.4215	2.54	12	L	

Cartridge	Case Type	Bullet Diam.	Case Length	Rim Diam.	Neck Diam.	Shoulder Diam.	Base Diam.	Ctge. Length	Twist	Primer	RWS/ Kynoch Primer #
7.5mm French MAS	C	0.308	2.11	0.482	0.340	0.411	0.480	2.99	10	B	
7.5mm Schmidt-Rubin	C	0.308	2.18	0.496	0.334	0.452	0.494	3.05	10.5	B	
309 JDJ	A	0.308	2.20	0.514	0.335	0.453	0.470	3.16	10	LR	
30-40 Krag	A	0.308	2.31	0.540	0.338	0.419	0.4577	3.089	10	L	
30 Flanged Nitro (Purdey)	A	0.308	2.36	0.545	0.338	0.415	0.457	2.97	?	.217	59
30-06 Improved	C	0.308	2.49	0.473	0.340	0.454	0.470	3.35	10	L	
7.62x63mm U.S.	C	0.308	2.49	0.473	0.340	0.441	0.470	3.34	10	Bx	5608
30-06 Springfield	C	0.308	2.49	0.473	0.340	0.441	0.470	3.34	10	L	
30 Newton	C	0.308	2.52	0.525	0.340	0.491	0.523	3.35	10-12	L	
300 Dakota	C	0.308	2.55		0.338	0.531	0.545	3.33	10	L	
308 Norma Magnum	E	0.308	2.56	0.529	0.340	0.489	0.514	3.30	10-12	L	
300 Winchester Magnum	E	0.308	2.62	0.530	0.334	0.4891	0.5126	3.30	10	L	
30R Blaser	A	0.308	2.68	0.531	0.343	0.441	0.480	3.80	?	?	?
300 Weatherby Magnum	E	0.308	2.825	0.530	0.337	0.495	0.5117	3.56	12	L	
300 Canadian Magnum	I	0.308	2.83	0.532	0.342	0.530	0.544	3.60	10	LR	
300 Belted Magnum (H&H)	E	0.308	2.85	0.530	0.338	0.447	0.513	3.60	10	L/.217	60
300 Holland & Holland Magnum	E	0.308	2.85	0.530	0.338	0.447	0.513	3.60	10	L/.217	60
30 Cody	C	0.308	2.875	0.586	0.34	0.544	0.59	3.67	10	L	
30 Flanged Magnum (H&H)	A	0.308	2.94	0.572	0.338	0.450	0.517	3.69	10	.217	60
300 Pegasus	C	0.308	2.99	0.580	0.339	0.566	0.580	3.75	10	LR	
35 S&W Automatic	D	0.309	0.67	0.348	0.345		0.346	0.97	12	SP	
32 Automatic	H	0.309	0.68	0.354	0.336		0.336	1.03	16	SP	
7.65mm MAS (French)	D	0.309	0.78	0.337	0.336		0.337	1.19	?	B	
7.62x45mm Czech M52	C	0.309	1.77	0.440	0.334	0.412	0.441	2.36	?	B	
32-40 Remington	A	0.309	2.13	0.535	0.330	0.358	0.453	3.25	16	S	
7.62mm (M-43) Russian	C	0.310	1.52	0.445	0.340	0.394	0.443	2.20	9.4	B	
7.62x39	C	0.310	1.52	0.445	0.340	0.394	0.443	2.20	9.4	B	
7.62mm Nagant	A	0.310	2.11	0.564	0.332	0.453	0.484	3.02	9.5	B	
7.62x53Rmm Russian	A	0.310	2.11	0.564	0.332	0.453	0.484	3.02	9.5	B	
303 Savage	A	0.311	2.15	0.501	0.3322	0.4135	0.439	2.52	12	L	
303 British	A	0.311	2.21	0.530	0.337	0.402	0.458	3.05	10	B/L	
7.7mm Arisaka	C	0.311	2.28	0.474	0.338	0.431	0.472	3.13	9.8	B	
375/303 Westley Richards	A	0.311	2.50	0.505	0.343	0.390	0.457	3.36			
32 S&W	B	0.312	0.61	0.375	0.334		0.335	0.92	16-18	SP	
32 S&W Long	B	0.312	0.93	0.375	0.335		0.335	1.27	16-18	SP	
32 H&R Magnum	B	0.312	1.08	0.371	0.333		0.333	1.35	16	SP	
32-20 Winchester	A	0.312	1.315	0.405	0.326	0.3424	0.353	1.59	20	S	
32-30 Remington	A	0.312	1.64	0.437	0.332	0.357	0.378	2.01	16	S	
32-35 Stevens & Maynard	B	0.312	1.88	0.503	0.339		0.402	2.29	16	S	
303 British	A	0.312	2.22	0.540	0.340	0.401	0.460	3.07	?	?	?
303 Magnum	C	0.312	2.34	0.557	0.345	0.462	0.530	3.25	?	?	?
32 Short & Long Colt	B	0.313	0.92	0.374	0.313		0.318	1.26	16	SP	
7.65x53mm Mauser	C	0.313	2.09	0.470	0.338	0.429	0.468	2.95	10	B	
32-40 Bullard	A	0.315	1.85	0.510	0.332	0.413	0.453	2.26	16	S	
310 Cadet Rifle	B	0.316	1.02	0.405	0.320		0.353	1.59	?	.177	69
8.15x46Rmm	A	0.316	1.82	0.484	0.346	0.378	0.421	2.28	?	.250	1794
8x48Rmm Sauer	B	0.316	1.88	0.500	0.344		0.432	2.58	?	.254	1775
8x51mm Mauser	C	0.316	1.98	0.467	0.344	0.436	0.467	2.67	?	.217	5603
8x51Rmm Mauser	A	0.316	1.98	0.515	0.344	0.436	0.467	2.88	?	.217	
320 Revolver	B	0.317	0.62	0.350	0.320		0.322	0.90	22	B	
32 Long, Center Fire*	B	0.317	0.82	0.369	0.318		0.321	1.35	20	S	
7.5mm Swiss Army	B	0.317	0.89	0.407	0.335		0.345	1.29	?	B	
32 Extra Long Ballard	B	0.317	1.24	0.369	0.318		0.321	1.80	22	S	
8x42Rmm-M/88	A	0.318	1.66	0.525	0.347	0.423	0.468	2.28	?	.217	5603
8x57Rmm 360	A	0.318	2.24	0.485	0.333	0.375	0.427	2.96	?	?	?
8x71mm Peterlongo	C	0.318	2.80	0.468	0.349	0.422	0.462	3.28	?	.216	2610
8x75mm	C	0.318	2.94	0.467	0.345	0.411	0.466	3.50	?	.217	5603
8x75Rmm	A	0.318	2.94	0.522	0.345	0.411	0.466	3.51	?	.217	
8mm Nambu	G	0.320	0.86	0.413	0.338	0.388	0.408	1.25	11	B	
8mm Rast-Gasser	B	0.320	1.037	0.376	0.332		0.334	1.391	?	?	
32 Winchester Self Loading	H	0.320	1.28	0.388	0.343		0.346	1.88	16	S	
32 Remington	C	0.320	2.04	0.421	0.344	0.396	0.420	2.57	14	L	
32-40 Ballard & Winchester	B	0.320	2.13	0.506	0.338		0.424	2.59	16	L	
8x50Rmm Siamese	A	0.321	1.98	0.550	0.347	0.450	0.480	2.97	?	B	
32 Winchester Special	A	0.321	2.04	0.506	0.343	0.4014	0.4219	2.565	16	L	
8x52Rmm Siamese	A	0.321	2.04	0.550	0.347	0.460	0.500	2.96	?	B-Bx	
8x58Rmm Sauer	B	0.322	2.28	0.499	0.345		0.438	3.00	?	0.254	1775
8mm Danish Krag	A	0.322	2.28	0.575	0.355	0.460	0.500	3.20	12	B	
8mm Lebel Revolver	B	0.323	1.07	0.400	0.350		0.384	1.44	9.5	B	
7.92mm Kurz	C	0.323	1.30	0.470	0.352	0.440	0.470	1.88	10	B	
32 Ideal	B	0.323	1.77	0.411	0.344		0.348	2.25	18	S	
8mm Austrian	A	0.323	1.98	0.553	0.351	0.462	0.501	3.00	9.8	B	
8mm Lebel	A	0.323	1.98	0.621	0.347	0.483	0.536	2.75	9.5	B	
8x54mm Krag-Jorgensen	C	0.323	2.12	0.478	0.351	0.435	0.478	2.85	?	.199	1680
8x56mm Mannlicher-Schoenauer	C	0.323	2.21	0.470	0.347	0.424	0.465	3.04	?	.217	5603
8mm JDJ	A	0.323	2.22	0.506	0.356	0.455	0.465	V	10	LR	

