



The Spanish Mauser Inquisition

By [Mark Trope](#) & [R. Ted Jeo](#)

WARNING!

As we have no control over your rifle, ammo and shooting habits, there is no implied or otherwise stated fact that YOUR rifle is safe to use. When in doubt, have a qualified gunsmith check it out. Here we present information gathered from recognized sources and combine them with our OWN rifles, ammo and shooting experiences for your information only.

The article Ted and I wrote about the Spanish FR8 generated a lot of feedback, in a very short time! There are a lot of questions about Spanish Mausers, both those made for Spain by German contractors, and those produced in Spanish arsenals. There is some confusion also. The purpose of this article is to answer some of the questions that crop up quite frequently, and to debunk a few myths. This article is not meant to be an inclusive history of Spanish arms.

Now, I happen to actually enjoy research! Preparing for this article found me surrounded by books, a couple borrowed, and most out of my considerable firearms library. I tried to get more than one reference to verify data. A lot of the investigative work has been done awhile back, some as much as 50 plus years ago! Pulling it all together has been a very rewarding project.

Questions seem to center around two areas when it comes to Spanish Mausers. The first question centers around is which model is it, a 93, 1916, 1943, FR7 or FR8? How do you tell them apart? What parts will interchange? Why do some rifles, which look exactly alike, fire two different cartridges, or is it three?

The second question revolves about safety and ammo. What ammo is safe to fire in these rifles? Do you need "special" ammo? Are Spanish Mausers fragile pot metal, only good for wall hangers, or are they safe to shoot? Questions crop up like "The ad said it fires .308 Winchester, but it is marked 7.62 NATO, and my buddy said it fires a secret Spanish round called the 7.62 CETME, I'm confused! Help!" Ok, let's look at a bit of history first, before we get to cartridges and reloading.

Over 100 years ago Spain was on the cutting edge when they sought a new battle rifle. They were looking for a reliable magazine fed repeater that used smokeless powder. Specifications called for a small caliber using jacketed bullets. The chosen rifle would have to be designed so troops could field strip it without tools, and reassembly would have to be "goof proof".

That was a tall order for any firearms designer of the day except Paul Mauser. Paul Mauser had been steadily upgrading and improving his original single shot black powder model of 1871. When weaknesses were identified, Mauser reworked his design. But, he just did not retrofit a "quick fix"; Mauser made subtle design changes to the entire action to complement the system. Mauser saw the entire program going to smokeless powder and upgraded his entire design to reflect that trend.

As breech pressures increased with smokeless powder, Mauser continued to upgrade his metallurgy and heat treatment to reflect those changes. This is a very important point; we will discuss it again when we look at loads and cartridges.

When the Spanish rifle trials were announced, Mauser had the model 1893 ready to go. The new rifle won against all contenders, hands down!

Information Tidbit

Paul Mauser was awarded the Grand Cross of the Order for Military Merit by the Spanish government for his work on the Spanish Model 1893.

The 1893 action has a two-lug design bolt that does not have the third, or safety lug, which was incorporated in the later 1898 pattern design. The 1898 pattern was

produced under many model designations by many countries. For example, Fabrique Nationale (*FN*) in Belgium produced licensed 1898 pattern rifles under various model numbers such as 1924, 1930, 24/30 and 1950.

The 1893 action also lacks the shrouded bolt sleeve and bolt sleeve lock of the 1898 design. The shroud was put on in the event of a primer ruptured. The shroud would keep gas from the shooters face. The lock kept the sleeve from turning when the bolt was opened. The 1893 action was a cock-on-close design.

The 1893 action was fitted out for Spain as long rifles, short rifles and carbines. Although different model numbers may be assigned such as 1893, 1916, model 95, Guardia Civil and later the FR7. 1893 actions and rifles were initially made by Mauser and Ludwig Lowe in Germany and later made in Spanish arsenals. While the German guns were better finished and fitted, both German and Spanish made guns were of about equal strength. For the purpose of this article we will simply use the 1893 designation.

Remember the Maine! Cuba 1898

The 7mm Mauser rifle was used by the Spanish troops in Cuba during the Spanish American war. The US regular troops were armed with the .30-40 Krag-Jorgensen rifle. Using modern smokeless powder and having similar accuracy as the Mauser, they still lacked in reloading speed. The Krag required rounds to be dumped in singly into the side loading port. The Mauser, on the other hand, could be stripper clip loaded. The rest of US troops (reserve and national guard units) were still armed with the Springfield trapdoor rifles using black powder cartridges. The use of these black powder rifles was repeatedly stated as causing smoke that pinpointed where the US shooters were, whereas the smokeless Mauser cartridges allowed the Spanish defenders to remain more "hidden". This factor ultimately led to the adoption of the Mauser action based 1903 Springfield (for which the US had to pay patent infringement to Mauser for prior to WW1.) It should also be noted that artillery wise, the same situation existed. The US forces were still using black powder field pieces whereas the Spanish had smokeless pieces. Because of this, the Spanish were able to determine where the batteries were located and could (and did) bring down effective counter battery fire, for a while.

