

Load Development

Barrel Length Variations in the .223 Remington

by John Haviland

Shorter barrels in rifles chambered in .223 Remington are the latest trend. I've wondered, though, how much of the .223's velocity and ballistic uniformity are lost when standard 22- or 24-inch barrels are decreased in length. I've seen a couple of reports of differences in .223 velocities as a barrel is cut to ever shorter lengths, but that seems like a waste of good barrels.

I took a different approach and fired a variety of bullet weights loaded with powders with a range of burning rates to determine velocity changes and if powders with certain burn rates produced more uniform and higher velocities from four rifles with different barrel lengths. Those rifles included a Jard J-16 AR-15, 16-inch barrel; Sisk Rifles Remington Model 700, 20-inch barrel; Savage Model 10 Predator Hunter, 22-inch barrel; and Remington Model 700 SPS, 24-inch barrel. Of course, barrels vary ever so slightly

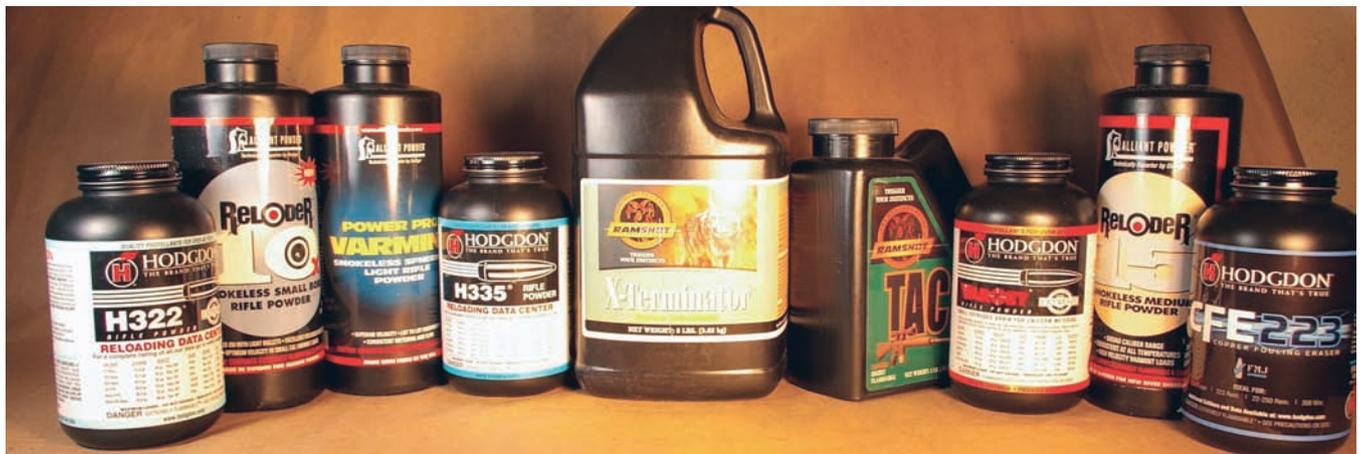


Four .223 Remington rifles with different barrel lengths were shot extensively to determine what powders with different burn rates had on velocity and ballistic uniformity.

from one to the next in their chamber and bore dimensions and produce slightly different velocities with the same length. These four rifles, however, give a pretty good idea of what can be expected from the .223 Remington cartridge in barrels of different lengths.

The powders used had fairly

broad burning rates. In order from fastest to slowest, the powders included Hodgdon H-322, Alliant Reloder 10X and Power Pro Varmint, Hodgdon H-335, Ramshot X-Terminator and TAC, Alliant Reloder 15 and Hodgdon Varget and CFE 223. I believe Power Pro Varmint occupies the correct spot on the list.



Nine powders were loaded in Winchester .223 Remington cases with four different bullets and shot through four rifles with different barrel lengths.

Alliant states it is relatively slower burning than its Reloder 10X and faster than Reloder 15. I could not find Varmint listed in a complete powder burn rate chart, however, so I extrapolated a bit.

Velocity Differences

The velocity difference was huge between the 16-inch barrel and the longer barrels, but shrank to nearly negligible between 20-, 22- and 24-inch barrels. The 24-inch barrel's additional 8 inches added up to 366 fps over the 16-inch barrel. Even the additional 4 inches of a 20-inch barrel supplied up to 340 fps higher speed over the 16-inch barrel. That spread narrowed somewhat with heavier, 55-grain Hornady bullets compared to the lighter 40- and 50-grain bullets. Comparing overall velocities of the 20-inch barrel with



These bullets were fired in the four .223 Remington rifles. From left: Berger 40-grain Flat Base Varmint, Barnes 50-grain Varmint Grenade, Nosler 50-grain Ballistic Tip and Hornady 55-grain V-MAX.

the 22- and 24-inch barrels showed gains of as little as 5 fps. In fact, the 20-inch barrel shot Barnes 50-grain bullets faster than the 22-inch barrel

with H-335, Reloder 10X and Varmint powders.