Cartridge	Case Type	Bullet Diam.	Case Length	Rim Diam.	Neck Diam.	Shoulder Diam.	Base Diam.	Ctge. Length	Twist	Primer	RWS/ Kynoch Primer #
8mm Mauser	C	0.323	2.24	0.473	0.3493	0.431	0.469	3.25	9-10	B/L/.217	5603
7.9x57JSmm	C	0.323	2.24	0.473	0.349	0.431	0.469	3.25	9-10	B/L/.217	5603
8x57JRSmm Mauser	A	0.323	2.24	0.526	0.349	0.431	0.469	3.55	9-10	.217	
8x60Smm Mauser****	C	0.323	2.34	0.468	0.350	0.431	0.470	3.11	?	.217	5603
8x60JRmm Mauser***	A	0.323	2.36	0.524	0.345	0.432	0.466	3.20			
8mm-06	C	0.323	2.47	0.473	0.351	0.441	0.470	3.25	9-10	L	
8x63mm Swedish	C	0.323	2.48	0.479	0.356	0.456	0.488	3.36	?	B	
8x64Smm Brenneke****	C	0.323	2.51	0.469	0.348	0.424	0.468	3.32	?	.217	5603
8x65RSmm Brenneke	A	0.323	2.56	0.520	0.348	0.421	0.464	3.65	?	.217	
8x68Smm Magnum	C	0.323	2.65	0.510	0.354	0.473	0.522	3.38	?	0.238	1698
8mm Remington Magnum	E	0.323	2.85	0.530	0.341	0.4868	0.5126	3.60	10	L	
310 Cadet	B	0.324	1.12	0.405	0.320	—	0.353	1.72		.177	K-69
8x72Rmm Sauer	B	0.324	2.84	0.483	0.344		0.429	3.40	?	.254	1775
7.5mm Nagant (Swedish)	B	0.325	0.89	0.406	0.328		0.350	1.35	18	B	
8x59 Breda	C	0.326	2.33	0.469	0.357	0.433	0.491	3.17	?	B	
8mm Guedes M-85	A	0.326	2.34	0.620	0.354	0.490	0.543	3.25	11	B	
8mm Roth-Sauer	D	0.329	0.74	0.356	0.353		0.355	1.14	10	B	
8mm Murata	A	0.329	2.06	0.558	0.361	0.485	0.492	2.90	?	B	
8mm Hungarian M-89	A	0.329	2.20	0.554	0.365	0.473	0.491	3.02	10	B	
318 Rimless Nitro-Express	C	0.330	2.38	0.465	0.358	0.445	0.465	3.35	?	.217	81
375/303 Axite	A	0.330	2.47	0.505	0.343	0.390	0.457	3.48	?	?	?
33 Winchester	A	0.333	2.11	0.610	0.365	0.443	0.508	2.80	12	L	
333 Rimless Nitro-Express	C	0.333	2.43	0.538	0.359	0.496	0.540	3.50	?	.217	59
333 Jeffery Rimless	C	0.333	2.48	0.538	0.359	0.496	0.540	3.48		.217	K-59
333 OKH	C	0.333	2.49	0.473	0.365	0.443	0.470	3.37	10	L	
333 Flanged Jeffrey	A	0.333	2.50	0.625	0.356	0.484	0.530	3.43	?	?	?
334 OKH	E	0.333	2.86	0.530	0.367	0.480	0.513	3.65	10	L	
338-223 Straight	D	0.338	1.41	0.378	0.362		0.376	2.25	10	S	
338 Whisper	C	0.338	1.47	0.466	0.360	0.457	0.463	V	V	SR	
338 KDK	A	0.338	2.20	0.514	0.365	0.453	0.470	V	10	LR	
33 (Belted) BSA	E	0.338	2.40	0.527	0.369	0.453	0.534	3.10	?	.217	59
338-06	C	0.338	2.48	0.473	0.360	0.440	0.470	3.37	10	L	
338 Winchester Magnum	E	0.338	2.50	0.530	0.369	0.491	0.5127	3.34	10	L	
330 Dakota	C	0.338	2.57	0.532	0.371	0.530	0.545-	3.32	10	L	
338 Lapua Magnum	C	0.338	2.72	0.586	0.365	0.544	0.589	3.68	10	L/Bx	
340 Weatherby Magnum	E	0.338	2.82	0.530	0.366	0.495	0.513	3.60	12	L	
338 Canadian Magnum	I	0.338	2.83	0.532	0.369	0.530	0.544	3.60	10-12	LR	
338 A-Square	K	0.338	2.85	0.579	0.367	0.553	0.582	3.67	10	LR	
338 Excalibur	C	0.338	2.99	0.580	0.371	0.566	0.580	3.75	10	LR	
338/50 Talbot	C	0.338	3.76	0.782	0.380	0.748	0.774	4.25	10	CCI-35	
348 Winchester	A	0.348	2.255	0.610	0.3757	0.485	0.553	2.795	12	L	
9x71mm Peterlongo	C	0.350	2.80	0.466	0.386	0.420	0.464	3.26	?	.216	2610
35 Winchester Self Loading	H	0.351	1.14	0.405	0.374		0.378	1.64	16	S	
351 Winchester Self Loading	H	0.351	1.38	0.407	0.374		0.378	1.91	16	S	
9mm Ultra	D	0.355	0.72	0.366	0.374		0.386	1.03	?	S-B	
9mm Gilsenti	D	0.355	0.75	0.393	0.380		0.392	1.15	10	B	
9mm Federal	B	0.355	0.754	0.435	0.382		0.386	1.163	9	S	
9mm Luger (+P)	D	0.355	0.754	0.393	0.380		0.392	1.16	9.8	S-B	
9mm Browning Long	D	0.355	0.80	0.404	0.376		0.384	1.10	12-16	B	
9x21mm	D	0.355	0.830	0.393	0.380		0.392	1.16	10	S	
9mm Action Express	J	0.355	0.866	0.394	0.390	0.433	0.435	1.152	18	S	
9mm Steyr	D	0.355	0.90	0.381	0.380		0.380	1.30	?	B	
38-45 Hard Head	C	0.355	0.90	0.476	0.381	0.475	0.476	1.20	14	L	
9mm Bayard	D	0.355	0.91	0.392	0.375		0.390	1.32	?	B	
9mm Mauser	D	0.355	0.981	0.390	0.376		0.389	1.38	1-12	B	
9mm Winchester Magnum	D	0.355	1.16	0.394	0.379		0.392	1.545	1-10	SP	
380 Automatic	D	0.356	0.68	0.374	0.373		0.373	0.98	12-16	SP	
38 Colt Automatic	H	0.356	0.90	0.405	0.382		0.383	1.28	16	SP	
38 Super Automatic (+P)	H	0.356	0.90	0.405	0.382		0.383	1.28	16	SP	
9x57mm Mauser	C	0.356	2.21	0.468	0.380	0.428	0.467	3.10	?	.217	5603
9x57R Mauser	A			0.515		0.424		3.18			
9x56mm Mannlicher	C	0.356	2.22	0.464	0.378	0.408	0.464	3.56	?	.217	5603
357 SIG	C	0.357	0.865	0.424	0.381	0.424	0.425	1.140	16	S	
357 Maximum	B	0.357	1.59	0.433	0.375	—	0.375	1.97	14	S	
38 Long Colt	B	0.357	1.03	0.433	0.377		0.378	1.32	16	SP	
38 Special	B	0.357	1.16	0.440	0.379		0.379	1.55	16-18	SP	
38 Special Match											
38 Special+P											
357/44 Bain & Davis	A	0.357	1.28	0.515	0.383	0.454	0.455	1.55	14	L	
357 Magnum	B	0.357	1.29	0.440	0.379		0.379	1.51	16-18.8	SP	
357 Automatic Magnum	C	0.357	1.298	0.473	0.382	0.461	0.470	1.60	18	LP	
357 Maximum	B	0.357	1.59	0.433	0.375		0.375	1.97	14	SP	
357 Herett	A	0.357	1.75	0.505	0.375	0.405	0.420	2.10	14	L	
35-30/30	A	0.357	2.04	0.506	0.378	0.401	0.422	2.55	12-14	L	
360 Nitro for Blackpowder (2¼")	B	0.357	2.25	0.480	0.384		0.430	2.63	?	.241	34
9x63mm	C	0.357	2.48	0.468	0.384	0.427	0.467	3.28	?	.217	5603