Source: San Juan 1898, Roosevelt's' Rough Riders, A. Konstam, Osprey 1998.

Some are afraid to shoot an 1893 type rifle without that third lug, so, just for a few minutes we will take things a bit out of order. Let's jump ahead to the 1898 pattern actions. There is some confusion as to the function of the

third lug in model 1898 pattern rifles. A bit of explanation is in order here. The third lug is not supposed to bear on the action in a properly functioning rifle. If the third lug is bearing in an 1898 pattern rifle, do not shoot it! That means the locking lugs have set back into the receiver and a condition of excessive headspace exists! I have seen one 1898 pattern rifle with the third lug bearing. It was a Chinese made copy of the K 98 made in the 1930's. While the Chinese may have been good at copying things, they had a poor grasp of heat treatment and ordnance steels (*At least on this one specimen*).



Figure 1. Photo of Disassembled 1893 Bolt



Figure 2. Photo of Disassembled 1898 Bolt

The common question seems to be, "Is it safe to shoot 7.62 NATO or .308 Winchester from an 1893 type rifle which has been rebarreled and" 7.62" stamped on the receiver ring? What about this mystery cartridge the 7.62 CETME?"

Let's get this CETME cartridge debunked right now. The ORIGINAL cartridge (*among a number of "prototypes"*) was a 7.92 x 40mm round developed for the (*then*) experimental CETME rifle. It was then changed to a 7.62 x 51mm cartridge but at a lower pressure and lighter bullet than the 7.62 NATO. According to sources, this 7.62 CETME round was only used in two rifles, the CETME model A and B assault rifles. The 7.62 NATO is 7.62 x 51mm round also, but is loaded at a higher

pressure and is still in use. The various re-worked rifles, including the FR7/8 and Guardia Civil, were ALL re-chambered in 7.62 NATO.

Recall we said earlier that Mauser upgraded his action designs, materials and heat treatment techniques to keep up with powder and cartridge developments? This may well be the most important thing we discuss about the 1893 action. The original cartridge for the 1893 is the 7 mm Mauser or 7 x 57. This cartridge was designed to have a breech pressure of no more than 46,000 cup. The 1893 action is designed within these parameters. Now, all actions are "proofed" with a high-pressure cartridge, often called a "Blue Pill". However, they are not fed a steady diet of them. All Mauser actions have a bit of insurance built into them, they have to, however, they are not meant to push the envelope all the time.

The American ammo companies stay within that 46,000 cup ceiling for a good reason. I have many reloading manuals. The Speer Manual, specifically states the 1893 type actions should be limited to starting loads in 7 mm Mauser. Other loading manuals have 7mm Mauser loads in two sections; mild loads for military rifles, another section for commercials (*Rugers, Winchesters etc*).

In the 1950's Spain rebarreled many 1893 types to the 7.62 NATO cartridge. Cartridges of the World, 5th Edition by Frank C. Barnes, DBI books, 1985, state the 7.62 NATO, M80 Ball, the standard rifle cartridge, has an average max pressure of 50,000 psi.

However, what about the .308 Winchester? In the book: Handloading, William C. Davis, NRA Publications, 1981, it states: "The commercial .308 Winchester is normally limited to a working pressure of about 52,000 cup, and the maximum average for commercial ammunition should not exceed 55,200 cup."

Military rifles tend to have roomy chambers, usually crowding the high side of tolerance. Throats also tend to be on the long side. Both these factors translate into slightly reduced pressures. So, it seems that firing the 7.62 NATO round in an 1893 type that has been rebarreled and marked 7.62 NATO is safe. Let's remember though, these are old rifles, some in excess of 100 years old. It would be wise to have the rifle completely inspected before firing. And, even then, a rifle, which appears perfect, will benefit greatly from reduced pressure hand loads.

No less of an authority than Frank de Haas, in his book Bolt Action Rifles 4th Expanded Edition, Krause Publications, 2003, states this about 1893 type actions: "I advise limiting the cartridge choice to those originally used, or to other cartridges within the following limits: any cartridge developing less than 45,000 psi breech pressure...I consider all of these actions...as having marginal strength and safety for the .308 Winchester (7.62 NATO) cartridge."

Notice de Haas states "marginal", not dangerous. Again, this seems an admonition to proceed with caution, not a condemnation of the 1893 type.

After WWII, Parker O. Ackley performed "blow up tests" on military actions. In his book, Handbook for Shooters & Reloaders, Volume II, Plaza Publishing, 1966 he states: "It was found the Mauser actions to have a low carbon steel, and were heat treated by a carburizing process. This process is known to the layman as case hardening."

The Mausers have a softer core to withstand the effects of impact, and case hardening on the outer surfaces to resist wear. Ackley had to put excessive overloads in the 1898 type to blow it up. However he did find excessive headspace began to develop before the action blew up. Ackley did not do a test on the 1893 type action, however, his comments about the way Mauser actions were built also applies to the 1893 types.

