

SHORT BOLT ACTIONS

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In the early twentieth century, shooters weren't obsessed with bolt actions precisely fitting their cartridges. The rifle now known as the pre-1964 Model 70 Winchester is a perfect example. Only one size of the pre-'64 action was produced, but with modifications to the magazine it accommodated cartridges as short as the .22 Hornet and .250 Savage and as long as the .300 and .375 H&H. Today, however, it's a minor ballistic sin to have too much action around smaller cartridges, and weight has also become a factor, since after about 1980 it apparently became extremely difficult to lift hunting rifles.

Making a Case for a Short Throw

The reason for this obsession with inches and ounces is the availability of dozens of "short" bolt actions, and they also feed our obsession with accuracy. Theoretically, shorter actions are stiffer, so a short

Remington Model 700, Ruger Model 77 or Winchester Model 70 should flex less than their long versions, reducing barrel vibrations. Thus, anybody wanting a really accurate rifle should use a short action and a shorter, smaller-caliber cartridge, since they're "inherently" accurate and also recoil less. (Many twenty-first-century shooters have rediscovered a basic principle of riflery: Not getting the snot kicked out of us results in more accurate shooting. Apparently this lesson has to be relearned by every generation.)

Just exactly what is a "short" bolt action? While some were made long before World War II (the *kurz* Mausers and Savage Model 20 come immediately to mind), the archetype for the present definition appeared in 1948.

From 1920 until early in the war, Remington's commercial bolt-action centerfires were based on the 1914/1917 Enfield action, which required extensive and expensive machining. Like other manufacturers, when America entered the war, Remington switched to making military equipment, in the process acquiring a bunch of new machinery and learning how to up production rates at lower costs.

After the war the company decided to design a new bolt action that would be easier and cheaper to make than the Enfield-based Models 30 and 720. It appeared with two model names, 721 for longer cartridges and 722 for shorter cartridges; the actions are exactly the same except for length. Though obviously more cheaply made than the 30 and 720, the new rifles were still very accurate, thanks in part to a quicker method of rifling barrels, accomplished by pulling a "button" through the reamed bore. Before then all rifling had been cut, in sporting rifles usually one groove at a time. But the floorplate was a fixed stamping of sheet steel, and the stocks of the basic models weren't checkered.

As a result, the 721 and 722 retailed for about two-thirds the price of Winchester's 12-year-old Model 70. American rifle snobs considered the 70 the very best bolt action ever made, but in 1950 the average house-



In 1948, when the Remington 722 .257 Roberts appeared, hunters wore red plaid and hunting knives wore leather. Below, the Remington 722 action (bottom) eventually became the Remington 700 short action (top), probably the most popular short bolt action ever made.



hold income in the U.S. was a little under \$5,000, around \$45,000 in today's money. The difference in price between the Remington and Winchester was a third of a month's income. Consequently, a lot of Americans bought Remingtons, especially the plainest models.

The 721 was originally chambered for the .270 Winchester, .30-06 and .300 Holland & Holland, while the 722 was chambered in .257 Roberts and .300 Savage. At the time the .257 was the longest "short" cartridge factory loaded in America, with a maximum SAAMI length of 2.78 inches, so Remington made the 722's magazine box just slightly longer. (SAAMI, the Sporting Arms and Ammunition Manufacturers' Institute, was established in the 1920s, mostly to make sure all factory ammunition worked in all factory rifles.) I also suspect Mike Walker, the principal designer of the 721/722 action, was already thinking of a new .22-caliber centerfire cartridge that would function handily in the shorter action. His other brainchild, the .222 Remington, appeared in 1950, only two years after the 722.



Benchrest gunsmiths often “sleeve” short Remington 700 actions to make them stiffer.



The “cheap” Remington 788 has a reputation for being very accurate, partly because the small ejection slot makes the short action very stiff.

Before 1948 most centerfire bolt-action rifles had magazine boxes around 3.3 inches long, thanks to the 8x57 Mauser and .30-06. As with the pre-'64 Model 70, these were often modified to accommodate shorter and longer cartridges,

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but Remington's popular postwar rifles firmly established the length of short-action magazines at 2.8 inches, where it remains over 70 years later.

In 1962 Remington decided to dress up its cheap rifle, calling it the Model 700 and dropping separate model designations for action lengths. This helped kill off the pre-'64 Model 70, and the 700 soon became the best-selling centerfire rifle in America.