Cartridge	Case Type	Bullet Diam.	Case Length	Rim Diam.	Neck Diam.	Shoulder Diam.	Base Diam.	Ctge. Length	Twist	Primer	RWS/ Kynoch Primer #
400/350 Rigby	A	0.357	2.75	0.520	0.380	0.415	0.470	3.55	?	.241	34
9x70Rmm Mauser	A	0.357	2.76	0.525	0.385	0.418	0.467	3.37	?	?	?
350 Griffin & Howe Magnum	E	0.357	2.848	0.528	0.382	0.446	0.511	3.64	12-16	L	
38 Automatic & Super Automatic	H	0.358	0.90	0.405	0.382	—	0.383	1.28	16	S	
35 Remington	C	0.358	1.92	0.460	0.384	0.4259	0.4574	2.52	16	L	
358 Winchester	C	0.358	2.015	0.473	0.386	0.454	0.4703	2.78	12	L	
356 Winchester	G	0.358	2.015	0.508	0.388	0.454	0.4703	2.56	12	L	
350 Remington Magnum	E	0.358	2.17	0.532	0.388	0.495	0.512	2.80	16	L	
358 JDJ	A	0.358	2.2		0.362	0.453	0.465	3.065	?	L	
35 Winchester	A	0.358	2.41	0.539	0.378	0.412	0.457	3.16	12	L	
35 Whelen	C	0.358	2.494	0.473	0.388	0.441	0.470	3.34	12-14	L	
358 Norma Magnum	E	0.358	2.52	0.526	0.384	0.489	0.508	3.22	12	L	
35 Newton	C	0.358	2.52	0.525	0.383	0.498	0.523	3.35	12	L	
350 Rigby Magnum	C	0.358	2.75	0.525	0.380	0.443	0.519	3.60		.241	K-34
350 No. 2 Rigby	A	0.358	2.75	0.520	0.380	0.415	0.470	3.60		.241	K-34
400/360 Nitro Exp. (2¾″)	A	0.358	2.75	0.590	0.375	0.437	0.470	3.59		.241	
358 Shooting Times Alaskan	E	0.358	2.855		0.484	0.500	0.532	3.655	14	L	
38 S&W	B	0.359	0.78	0.433	0.386		0.386	1.20	16-18	SP	
35-30 Maynard 1882	B	0.359	1.63	0.494	0.395		0.400	2.03	16-18	S	
35-40 Maynard	B	0.360	2.06	0.492	0.390		0.400	2.53	16-18	S	
35-40 Maynard 1873	B	0.360	2.10	0.764	0.390		0.403	2.57	16-18	B-1	
360 No. 5 Rook	B	0.362	1.05	0.432	0.375		0.380	1.35	?	?	?
9mm Makarov	D	0.363	0.71	0.396	0.384		0.389	0.97	?	B	
38-45 Stevens	B	0.363	1.76	0.522	0.395		0.455	2.24	16-18	S	
35-30 Maynard 1873	B	0.364	1.63	0.765	0.397		0.403	2.10	16-18	B-1	
9.3x53mm Swiss	C	0.365	2.11	0.491	0.389	0.453	0.492	2.80	?	?	?
9.3x53Rmm Swiss	A			0.563	0.391	0.455	0.494	2.83			
9.3x57mm Mauser	C	0.365	2.24	0.469	0.389	0.428	0.468	3.23	?	.217	5603
360 Express (2¼″)	B	0.365	2.25	0.480	0.384	—	0.430	3.00		.241	K-34
360 Nitro (2¼″)	B	0.365	2.25	0.480	0.384	—	0.430	2.80		.241	K-34
9.3x62mm Mauser	C	0.365	2.42	0.470	0.388	0.447	0.473	3.29	?	.217	5603
9.3x64mm Brenneke	C	0.365	2.52	0.492	0.391	0.475	0.504	3.43	?	.217	5603
9.3x72Rmm Sauer	A	0.365	2.83	0.518	0.390	0.422	0.473	3.34	?	.254	1775
9.3x74Rmm	A	0.365	2.93	0.524	0.387	0.414	0.465	3.74	?	.217	5603
9.3x80Rmm	B	0.365	3.14	0.485	0.386		0.430	3.50	?	.254	1775
9.3x82Rmm	B	0.365	3.21	0.485	0.386		0.430	3.72	?	.254	1775
9.3mm JDJ	A	0.366	2.22	0.506	0.389	0.455	0.465	V	12	LR	
360 No. 2 Nitro-Express (2″/4″)	B	0.367	2.25	0.480	0.384		0.430	2.98	?	.241	34
9.3x65Rmm Collath	A	0.367	2.56	0.508	0.384	0.420	0.443	3.01	?	?	?
400/360 Westley Richards NE	A	0.367	2.73	0.572	0.375	0.437	0.483	3.44	?	?	?
350 Rimless Magnum (Rigby)	C	0.367	2.74	0.525	0.380	0.443	0.519	3.57	?	.241	34
360 Nitro-Express No. 2	A	0.367	3.00	0.631	0.393	0.517	0.539	3.85	?	.254	40
9.3x53Rmm Hebler	A	0.369	2.12	0.550	0.398	0.462	0.484	2.92	?	?	?
35-30 Maynard 1865	B	0.370	1.53	0.771	0.397		0.408	1.98	16-18	Internal	
400/375 Nitro Express (H&H)	E	0.371	2.47	0.466	0.397	0.435	0.465	3.00	?	?	?
38-40 Remington	B	0.372	1.77	0.537	0.395		0.454	2.32	16	S	
38-45 Bullard	A	0.373	1.80	0.526	0.397	0.448	0.454	2.26	16-18	S	
9.1x40Rmm	B	0.374	1.60	0.446	0.385		0.404	2.00	?	?	?
380 Short	B	0.375	0.600	0.430	0.379	—	0.380	1.11		—	—
380 Revolver	B	0.375	0.70	0.426	0.377		0.380	1.10	15	S-B	
38 Long, Center Fire*	B	0.375	1.03	0.441	0.378		0.379	1.45	36	S	
38-35 Stevens	B	0.375	1.62	0.492	0.402		0.403	2.43	?	S	
38 Extra Long, Ballard*	B	0.375	1.63	0.441	0.378		0.379	2.06	36	S	
9.5x47Rmm	A	0.375	1.85	0.583	0.409	0.497	0.513	2.37	?	.254	1775
38-50 Maynard 1882	B	0.375	1.97	0.500	0.415		0.421	2.38	?	S	
375 Winchester	B	0.375	2.02	0.502	0.400		0.4198	2.56	12	L	
375 JDJ	A	0.375	2.2	0.514	0.396	53	0.465	3.13	?	L	
375 Rimless Nitro Express (2¼″)	C	0.375	2.25	0.468	0.403	0.456	0.468	2.96	?	?	?
9.5x57mm Mannlicher	C	0.375	2.25	0.473	0.400	0.460	0.471	2.94	?	.217	5603
9.5x56mm	C	0.375	2.25	0.473	0.400	0.460	0.471	2.94	?	.217	5603
400/375 Belted Nitro Express (H&H)	E	0.375	2.50	0.466	0.397	0.435	0.470	3.00		.217	
375 Flanged Nitro (2½″)	B	0.375	2.50	0.523	0.397		0.456	3.10	?	.217	34
375 Whelen	C	0.375	2.50	0.473	0.403	0.442	0.470	3.42	12	L	
375 Dakota	C	0.375	2.57	0.532	0.402	0.529	0.545	3.32	10	L	
369 Purdey	A	0.375	2.69	0.616	0.398	0.475	0.543	3.59	?	.254	40
375 Canadian Magnum	I	0.375	2.83	0.532	0.402	0.530	0.544	3.60	10	LR	
375 JRS	E	0.375	2.84	0.532	0.498	0.485	0.535	3.69	12	L	
375 Holland & Holland Magnum	E	0.375	2.85	0.530	0.402	0.4478	0.5121	3.60	12	L/.217	40
375 Belted Magnum	E	0.375	2.85	0.530	0.404	0.440	0.464	3.60		.217	60
375 Rimless NE											
375 Weatherby Magnum	E	0.375	2.86	0.530	0.403	0.495	0.513	3.69	12	L	
9.5x73mm Miller Greiss Magnum	C	0.375	2.86	0.541	0.402	0.531	0.543	3.50	?	214	5603
378 Weatherby Magnum	E	0.375	2.92	0.580	0.403	0.560	0.584	3.69	12	L	
375 Flanged Magnum	A	0.375	2.94	0.572	0.404	0.450	0.502	3.69			
380 Long Rifle	B	0.376	1.01	0.435	0.379		0.380	1.33	?	.177	69
9.3x48Rmm	B	0.376	1.89	0.492	0.382		0.433	2.35	?	.254	1775