I have owned a 1916 Spanish Mauser, which was barreled in 7.62 NATO. I fired a handful of 7.62 NATO cartridges in it once, head stamped LC71 (*Lake City*). The rifle handled it fine. After that it was only fired with reduced hand loads, most with cast bullets. Remember, this was one rifle. It does not mean all rifles will do as well. Each rifle is an individual, and needs to be treated as such.

Spain, like most other European countries adopted an 1898 type action during WWII. The Spanish 1898 type was designated Model 43. Its original cartridge was the 8mm Mauser or 8 x 57 (*actually 7.92mm*). The 8mm Mauser cartridge has a long, fascinating history. This cartridge evolved with different bullets, and pressures increased as designers continued to work this cartridge out to its full potential. By WWII, some 8mm Mauser loads were in the 50,000 cup range. Suffice it to say that a serviceable M43 action, being an 1898 type, is safe with

rounds developing 50,000 cup. In the NRA book Hand loading, William C. Davis states: "If the rifle is 98 Mauser, or a another type having a comparably strong action, loads developing up to 50,000 cup are acceptable."

"Psi, or cup, which is it? The authors seem confused. Can't these two characters stick to one method of measurement?"

(Source: "Lyman Reloading Handbook, 46th Ed, 1982)

Ok, here's the deal, CUP stands for Copper Units of Pressure. The CUP method uses a pressure port drilled into the side of a rifle chamber. To the port, a gauge is attached and sealed. A corresponding hole is also drilled into the side of the cartridge round. The gauge contains a piston that rests upon a pure copper pellet and goes through the hole in the chamber and into the cartridge. When the cartridge is fired, the expanding gases cause the piston to move up against the copper pellet, deforming it. The amount of deformation is measured and compared to a reference (Tarage Table) made by the pellet factory. This system only yields the peak pressure attained.

In contrast, the piezoelectric transducer pressure gauge is of a new design that uses a direct measuring detector. Again, a hole is drilled through the receiver and cartridge. When the cartridge is fired, the pressure of the expanding gases are measured directly in pounds per square inch, or PSI. This device yields not only the maximum pressure attained, but also can record the increase and subsequent decrease of gas pressure. Testing has determined that peak pressure is attained when the bullet is some distance down the bore, so it is not right after the bullet leaves the case.

The two detectors differ in their readings. Usually the piezoelectric detector is higher than the copper cup method, but sometimes this reverses. According to the article, there is a database of CUP measurements that go back more than 100 years and that CUP gives excellent relative pressure readings and it is for that reason that the SAAMI ammunition specifications refer to CUP measurements.

Most ballistics people agree that the piezoelectric method gives a more accurate reading of pressures. Also on the plus side, the method detects the changes in pressure during the firing. Still, the database on the CUP is overwhelming in its use for pressure readings.

To muddy the waters further, there is a third slightly different transducer method used in Europe. Commission Internationale Permanente or CIP controls its specifications.

Let me offer this quote, which stills my troubled heart on this subject.

"Despite attempts at standardization of pressure gun specifications, certain inaccuracies are bound to creep in." Phil Sharpe penned those words....in 1937! His great work, Complete Guide To Hand Loading, Funk & Wagnalls, 1937, should be on every reloaders shelf.

We used either "cup" or "psi" as the quoted works stated. Do not get worried about this. The important thing is to use the correct factory loaded cartridges, or if you hand load to use current reloading

manuals, and live by them.

The 14th edition of the Speer manual has this to say about the loads they worked up for model 1898 type actioned rifles: "Pressures approach 50,000 cup. Do not use these loads in any 8 mm rifles other than Model 98 Mausers which have been inspected by a gunsmith familiar with these actions." Again we see the admonition to use only a good, strong, inspected rifle. That being said, we can now discuss the Spanish FR8.

Using Model 43 actions, Spain developed the FR8 rifle. The FR8 is chambered in 7.62 NATO. As the Model 43 is an 1898 type, developed when 50,000 cup 8mm loadings were in use, a serviceable FR8 should be safe to shoot with ammunition developing NATO pressures. Once again, remember these rifles are not new production. The actions were made in WWII and later rebarreled. My FR8 is a joy to shoot and very accurate. I have fired NATO equivalent hand loads with no problems. These days the FR8 sees only cast bullet loads for a Military Rifle Cast Bullet Silhouette Match at my rifle club, [Lubbock Precision Shooting Association](#), in Lubbock, Texas. Our club sponsors many types of mil-surp matches. Last year we had a total of 58 matches, most of them with mil-surp rifles.

Keep in mind that old rifles should be thoroughly inspected before shooting, and that each rifle is unique as to what loads it will handle. Having said that, have fun shooting your FR7 or FR8. Remember, 7.62 NATO ammo is the correct ammunition these rifles were designed to use, not the higher pressured .308 Winchester.

WARNING

As we have no control over your rifle, ammo and shooting habits, there is no implied or otherwise stated fact that YOUR rifle is safe to use. When in doubt, have a qualified gunsmith check it out. Here we present information gathered from recognized sources and combine them with our OWN rifles, ammo and shooting experiences for your information only.

By [Mark Trope](#) & [R. Ted Jeo](#)

Copyright 2003, 2004 © Jamie Mangrum