For many years we've been told Remington 700 actions are stiffer because they're round, one of several reasons they're more accurate

than older “square” actions, like the Model 70. This isn't exactly so, because of the major cut-out in the bottom of the action for the magazine box. Stuart Otteson points this out in his fine book *The Bolt-Action – A Design Analysis*. On page 100 of my copy there's a drawing of the smallest cross-sectional area of the Remington 700, pre-'64 Model 70 and Remington 40-XB actions. The 700's cross-section is by far the smallest of the three, the reason gunsmiths who build benchrest rifles on short Remington 700 actions usually glue an aluminum “sleeve” around the action.

The round shape of a Remington 700 receiver does affect accuracy, but in a different way than standard theory suggests. In 1998 a remarkable book entitled *Rifle Accuracy Facts* appeared, written by Harold R. Vaughan, a World War II fighter pilot and, after the war, one of the top aeronautics engineers in the world, among other

jobs working for NASA. Aside from being a world-renowned scientist, Vaughan was a rifle loony and used his science background to investigate factors in accuracy, choosing a Remington 721 chambered in .270 Winchester.



Short actions are supposedly much lighter than longer models. In reality, the difference isn't much; this Kimber would weigh around 6 pounds, 8 ounces with the same stock and barrel and a long action.

Among dozens of experiments, Vaughan used extremely sensitive strain gauges to measure the “moment” in the front receiver ring when the 721 was fired and various parts of the ring compressed and expanded. In this context “moment” basically means momentary movement, and since the front receiver ring holds the barrel, its moment directly affects accuracy.

Vaughan discovered most of the receiver's moment occurs “between the rear face of the bolt lugs and the rear face of the barrel.” The biggest cause was the recoil lug: When recoil slammed the barreled action backward in the stock, the lug acted

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Some short-action magazines, like the detachable model on this Ruger American .308 Winchester, are longer than 2.8 inches, providing a little leeway to handloaders.



Some recent "accuracy" cartridges, such as the 6.5 Creedmoor, are specifically designed to provide a little more room for bullet seating in short magazines. Overall cartridge length is considerably shorter than the .257 Roberts.

like a lever on the bottom of the action, flipping the muzzle upward. Vaughan built what he called a "Recoil Isolater," a sophisticated shock absorber that delayed the effects of recoil on the lug until after the bullet left the muzzle.

After installing the Recoil Isolater, however, Vaughan discovered some up-and-down moment was also created by the front receiver ring's

"asymmetry." The theoretically round ring still bent slightly during firing, due to having a .25-inch hole for the front action screw in the bottom but only a pair of small scope-mount holes in the top.

Vaughan made several modifications to the receiver ring, including drilling another large hole in the top to "balance" the action-screw hole in the bottom. This

further reduced the up-and-down moment, but his strain gauges then found a slight sideways moment. Vaughan pinpointed the cause as the gas vent hole in the side of the ring, so drilled another hole of the same size on the opposite side. The action ended up with only a tiny amount of moment compared to the unmodified action.

Like many of Vaughan's experi-

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ments on the 721, his results contradict a lot of theory from accuracy gunsmiths and indicate a short action probably doesn't have

nearly as much effect on receiver moment as other factors. Remember, Vaughan's rifle was a *long-action* 721, and he was able to almost eliminate receiver moment

by modifications to the recoil lug bedding and the front receiver ring itself.

Some of my own far more limited shooting also contradicts the short-action theory of accuracy. In 2001 a heavy-barreled, short-action Remington 700 in .223 Remington was purchased at a local store. The rifle was "accurized" to the extent of my modest ability and the trigger adjusted to a 1.5-pound pull. When relatively new, the rifle averaged .25 inch for five-shot groups at 100 yards, using Nosler 50-grain Ballistic Tips sorted with a Juenke Internal Bullet Concentricity Comparator, loaded in uniformed brass with Redding Competition dies. A 6-24x scope and the use of wind flags even on calm mornings also helped. Today the barrel's shot a few thousand more rounds, mostly at prairie dogs, but still averages around .5 inch with most ammunition.