Cartridge	Case Type	Bullet Diam.	Case Length	Rim Diam.	Neck Diam.	Shoulder Diam.	Base Diam.	Ctge. Length	Twist	Primer	RWS/ Kynoch Primer #
38-50 Ballard	B	0.376	2.00	0.502	0.395		0.425	2.72	20	S	
38-56 Winchester	A	0.376	2.10	0.606	0.403	0.447	0.506	2.50	20	L	
38-50 Remington	B	0.376	2.23	0.535	0.392		0.454	3.07	16	S	
9.3x57Rmm	B	0.376	2.24	0.486	0.389		0.428	2.80	?	.254	1775
9.3x70Rmm	B	0.376	2.75	0.482	0.387		0.427	3.45	?	.254	1775
9.3x72Rmm	B	0.376	2.84	0.482	0.385		0.427	3.27	?	.254	1775
38-90 Winchester Express	A	0.376	3.25	0.558	0.395	0.470	0.477	3.70	26	L	
9.8mm Automatic Colt	D	0.378	0.912	0.405	0.404		0.404	1.267	?	SP	
38-70 Winchester	A	0.378	2.31	0.600	0.403	0.421	0.506	2.73	24	L	
38-72 Winchester	A	0.378	2.58	0.519	0.397	0.427	0.461	3.16	22	L	
38-55 Winchester & Ballard	B	0.379	2.085	0.506	0.392	0.3938	0.422	2.51	18	L	
41 Long Colt	B	0.386	1.13	0.430	0.404-		0.405	1.39	16	SP	
9.5mm Turkish Mauser	A	0.389	2.37	0.612	0.411	0.487	0.511	2.97	20	B	
400 Nitro for Blackpowder (3″)	B	0.395	3.00	0.522	0.427		0.471	3.56	?	.254	34
40 S&W Automatic	D	0.400	0.850	0.424	0.423		0.423	1.135	16	SP	
10mm Automatic	D	0.400	0.99	0.424	0.423		0.423	1.26	16	LP	
41 Short Colt	B	0.401	?	0.430	0.404	—	0.405	?	?	S	
401 Herter Powermag	B	0.401	1.29	0.483	0.425		0.426	1.64	18	L	
38-40 Winchester (WCF)	A	0.401	1.30	0.520	0.416	0.4543	0.465	1.59	36	LP	
40-50 Sharps (Necked)	A	0.403	1.72	0.580	0.424	0.489	0.501	2.37	18-20	B-1	
40-50 Sharps (Straight)	B	0.403	1.88	0.554	0.421		0.454	2.63	18	B-1	
40-60 Marlin	B	0.403	2.11	0.604	0.425		0.504	2.55	20	S	
40-70 Sharps (Necked)	A	0.403	2.25	0.595	0.426	0.500	0.503	3.02	18-20	L	
40-63 (40-70) Ballard	B	0.403	2.38	0.555	0.430		0.471	2.55	20	S	
40-65 Ballard	B	0.403	2.38	0.600	0.435		0.508	2.55	18-20	B-1	
10.15mm Jarmann	A	0.403	2.40	0.615	0.430	0.540	0.548	3.06	22	B	
40-70 Sharps (Straight)	B	0.403	2.50	0.533	0.420		0.453	3.18	18-20	L	
40-90 Sharps (Necked)	A	0.403	2.63	0.602	0.435	0.500	0.506	3.44	18-20	B-1	
40-85 (40-90) Ballard	B	0.403	2.94	0.545	0.425		0.477	3.81	18-20	S	
40-90 Sharps (Straight)	B	0.403	3.25	0.546	0.425		0.477	4.06	18	B-1	
40-110 Winchester Express	A	0.403	3.25	0.651	0.428	0.485	0.543	3.63	28	L	
40-60 Winchester	A	0.404	1.87	0.630	0.425	0.445	0.506	2.10	40	S	
10.25x69Rmm Hunting-Express	A	0.404	2.72	0.630	0.415	0.480	0.549	3.17	?	.254	1775
40-70 Remington	A	0.405	2.25	0.595	0.434	0.500	0.503	3.00	18-20	L	
40-70 Winchester	A	0.405	2.40	0.604	0.430	0.496	0.504	2.85	20	L	
400 Whelen	C	0.405	2.49	0.473	0.436	0.462	0.470	3.10	16	L	
400 Purdey (3″)	B	0.405	3.00	0.516	0.427	—	0.469	3.60		.241	K-34
450/400 Nitro Express (3¼″)	A	0.405	3.25	0.615	0.432	0.502	0.544	3.85	?	.254	40
401 Winchester SL	H	0.406	1.50	0.457	0.428		0.429	2.00	14	L	
40-65 Winchester	B	0.406	2.10	0.604	0.423		0.504	2.48	20-26	L	
40-75/82 Winchester	A	0.406	2.40	0.604	0.428	0.448	0.502	2.77	28	L	
40-72 Winchester	B	0.406	2.60	0.518	0.431		0.460	3.15	22	L	
450/400 (2 3/8″)	A	0.407	2.38	0.616	0.427	0.456	0.545	2.95		—	—
40-70 Peabody	A	0.408	1.76	0.662	0.428	0.551	0.581	2.85	18	L	
40-90 Peabody	A	0.408	2.00	0.659	0.433	0.546	0.586	3.37	?	B-1	
450/400 Nitro (3″)	A	0.408	3.00	0.613	0.434	0.518	0.545	3.75	?	.254	40
41 Action Express	J	0.410	0.866	0.394	0.434	—	0.435	1.17	16-18	S	
41 Remington Magnum	B	0.410	1.28	0.488	0.432	—	0.433	1.58	18	L	
400 Jeffery (450/400 3″)	A	0.410	3.00	0.613	0.434	0.518	0.545	3.75		.254	K-40
411 JDJ	A	0.411	2.235	0.506	0.425	0.455	0.465	V	14	LR	
10.15mm Serbian Mauser	A	0.411	2.46	0.592	0.433	0.515	0.520	3.13	22	B	
405 Winchester	B	0.412	2.58	0.543	0.436		0.461	3.18	14	L	
40-90 Bullard	A	0.413	2.04	0.622	0.430	0.551	0.569	2.55	18	L	
40-75 Bullard	B	0.413	2.09	0.606	0.432		0.505	2.54	20	S	
10.4mm Swiss Vetterli	A	0.415	1.60	0.630	0.437	0.518	0.540	2.20	26	B-RF	
40-40 Maynard 1882	B	0.415	1.78	0.532	0.450		0.456	2.32	18-20	S	
10.3x60Rmm Swiss	A	0.415	2.36	0.619	0.440	0.498	0.547	3.08	?	?	?
416 Barnes	A	0.416	2.112	0.608	0.432	0.484	0.505	2.95	14	L	
416 JDJ	A	0.416	2.22	0.506	0.430	0.455	0.465	V	14	LR	
416 Taylor	E	0.416	2.50	0.533	0.440	0.489	0.512	3.33	14-16	L	
416 Howell	C	0.416	2.5		0.444	0.515	0.545	3.25	12	L	
416 Rem. Magnum	E	0.416	2.85	0.530	0.447	0.487	0.509	3.60	14	L	
416 Hoffman	E	0.416	2.85	0.530	0.446	0.491	0.513	3.372	14-16	L	
416 Dakota	C	0.416	2.85		0.441	0.527	0.545	3.645	10	L	
416 Rigby	C	0.416	2.90	0.586	0.4461	0.5402	0.589	3.75	16½	L/?	?
416 Weatherby Magnum	E	0.416	2.915	0.580	0.444	0.561	0.582	3.75	14	L	
40-60 Maynard 1882	B	0.417	2.20	0.533	0.448		0.454	2.75	18-20	S	
40-70 Maynard 1882	B	0.417	2.42	0.535	0.450		0.451	2.88	18-20	B-1	
44 Evans Short	B	0.419	0.99	0.513	0.439		0.440	1.44	36	S	
44 Evans Long	B	0.419	1.54	0.509	0.434		0.449	2.00	36	L	
10.5x47Rmm	A	0.419	1.85	0.591	0.445	0.496	0.513	2.40	?	.254	1775
404 Rimless Nitro	C	0.421	2.86	0.537	0.450	0.520	0.544	3.53	?	.217	81
404 Jeffery (10.75x73mm)	C	0.421	2.86	0.537	0.450	0.520	0.544	3.53	?	.217	
10.75x73mm	C	0.421	2.86	0.537	0.450	0.520	0.544	3.53	?	.217	?
10.4mm Italian	B	0.422	0.89	0.505	0.444		0.451	1.25	10	B	
40-40 Maynard 1873	B	0.422	1.84	0.743	0.450		0.460	2.34	18-20	B-1	

