

ASK DERRICK 3

Derrick Martin, Accuracy Speaks Inc.

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Dear Derrick:

I have been very careful to use ammunition compatible with the operating rod of the M-1. I have fired GI M-2 ball, Federal American Eagle, or handloads with 4895, 3031, or 748 to keep port pressure as near arsenal specs as possible (which I understand to be 6,000 psi, plus-minus 2,000). Further, I have used 150, 165, 168 and 180-gr bullets exclusively. I don't think I have done any damage to the op rod with the ammo used to date, but I fret about it since I have no way to measure port pressure. Then I read "You Can't Get There With a Gas Gun" a few issues ago. What I don't understand is the comment by the author's gunsmith about shooting 190-gr bullets in an attempt to find a load which would remain supersonic, stable, and accurate to 1,000 yds. He said that such loads would batter one's rifle and force one to rebuild it more often. As I would regard this as abuse of one's rifle, I (like the author) would choose not to shoot 190-gr bullets.

But why is this so? Why would 190s, 200 or 220s batter the gun more than 147, 150 or 168s if a powder of the correct burning rate was used, and in a safe amount? It seems that if the port pressure was correct, the pressure in the chamber would have dropped off to levels similar to what existed in the chamber when a service-type load was fired, and cycling of the rifle's mechanism was normal. Yet this seems not to be the situation. Why not?

Thomas Kollin
Juneau, Alaska

Dear Tom:

I will subdivide my answer into two further questions:

(I) Is it possible to shoot heavy bullets (over 150 gr) in a service rifle, and if so, how?

(II) How do bullet weights and powder speeds effect port pressures?

(I) I have shot for the All-National Guard Rifle Team for eight years. In that time, our service rifle 1,000-yd program has undergone several changes. When I first joined the program, our 1,000-yd load was a Sierra 180 with a stiff load of 4064 powder (No, I won't tell you how much.) As I recall, we had used this load for quite a long time before I joined the team.

About the second or third year I shot, we briefly tried Federal factory 180s, and the Army Marksmanship Unit tried RWS 190- gr factory ammo, but neither team enjoyed much success.

The next year our new 1,000-yd team captain (WO4 Dave Logan, PANG) began testing 190 Sierras and 4064 (I still won't tell you how much.) By comparing ballistic coefficient and velocity on the 180s and 190s, we determined that the BC advantage overcame the velocity loss, and the 190s would use less wind correction than the 180s we'd been using. The 190s also shot better in our rifles than the 180s.

During the past three years we have won two? national team championships at Camp Perry, and this year (1995) SSGT Peter Viau of VT NG was the only person in history to win both the Porter and Farr Thousand-Yard Individual Matches in the same year.

So, yes, you can shoot 190s in a service rifle. No special effort is devoted to our 1,000-yd rifles, with the exception of 1-10 twist barrels (our across-the-course rifles are 1-12), and shorter front sight blades. For the civilian shooter who lacks the luxury of a dedicated 1,000-yd rifle, there are three solutions:

(1) Don't worry about it. The two or three 1,000-yd matches you'll shoot in a year won't injure your rifle. Even with sighters, three matches will consume fewer than 200 rounds.

(2) Worry about it (but not much). At Accuracy Speaks, Inc., we vent the gas plug on both M-1s and M-14s to bleed off the unnecessary gas. Vary the diameter of the vent to just allow functioning with the chosen load. Replace the solid plug when you go back to your across-the-course loads. On Garands, we make a variable vent out of the later-style gas plug. Due to the length of the M-1 op rod, I feel venting to be necessary with any bullet over 180 gr, and any powder slower than 4064 in both .30-06 and .308.

(3) Consider Sierra's new 175-gr bullet. Basically, it is a slight redesign of the Lake City 173 match bullet. It should shoot well from 1-12 twist barrels and will remain supersonic at 1,000 yds, provided muzzle velocity exceeds 2,550 fps. You should be able to substitute the 175-gr bullet for 168s over your normal powder charge (provided it's not a maximum load.) But work your way up to your normal load with careful testing.

(II) It's a common mistake to draw a comparison between peak chamber pressure and velocity. To use the example from your letter, we could use Bullseye powder in an M-1A. However, the burning rate is so fast that at 50,000 psi peak chamber pressure, there will be insufficient port pressure to function the rifle. The reason is that, as the bullet moves down the barrel, the available volume that the gas must fill increases dramatically. Also, due to the relatively small amount of powder, the total volume of gas is small. When the bullet reaches the gas port, there will be insufficient gas volume and pressure to function the rifle.

Conversely, with a larger amount of slower powder, the powder continues to burn as the bullet moves down the barrel, so the pressure/velocity curve shows a lower peak chamber pressure but a muzzle velocity more than twice our theoretical Bullseye load.

Changes in bullet weight become a little harder to explain, as it is not quite so straightforward. In general, a heavier bullet will have a larger bearing surface as well as more mass (i.e., resistance to acceleration). Working together, this combination makes it harder to move the bullet down the bore. But the powder tries to burn at the same rate, so the pressure behind the bullet (for the same type of powder) will tend to be higher for the heavier bullet.

While I have little proof, I strongly suspect that the port pressure in either rifle is significantly higher than 6,000 psi, but the actual volume of gas used is quite small, and insignificant to muzzle velocity. The only evidence I can offer comes from our AR-15 testing, when we shot the same ammunition through the same barrel, alternately covering and exposing the gas port. We actually gained 5 fps with the port open. These are five-shot averages and well within normal testing parameters for the same ammo. Net effect to velocity = zero.

PS: Spurred to action by my own reply, I chronographed Federal 168-gr factory ammunition in my M-1A. With port open, velocity was 2,527 average; with port closed 2,553 average, for a difference of 26 fps. Garand ports are so close to the muzzle that I doubt there will be any loss whatsoever.

Derrick Martin

For further queries out there in computerland, visit Accuracy Speaks via our E mail address: ask-derrick@accuracyspeaks.com We can't respond to every query, but we'll select pertinent subjects for use in further columns.