A decade later I bought a used "heavy varmint" benchrest rifle in 6mm PPC made on a sleeved Remington 700 short action by Helena, Montana, gunsmith and benchrest shooter Arnold Erhardt. With a 4.5-30x Bushnell 6500 Elite scope, it weighs almost two pounds more than the .223 Remington, partly because the Hart barrel measures .950 inch at the muzzle versus the .870 of the .223's barrel. After quite a bit of experimenting with various powders and bullets, its best load uses Berger 65-grain bullets, with five-shot groups averaging .18 inch at 100 yards.

Is the .07-inch difference between the .223's and 6mm PPC's most accurate groups due to the sleeving of the action? Or is it due to the 6mm PPC cartridge, heavier Hart barrel, two extra pounds of rifle weight or 2-ounce trigger?

I don't know, but do own another very accurate small-caliber rifle built on a Remington 700 action with a Brux barrel measuring .675 inch at the muzzle, chambered for the .22/6mm Remington wildcat. Its most accurate load uses Berger 80-grain VLDs, and five-shot groups

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average about .35 inch. It's a pound lighter than the .223 Remington, and the scope is a 3-15x Weaver Super Slam, but I haven't bothered to "uniform" cases like I did with the .223 and 6mm PPC, because the rifle's meant for shooting animals from 30 pounds up, not prairie dogs or paper.

With worked-over cases and a higher magnification scope, I bet the .22/6mm would group into .25 inch, or close to it, but it's built on a long Remington 700 action, because rounds loaded with the long 80-grain Bergers won't fit in a 2.8-inch magazine. (By the way, the cartridges feed perfectly through the half-inch of unused air-space in the front of the magazine.)

Short Remington 700 actions do weigh three ounces less than long 700 actions. This might make a difference in benchrest shooting, where rifles must conform to weight limits, but doesn't make any practical difference otherwise. However, the bolt of a short 700 action is almost an inch shorter than a long-action bolt, and the difference can affect shooters who might also be termed "short."

I know a woman who's barely five feet tall. Her much taller husband insisted she use a long-action .270 Winchester for hunting elk and thoughtfully had the stock cut down to fit her. She had to pull her head back when working the bolt, because otherwise it would punch her in the cheek. She now has a short-action 7mm-08 Remington, an ex-husband and is much happier.

Eventually 2.8-inch magazines became too short to accommodate some of the longer, sleeker bullets many of today's shooters prefer. In cases based on the .308 Winchester, the rear of these bullets' ogives ended up behind the case mouth and the front of the ogive far from the lands. Thus the Remington 722 is the reason, 70+ years later, for cartridges such as the 6x47 Lapua, 6XC and 6.5 Creedmoor. All have powder capacities similar to the .243 Winchester and .260 Reming-

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ton, both based on the necked-down .308 Winchester case but leave enough space in the front end of a 2.8-inch magazine to use very long bullets – and also enough to “chase the lands” by seating bullets farther out as throats erode.

Of course, today some actions are also slightly longer for much the same reason. The New Ultra Light Arms Model 20 has a 3-inch magazine, and the “short” Montana 1999 (a Mauser 98/Model 70 hybrid), a 3.1-inch magazine. You can also purchase custom magazines and fit them to standard actions. But by and large, the 2.8-inch magazine is now *the* length for short bolt actions. Oh, it’s been extended slightly in some factory actions, notably for the Winchester Short Magnums, but most short cartridges work fine in the standard length.

Any company introducing a bolt-action rifle today almost has to chamber it for eight rounds, the .223 Remington, .22-250 Remington, .243 Winchester, .270 Winchester, 7mm Remington Magnum, .308 Winchester, .30-06 and .300 Winchester Magnum. Half are short-action rounds. The .25-06 Remington, 7mm-08 Remington, .300 Winchester Short Magnum and .338 Winchester Magnum are semiregulars, and again half are for short actions. While most shooters consider the .300 WSM an ultra-modern, twenty-first-century cartridge, its prototype appeared shortly after the Remington 722 action, when a couple of wildcatters turned the rim off .348 Winchester cases, then necked them down and blew them out to create stumpy “magnums” to fit the new Remington rifle.

The 2.8-inch magazine isn’t necessary, but it’s not going anywhere either and originated due to the maximum length of factory .257 Roberts ammunition. While many shooters still argue about the right length for .257 cartridges, there isn’t any realistic argument over short bolt actions. They’re here to stay. 

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