Cartridge	Case Type	Bullet Diam.	Case Length	Rim Diam.	Neck Diam.	Shoulder Diam.	Base Diam.	Ctge. Length	Twist	Primer	RWS/ Kynoch Primer #
40-70 Maynard 1873	B	0.422	2.45	0.759	0.450		0.451	3.00	18-20	B-1	
44 Henry (Center Fire)	B	0.423	0.88	0.523	0.443		0.445	1.36	36	S	
40-40 Maynard 1865	B	0.423	1.75	0.766	0.450		0.458	2.24	18-20	Internal	
425 Express	E	0.423	2.552	0.532	0.446	0.490	0.513	3.38	14	L	
10.3x65Rmm Baenziger	B	0.423	2.56	0.505	0.431		0.462	3.15	?	?	?
10.75x57mm Mannlicher	C	0.424	2.24	0.468	0.448	0.465	0.468	3.05	?	?	?
10.75x63mm Mauser	I	0.424	2.47	0.467	0.447	0.479	0.493	3.22	?	?	?
10.75x65Rmm Collath	B	0.424	2.56	0.542	0.451		0.487	3.02	?	?	?
10.75x68 Mauser	C	0.424	2.67	0.488	0.445	0.470	0.492	3.16	?	.217	5603
44-40 Winchester	A	0.427	1.31	0.525	0.443	0.4568	0.471	1.592	20-36	LP	
44-40 Extra Long	A	0.428	1.58	0.515	0.442	0.463	0.468	1.96	36	S	
44 S&W Russian	B	0.429	0.97	0.515	0.457		0.457	1.43	20	LP	
44 S&W Special	B	0.429	1.16	0.514	0.457		0.457	1.62	20	LP	
44 Magnum	B	0.429	1.29	0.514	0.457		0.457	1.61	20	LP	
44 Automatic Magnum	D	0.429	1.298	0.472	0.457		0.470	1.60	18-20	LP	
444 Marlin	B	0.429	2.225	0.514	0.453	0.4549	0.469	2.57	38	L	
10.4mm Italian M-70	A	0.430	1.87	0.634	0.437	0.517	0.540	2.46	26	B	
10.75mm Russian Berdan	A	0.430	2.24	0.637	0.449	0.506	0.567	2.95	21	B	
11mm Murata	A	0.432	2.36	0.632	0.465	0.526	0.542	3.13	20	B	
44 S&W American	B	0.434	0.91	0.506	0.438		0.440	1.44	20	LP	
11mm Belgian Albini	A	0.435	2.00	0.678	0.472	0.535	0.580	.6	22	B	
425 Westley Richards Magnum	I	0.435	2.64	0.467	0.456	0.540	0.543	3.30	?	?	?
44 Webley	B	0.436	0.69	0.503	0.470		0.472	1.10	20	L-B	
11mm Belgian Comblain	A	0.436	2.10	0.673	0.460	0.532	0.575	2.76	22	B	
44 Long Ballard*	B	0.439	1.09	0.506	0.440		0.441	1.65	36	S	
44 Extra Long Ballard (CF)*	B	0.439	1.63	0.506	0.441		0.441	2.10	36	S	
11.15mm Spanish Rem.	A	0.439	2.25	0.635	0.458	0.512	0.516	2.82	20	B	
44 Bull Dog	B	0.440	0.57	0.503	0.470		0.473	0.95	21	S-B	
44 Extra Long Wesson*	B	0.440	1.63	0.510	0.441		0.441	2.19	36	S	
11.2x60mm Schuler (Mauser)	I	0.440	2.35	0.465	0.465	0.512	0.512	2.86	?	.217	5601
11.2x72mm Schuler (Mauser)	I	0.440	2.80	0.469	0.465	0.510	0.536	3.85	?	.217	5601
10.8x47Rmm Martini Target	A	0.441	1.75	0.591	0.463	0.512	0.516	2.23	?	.254	1775
11.15mm Werndl M-77	A	0.441	2.27	0.617	0.466	0.536	0.545	3.02	28	B	
44-90 Rem, Special (Necked)	A	0.442	2.44	0.628	0.466	0.504	0.506	3.08	?	L	
44-90 (44-100) Rem. (Straight)	B	0.442	2.60	0.568	0.465		0.503	3.97	22-30	L	
44 Colt	B	0.443	1.10	0.483	0.450		0.456	1.50	16	LP	
44-95 Peabody	A	0.443	2.31	0.670	0.465	0.550	0.580	3.32	?	B-1	
11.75mm Montenegrin	B	0.445	1.40	0.555	0.472		0.490	1.73	?	B	
44-70 Maynard 1882	B	0.445	2.21	0.601	0.466		0.499	2.87	?	B-1	
11mm French Gras	A	0.445	2.34	0.667	0.468	0.531	0.544	3.00	22	B	
11x59Rmm Vickers	A	0.445	2.34	0.667	0.468	0.531	0.544	3.00	22	B	
44-75 Ballard	B	0.445	2.50	0.603	0.487		0.497	3.00	?	B-2	
44-100 Ballard	B	0.445	2.81	0.597	0.485		0.498	3.25	20	L	
44-100 Wesson	B	0.445	3.38	0.605	?		0.515	3.85	?	L	
44-77 Sharps & Remington	A	0.446	2.25	0.625	0.467	0.502	0.516	3.05	?	L-B-1	
11.15mm (43) Mauser	A	0.446	2.37	0.586	0.465	0.510	0.566	3.00	22	B	
44-90 (44-100) Sharps 2 5/8"	A	0.446	2.63	0.625	0.468	0.504	0.517	3.30	?	B-1	
44-85 Wesson	B	0.466	2.88	0.605	?		0.515	3.31	?	L	
44-60 Sharps & Remington	A	0.447	1.88	0.630	0.464	0.502	0.515	2.55	?	L-B-1	
44-60 Peabody 8 Winchester	A	0.447	1.89	0.628	0.464	0.502	0.518	2.56	?	B-1	
11.43mm Turkish	A	0.447	2.30	0.668	0.474	0.560	0.582	3.12	22	B	
11.43mm Egyptian	A	0.448	1.94	0.668	0.479	0.542	0.581	2.73	20	B	
11.4mm Werndl M-73	B	0.449	1.97	0.571	0.472		0.493	2.55	29	B	
44-90/100/110 Maynard 1873	B	0.450	2.88	0.759	0.490		0.497	3.46	?	B-1	
11mm French Ordnance	B	0.451	0.71	0.491	0.449	—	0.460	1.18	16	B	
11mm German Service	B	0.451	0.96	0.509	0.449	—	0.453	1.21	23	B	
45 Winchester Magnum	D	0.451	1.198	0.481	0.475	—	0.477	1.55	16	LP	
500/450 BP No. 2 Musket	A	0.458	2.36	0.658	0.486	0.535	0.576	2.90	?	?	
45 Sharps 2.6"	B	0.451	2.60	0.597	0.489	—	0.500	2.85	18-20	B-1	
45 Sharps 2 3/4"	B	0.451	2.75	0.597	0.489	—	0.500	3.00	18-20	B-1	
45 Sharps 2 7/8"	B	0.451	2.87	0.597	0.489	—	0.500	3.00	18-20	B-1	
11mm French Ordnance	B	0.451	0.71	0.491	0.449	—	0.460	1.18	16	B	
45-120 Sharps (3 1/4")	B	0.451	3.25	0.597	0.490		0.506	4.16	18	L	
45 Webley	B	0.452	0.82	0.504	0.471		0.471	1.15	?	L-B	
45 Automatic Short	D	0.452	0.860	0.476	0.476		0.476	1.17	16	LP	
45 Automatic-Rim	B	0.452	00.898	0.516	0.472		0.476	1.28	15-16	LP	
45 Automatic (+P)	D	0.452	00.898	0.476	0.476		0.476	1.17	16	LP	
451 Detonics	D	0.452	0.942	0.476	0.476		0.476	1.17	16	L	
45 Colt (Post WW-II)	B	0.452	1.29	0.512	0.476	—	0.480	1.60	16	LP	
454 Casull	B	0.452	1.29	0.512	0.476		0.480	1.60	16	L	
11.4mm Brazilian Comblain	A	0.452	2.02	0.682	0.494	0.530	0.588	2.62	22	B	
45-100 Remington (Necked)	A	0.452	2.63	0.645	0.490	0.550	0.558	3.26	18-20	L	
45 Webley Revolver Mk-II	B	0.454	0.77	0.535	0.476		0.480	1.23	16-20	L-B	
45 S&W Schofield	B	0.454	1.10	0.522	0.477		0.476	1.43	24	LP	
45 Colt	B	0.454	1.29	0.512	0.476		0.480	1.60	16	LP	
45 Colt (Post WW-II)		0.452									