I thought it might be possible to prove powders with certain burn rates would achieve the highest velocities in barrels of different lengths, but there was no clear evidence of that. Perhaps extended shooting that would burn out the four barrels is necessary before any such conclusions can be drawn.

In other cartridges, powders that produced the highest velocities in standard length barrels also provided the highest bullet speeds in rifles with shorter barrels, particularly with the .223 Remington shooting 50- and 55-grain bullets.

I was a bit perplexed and disappointed in the low velocities of the Berger 40-grain bullet with all the powders tried, and with CFE 223 powder shooting Hornady 55-grain V-MAX bullets. I thought my RCBS AmmoMaster chronograph might have been on the fritz, because its velocity readings were 300

Table 1 **.223 Remington Velocity Differences Compared to Barrel Lengths**

bullet (grains)	barrel length differences (inches)	average velocity gain (fps)
40 Berger Varmint flatbase hollowpoint	16 vs. 20	254
	16 vs. 22	286
	16 vs. 24	318
	20 vs. 22	32
	20 vs. 24	64
	22 vs. 24	33
50 Barnes Varmint Grenade and 50 Nosler Ballistic Tip	16 vs. 20	265
	16 vs. 22	249
	16 vs. 24	328
	20 vs. 22	-37
	20 vs. 24	57
	22 vs. 24	73
55 Hornady V-MAX	16 vs. 20	191
	16 vs. 22	214
	16 vs. 24	224
	20 vs. 22	23
	20 vs. 24	33
	22 vs. 24	19

to 400 fps slower than those stated in various reloading manuals with 24-inch barrels. The Berger 40-grain bullets were loaded again with the same powders, and the 55-grain V-MAX with CFE 223. This time I put a Shooting Chrony Master Chrony chronograph in front of the RCBS chronograph to double check velocities. The RCBS chronograph recorded essentially the same velocities it had the first time. The Master Chrony showed about 40 fps faster velocities across the board.

Uniformity

I had a preconceived notion the J-16's short barrel would produce the widest velocity variations, especially with 40-grain bullets – but was mistaken. What all the shooting showed was the .223 Remington is a balanced cartridge that works well

Table II

.223 Loads and Barrel Lengths

bullet (grains)	powder	charge (grains)	barrel length (inches)			
			16	20	22	24
40 Berger Flat Base Varmint	Varmint	27.5	2,939	3,189	3,235	3,276
	CFE 223	28.5	2,789	3,079	3,111	3,148
	H-322	25.0	2,985	3,207	3,224	3,244
50 Barnes Varmint Grenade	H-335	26.0	2,996	3,228	3,169	3,251
	RL-15	27.5	2,977	3,317	3,322	3,343
	Varmint	26.0	2,848	3,086	3,017	3,147
50 Nosler Ballistic Tip	RL-10X	23.5	2,771	3,057	3,003	3,086
	TAC	26.8	3,043	3,288	3,352	3,402
	Varget	26.5	2,772	3,020	3,039	3,111
55 Hornady V-MAX	CFE 223	27.5	2,851	3,035	3,067	3,052
	TAC	25.0	2,784	2,979	3,013	3,036
	X-Terminator	25.0	2,908	3,102	3,106	3,126

Notes: All cartridges used Winchester cases and Winchester Small Rifle primers. All velocities were recorded with an RCBS AmmoMaster chronograph set 11 feet in front of a bench.
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with a variety of powders and bullets from different barrel lengths.

With Berger 40-grain bullets there was an ever-so-slight reduction in velocity standard deviations (SD) with three powders used as barrel lengths increased from 16 to 24 inches. However, once in awhile a standard deviation increased considerably, as in 59 fps with Power Pro Varmint in the 22-inch barrel, which threw a wrench into my thinking. You would think relatively slow burning CFE 223 would produce the highest SD in the shorter barrel. With all four barrel lengths, however, SDs with CFE 223 varied only from a high of 17 fps from the 16-inch barrel to a low of 11 fps from the 22-inch barrel. Evidently CFE 223 and the other powders had reached their all-burnt state well before bullets reached the end of the 16-inch barrel.

With 50-grain bullets SDs really showed no difference with the five powders fired in the four barrel lengths. Relatively fast burning H-335's SDs varied only from 22 fps in the 20-inch barrel and slower-burning TAC from 9 fps in the 24-inch barrel to 23 fps in the 20-inch barrel.



The .223 Remington case holds just the right amount of powder to produce top velocities in a 20-inch barrel.

With 55-grain bullets relatively fast burning X-Terminator had narrow SDs from 14 to 27 fps with the shortest barrel at 19 fps and the longest barrel at 14 fps. TAC's SD was 35 fps from the shortest barrel but then 7 fps from the 20-inch barrel. CFE 223's SDs were 31 fps from the 24-inch barrel but a low of 17 fps from the stubby barrel.

These numbers prove powders with burn rates suitable for the .223 Remington all produce consistent ballistics no matter if the rifle's barrel length is 16, 20, 22 or 24 inches. The short barrel may lose about 10 percent of the .223's potential velocity compared to the longer barrels, but not a bit of ballistic uniformity. ●

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