Cartridge	Case Type	Bullet Diam.	Case Length	Rim Diam.	Neck Diam.	Shoulder Diam.	Base Diam.	Ctge. Length	Twist	Primer	RWS/ Kynoch Primer #
45-50 Peabody	A	0.454	1.54	0.634	0.478	0.508	0.516	2.08	?	?	
45-60 Winchester	B	0.454	1.89	0.629	0.479		0.508	2.15	20	L	
45-75 Winchester	A	0.454	1.89	0.616	0.478	0.547	0.559	2.25	20	L	
11.5mm Spanish Reformado	B	0.454	2.26	0.631	0.466		0.525	3.06	20	B	
45-100 Ballard	B	0.454	2.81	0.597	0.487		0.498	3.25	20	L	
450 Revolver	B	0.455	0.69	0.510	0.475		0.477	1.10	16	L-B	
455 Enfield (455 Colt)	B	0.445	0.87	0.530	0.473		0.478	1.35	?	L-B	
455 Webley Automatic	H	0.455	0.93	0.500	0.473		0.474	1.23	10	B	
577/450 Martini Henry	A	0.455	2.34	0.746	0.487	0.628	0.668	3.12	33	B	
500/450 Magnum Nitro-Express	A	0.455	3.25	0.644	0.479	0.500	0.570	3.91	?	.254	40
450 No. 2 Express (3½″)	A	0.455	3.50	0.650	0.477	0.518	0.564	4.28	?	.254	40
45-125 Winchester	A	0.456	3.25	0.601	0.470	0.521	0.533	3.63	36	L	
11mm Beaumont M-71	A	0.457	2.04	0.665	0.484	0.528	0.576	2.54	30	B	
450/400 Nitro Express for Blackpowder	A	0.457	2.36	0.615	0.247	0.486	0.544	2.89	?	?	?
458x1½ Barnes	F	0.458	1.50	0.530	0.493		0.509	2.19	16	Bx	
45 Silhouette	B	0.458	1.51	0.600	0.477		0.501	1.97	18	L	
458 Whisper	F	0.458	1.75	0.525	0.485	—	0.506	V	V	LR	
458x2″ American	F	0.458	2.00	0.532	0.478		0.508	2.60	14-16	L	
45-(2.1″) Sharps Straight	B	0.458	2.105	0.608	0.480	0.4813	0.500	2.43	18-22	L	
45-70 Government	B	0.458	2.105	0.608	0.480		0.500	2.55	18-22	L	
45-70 500 Government	B	0.458	2.105	0.608	0.480		0.500	2.70	18-22	L	
45-75 Sharps	B	0.458	2.105	0.608	0.480		0.500	2.90	18-22	L	
45-70 Van Choate	B	0.458	2.250	0.608	0.480		0.500	2.91	18-22	L	
45-78 Wolcott	B	0.458	2.310	0.608	0.480		0.500	3.19	18-22	L	
500/450 No. 2 Musket	A	0.458	2.36	0.658	0.486	0.535	0.576	2.90			
45-80 Sharpshooter	B	0.458	2.400	0.608	0.480		0.500	3.25	18-22	L	
45-82/85/90 Winchester	B	0.458	2.40	0.597	0.477		0.501	2.88	32	L	
458 Winchester Magnum	F	0.458	2.50	0.532	0.4811		0.513	3.34	14-16	L	
450 Howell	C	0.458	2.5	0.532	0.480	0.515	0.545	3.25	14	L	
460 Short A-Square	K	0.458	2.50	0.579	0.484	0.560	0.582	3.50	10	LR	
500/450 No. 1 Express	A	0.458	2.75	0.660	0.485	0.530	0.577	3.25	?	.251	31A
458 Lott	F	0.458	2.80	0.530	0.480		0.513	3.60	14-16	L	
450 Ackley Magnum	E	0.458	2.845	0.527	0.478	0.495	0.508	3.685	16	C	
450 Watts Magnum	E	0.458	2.85	0.530	0.481		0.513	3.65	14	L	
450 Dakota	C	0.458	2.9	0.568	0.485	0.560	0.589	3.74	10	L	
460 Weatherby Magnum	E	0.458	2.91	0.580	0.485	0.560	0.584	3.75	14	L	
450 Nitro Express (3¼″)	B	0.458	3.25	0.626	0.479		0.548	3.85	?	.254	40
500/450 Magnum Express *	A	0.458	3.25	0.644	0.479	0.500	0.570	0.644	3.91	.254	K-40
450 No. 2 Nitro Express (3½″)	A	0.458	3.50	0.650	0.477	0.518	0.564	4.42		.254	K-40
450 Rigby Match	B	0.461	2.40	0.598	0.472		0.507	3.70	?	?	?
11.4mm Danish Remington	B	0.462	2.01	0.579	0.486		0.514	2.45	29½	B	
11.3mm Beaumont M-71/78	A	0.464	1.97	0.666	0.486	0.530	0.581	2.49	29	B	
500/465 Nitro-Express	A	0.466	3.24	0.650	0.488	0.524	0.573	3.89	?	.254	40
476 Enfield	B	0.472	0.87	0.530	0.474		0.478	1.33	?	B	
475 Ackley OKH	F	0.474	2.739	0.528	0.496		0.508	3.518	16-18	L	
475 Wildey	D	0.475	1.295	0.473	0.497		0.500	1.58	?	L	
475 Linebaugh	B	0.475	1.50	0.600	0.495		0.501	?	?	L	
475 JDJ	B	0.475	2.10	0.604	0.497	—	0.502	V	14	LR	
470 Capstick	F	0.475	2.85	0.532	0.499		0.513	3.65	10	LR	
475 A&M Magnum	E	0.475	2.90	0.533	0.502	0.560	0.584	3.75	14	L	
470 Nitro Express	A	0.475	3.25	0.655	0.504	0.5322	0.572	3.86	?	L	
476 Nitro-Express	A	0.476	3.00	0.643	0.508	0.530	0.570	3.77	?	.254	40
475 Nitro-Express	B	0.476	3.30	0.621	0.502		0.545	3.82	?	.254	40
475 No. 2 Nitro-Express	A	0.483	3.49	0.665	0.510	0.547	0.576	4.26	?	.254	40
475 No. 2 Nitro (Jeffery)	A	0.489	3.50	0.666	0.510	0.547	0.576	4.32	?	.254	40
50 Action Express	J	0.500	1.285	0.514	0.540	—	0.547	1.610	?	L	
577/500 Magnum Nitro-Express	A	0.500	3.13	0.717	0.526	0.585	0.645	3.74	?	.251	31A
12.17x44R Remington M67	B	0.502	1.73	0.624	0.544		0.546	2.13	?	?	?
505 Gibbs	C	0.505	3.15	0.635	0.530	0.588	0.635	3.85	?	.254	40
500 No. 2 Express (577/500)	A	0.507	2.81	0.726	0.538	0.560	0.641	3.40	?	.251	31A
50 Remington Army	A	0.508	0.875	0.665	0.532	0.564	0.565	1.24	?	LP	
577/500 3⅛″ Nitro Express	A	0.508	3.13	0.717	0.526	0.585	0.645	3.74		.251	K-31A
50-90 Sharps	B	0.509	2.50	0.663	0.528		0.565	3.20	?	L	
50-140 (3¼″) Sharps	B	0.509	3.25	0.665	0.528		0.565	3.94	?	L	
50 Action Express	J	0.510	1.285	0.514	0.540		0.547	1.61	?	L	
500 Linebaugh	B	0.510	1.405	0.610	0.540		0.553	1.755	?	L	
500 Jeffery	I	0.510	2.74	0.578	0.535	0.615	0.620	3.50	?	.254	40
495 A-Square	L	0.510	2.80	0.579	0.542	—	0.582	3.60	10	LR	
500 A-Square	K	0.510	2.90	0.579	0.536	0.668	0.582	3.74	10	LR	
500 Jeffery (12.70x70 Schuler)	I	0.510	2.94	0.578	0.535	0.615	0.620	3.50	?	.254	2703
12.70x70 Schuler	I	0.510	2.94	0.578	0.535	0.615	0.620	3.50	?	.254	2703
500 Express (3″)	B	0.510	3.01	0.660	0.535	—	0.580	3.39		.251	K-31A
500 Nitro (3″)	B	0.510	3.01	0.660	0.535		0.580	3.68	?	.251	31A
500 Nitro for Blackpowder (3″)	B	0.510	3.01	0.660	0.535		0.580	3.39	?	.251	31A
510 Nitro	B	0.510	3.245	0.665	0.535		0.565	4.185	?	L	

Cartridge	Case Type	Bullet Diam.	Case Length	Rim Diam.	Neck Diam.	Shoulder Diam.	Base Diam.	Ctge. Length	Twist	Primer	RWS/ Kynoch Primer #
50 Browning Machine Gun (BMG)	C	0.510	3.91	0.804	0.560	0.714	0.804	5.545	16	Bx/CCI-35	
50-115 Bullard	G	0.512	2.19	0.619	0.547	0.577	0.585	2.56	72	L	
50-100/105/110 Winchester	B	0.512	2.40	0.607	0.534		0.551	2.75	54	L	
50-140 (3¼″) Winchester	B	0.512	3.25	0.665	0.531	—	0.565	3.94	?	L	
50-50 Maynard 1882	B	0.513	1.37	0.661	0.535		0.563	1.91	42	L	
50-95 Winchester	A	0.513	1.94	0.627	0.533	0.553	0.562	2.26	60	L	
50-70 Maynard 1873	B	0.514	1.88	0.760	0.547		0.552	2.34	42	B-1	
50-70 Government (Musket)	B	0.515	1.75	0.660	0.535		0.565	2.25	24-42	L	
50 Maynard 1865	B	0.520	1.24	0.770	0.543		0.545	1.75	42	Internal	
55-100 Maynard 1882	B	0.551	1.94	0.718	0.582		0.590	2.56	?	L	
577 (14.7mm) Snider	B	0.570	2.00	0.747	0.602		0.660	2.45	78	B	
585 Nyati	C/I	0.585	2.79	0.586	0.605	0.650	0.660	3.525	?	L	
577 Tyrannosaur	C	0.585	2.99	0.688	0.614	0.673	0.688	3.71	12	LR	
577 Nitro-Express	B	0.585	3.00	0.748	0.608		0.660	3.70	?	.254	40
58 Berdan Musket	B	0.589	1.75	0.740	0.625		0.646	2.15	68	B-1	
600 Nitro Express	B	0.622	3.00	0.805	0.648		0.697	3.59	?	.254	40
700 Nitro Express	B	0.700	3.50	0.890	0.728		0.780	4.20	?	?	?
70-150 Winchester	A	0.705	2.18	0.870	0.725	0.790	0.805	2.63	?	L	

Notes: Bullet diameter can vary by several thousandths. The sizes listed are those that are most commonly encountered or are as specified in appropriate standards.

Cartridge length is not a particularly useful measure for identifying cardridges: This often varies widely, depending upon load type and bullet weight; it can vary between manufacturers; and it can vary with time, standard length from one era might not hold in another. An example is the 45-70 cartridge: 405gr. Loads from the 1870s are about 2.625″ long while current standards call for a maximum length of 2.55″. Similar examples abound.

Rim types (For simplicity the various common rimmed/rimless pairs are listed together but with separate dimension, where variation occurs):
A-Rimless bottleneck; B-Rim, straight; C-Rimless, straight; E-Belted, bottleneck; F-Belted, straight; G-Semi-rimmed, bottleneck; H-Semi-rimmed, straight; I-Rebated, bottleneck; J-Rebated, straight

Twist (standard factory) is given as inches per complete revolution, e.g., 12 means 1 turn in 12″ of barrel, etc.

Unless otherwise noted all dimensions are in inches. 25.4mm, exactly, equals 1 inch.

Primer: S-Small rifle (1.75″) SP-Small pistol (.175″) L-Large rifle (.210″) LP-Large Pistol (.210″) B—Berdan B-1—Berdan #1 B-2—Berdan #2 Berdan Diameter (inches) and DWM part number are also sometimes given.

Note on Blackpowder primers: Not all companies used the same primer type or size in the same caliber or length case. For example, the 45-70 or its equivalent was usually loaded with the standard large-rifle diameter primers. However, Marlin's version used small-rifle diameter primer and Sharps Co., ammunition used Berdan primers. Primer type and size listed is what appears to have been the most general (common?) size and type used.

Finally, earliest loadings for the military and possibly other cartridges used an internal primer and were not reloadable. This practice continued until about 1877, perhaps later with some manufacturers. In some instances the earliest outside primers were 0.250″ in diameter. Some early 30-06 military loading also used a 0.250″ primer. It is possible other oddball primer sizes might be encountered, for example, both the 38-40 and the 45 Automatic have sometimes been loaded with small diameter Boxer primers. Likely this is true of the 44-40 and perhaps many other chamberings, too.

Notes on handgun primers: Magnum pistol cartridges are usually loaded with special Magnum primers and the 22 Remington Jet and 256 Winchester are sometimes loaded with Small Rifle primers. The 454 Casull is always loaded with Small Rifle primers. During WWI, Frankford Arsenal made 45 Automatic cases with special #70 primers of .204″ diameter instead of the standard .210″. Recently, at least one foreign manufacturer produced 45 Automatic ammunition using small-pistol primers.

*Cartridges so marked used an outside lubricated bullet when originally introduced; these bullets were heel-based. The front was about the same diameter as the outside of the case neck (shell mouth) just like a modern 22 rim fire cartridge. Later, inside-lubricated loadings used an inside case mouth diameter bullet: these bullets usually had a long, hollow base intended to expand to fill the rifling while providing a cleaner to handle load. (This system was never particularly successful.)

V**Various versions exist, these differ chiefly in length of the case and loaded cartridges.

**Original 22-10-45 Maynard case length was 1.25″.

***This is a Blackpowder primer smaller than standard small rifle or pistol size. It has not been used or available for decades.

****The 8x60mm, 8x60Rmm (dimensionally similar to the 8x60mm Mauser, except for the rim) and 8x64mm Brenneke, are dimensionally the same as ″S″ designated series, shown, excepting use of bullets of .318″ diameter.

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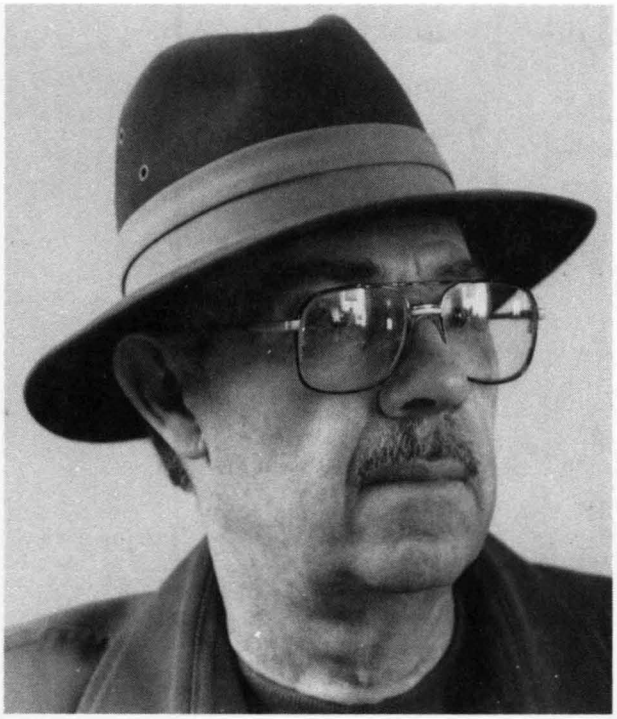
Frank C. Barnes
1918-1992



IT IS NOT GIVEN to many of us in the bookish trades to create perennials, books that go on and on. Fellow named Webster did it with dictionaries and a lady named Irma Rombauer hit a good lick with *Joy of Cooking* and Frank Barnes made the grade with this very book, CARTRIDGES OF THE WORLD.

Actually, Barnes was not, at the beginning, very deeply into bookish stuff. He was more of a doer. However, COTW caught him well and truly and held him, one edition after another, for decades.

Barnes died in 1992 and was sick a while before that. It was then he handed over the job, sure that the book (and the royalties) would go on for more decades. It's going to be that way, too, and it will be Frank Barnes' book the whole time.

Frank C. Barnes was born in Chicago June 25, 1918. How early he caught firearms fever we don't know; we do know he began collecting cartridge data about age 12, which would be about 1930 or 64 years ago.

Before he began to write of guns and ammunition, the writer-to-be made a living as a geologist-engineer and spent a lot of time in the field in the West and Southwest. He did not, he said many times, "go hunting," because he was already there. This experience made Barnes into a practical hunter-rifleman, entitled to his opinions on rifles and shotguns and their cartridges. Barnes came to the same sort of competence with handguns even earlier—his father was a police officer who let his son shoot his sidearms if he kept them clean.

The net result was a practical sort of fellow and his principal creation, CARTRIDGES OF THE WORLD, is a practical sort of book. He decided it should cover all the cartridges that count, that it should be a great guide to all of those and not get lost in the esoteric worlds of headstamps and variations. It proved a good plan. It is not surprising how many prominent cartridge collections began as attempts to secure one each of those listed in Barnes' book.

He tried his hand at lots of things besides books, of course. Barnes was a pilot and raced sports cars and rode motorcycles. Eventually he took a Masters in Justice and taught law enforcement matters at the college level.

And he designed cartridges, too, becoming a respected wildcatter. When he generated the 458 American by cutting ½-inch off the redoubtable 458 Winchester Magnum, Barnes put it into a practical rifle. A big Mauser, you say, in the British style? No. A California-styled Weatherby? No. His shortened big bore fit very nicely into a short-actioned 722 Remington, stocked to the muzzle. He hunted with it for years.

Barnes' last project, his last wildcat, was another practical sort of thing. It involved a 416 on the 45-70 case fitted into the Marlin Model 1895 lever-action rifle. This one was not to be, however—he just didn't get it finished.

He did finish enough in his 74 years, however. If he's remembered as long as his book lasts, that's a lot longer than the rest of us ever count on.

Ken Warner