LOADING THE 284 WINCHESTER FOR ACCURACY

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SUMMARY

This report presents accuracy load data for the 284 Winchester. It is intended to help others quickly find the most accurate load for their rifles. 33 powders were tested with bullet weights of 120, 140, and 150 grains. Each of the most accurate powders was tested with 4 different primers. 8 different hunting bullets were tested using the most accurate load. A total of 3,622 shots were fired in these tests, 3,310 of which were used in the calculations of accuracy.

The most accurate powders were shot in two rifles, with each bullet weight, at 100 and 300 yards, and in perfect conditions. The resulting data show that both rifles have very similar preferences. Several loads were also tested in two additional rifles, and the results are similar to the results from the two test rifles. The results of the powder tests indicate that a) the accuracy data in Nosler’s Reloading Manual is generally correct - the only major goof being that they missed the most accurate powder, and b) the accuracy data in Sierra’s Reloading Manual is incomplete and of little use. Pressure and velocity data in both manuals remain valid.

It is not possible to predict that this powder or that bullet weight will always be the most accurate in every rifle. However the similarity of the results from all four rifles is so strong that one can make the following statements with reasonable confidence when applied to 22” barrels.

1. The 284 Winchester will most likely shoot VihtaVuori N150 more accurately than all other powders with bullets weighing from 120 to 150 grains. VihtaVuori N160, Reloder 15, and Hodgdon 4831SC are also likely to shoot some of these bullet weights well. It is very unlikely that any other powder will be the most accurate powder.

2. When using any of these 4 powders and any of the three bullet weights tested, Winchester Large Rifle primers are likely to produce much better accuracy than other primers.

3. Using these 3 bullet weights, the most accurate load is very likely to be one of the following (in order of probable accuracy):

<table>
<thead>
<tr>
<th>Bullet</th>
<th>Powder</th>
<th>Velocity (22” bbl)</th>
<th>Primer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>140 gr</td>
<td>2800 – 2875 (46.0 to 48.0 gr)</td>
<td>WLR</td>
</tr>
<tr>
<td>2</td>
<td>120 gr</td>
<td>3050 – 3100 (48.0 to 50.3 gr)</td>
<td>WLR</td>
</tr>
<tr>
<td>3</td>
<td>120 gr</td>
<td>3050 – 3100+ (55.0 to 55.8+ gr)</td>
<td>WLR</td>
</tr>
<tr>
<td>4</td>
<td>150 gr</td>
<td>2700 – 2750 (45.0 to 46.5 gr)</td>
<td>WLR</td>
</tr>
<tr>
<td>5</td>
<td>150 gr</td>
<td>2700 – 2825 (44.5 to 47.1 gr)</td>
<td>WLR</td>
</tr>
<tr>
<td>6</td>
<td>140 gr</td>
<td>2800 – 2975 (46.5 to 49.3 gr)</td>
<td>WLR</td>
</tr>
<tr>
<td></td>
<td>140 gr</td>
<td>2825 – 2950 (53.5 to 55.0 gr)</td>
<td>WLR</td>
</tr>
</tbody>
</table>

Is it possible that a particular 284 will not prefer these loads to all others? Of course it is. However, the data suggest such strong and consistent preferences in these rifles that if I found a rifle that did not shoot these loads well I would spend my money on a new barrel before I spent my time and money trying to find a better load.

All loads tested in this report were safe in these rifles, but may be dangerous in yours. Use safe hand loading procedures and work up to these loads carefully.
SECTION I – INTRODUCTION

For 31 years my primary hunting rifle was a 270 Win. This rifle is an accurate and reliable work horse that I have carried and shot often. However, when the 50-Somethings caught up with me, carrying it’s 9+ pounds up and down mountains was something I considered with less and less enthusiasm. I decided to retire the 270 in favor of something completely different.

In 2001, I purchased an Ultra Light Arms Model 20 weighing 5½ pounds with the scope. I had the gun chambered for the 284 Winchester for two reasons. First, this cartridge has the most juice of any standard cartridge that fits in the Model 20. Second, this cartridge is, for all practical purposes, ballistically identical to the 270 I had used for years. The rifle has shot well since I received it. One could even say it shot remarkably well considering that its barrel looks more like a toothpick than a proper rifle barrel. I am very happy with the rifle.

I started working up the Model 20’s accuracy load immediately after I received it. Thus began my quest for this gun’s most accurate load, a quest that ends with the release of this report. I am now also happy with the cartridge, but it has taken me a long time to learn its quirks, and this latter statement leads me to the purpose of this report.

As far as I can tell, accuracy load data for the 284 Winchester has never been thoroughly explored. The data in the Sierra Manual is old, using powders that seem to have changed a bit over the years and none of the recently released powders. Nosler’s data is more current, but neither set of data is close to exhaustive. Seeking more accuracy data, I corresponded and spoke with other users of this cartridge and read everything I could find. However, I could find no one who had thorough, exhaustive, and reliable data shot under controlled conditions.

Thus, I was left with a tough decision. On one hand, I could work up a good load – one certainly accurate enough to kill any animal I chose to hunt – using what little data I had. On the other hand, the only way I could work up this gun’s most accurate load – and be sure that I had indeed found the most accurate – was to commit the time and money to develop comprehensive data myself. I tend to be somewhat compulsive about such things, so my wife and friends were not surprised that I chose the second option. This report presents the results of my tests.

A couple other notes are relevant: First, I am not the best hand loader in the world, but I doubt there are many who are better. I load and shoot over 5,000 rounds of extremely accurate ammo each year and every shot on paper (except those shot in competition) is recorded in a computer data base that now exceeds 120,000 rounds. In short, I am fully experienced at loading precision ammunition and finding the right combination of voodoo and incantations that make a rifle sing.

Second, I am a numbers geek. My professional life has been spent in statistical analysis, but I have assumed that the reader is “arithmetically challenged” and have intentionally omitted all of the mathematics from this report. The proper collection of the data presented in this report was easy. The proper interpretation of what the data meant was also not a challenge. Except where noted otherwise, I am confident that the conclusions I have drawn are correct.

Third, I will willingly accept criticisms, suggestions, and requests for help. You can find me at: rfrailey@earthlink.net
SECTION II – DETAILS

1. MEASURING ACCURACY: Measuring the diameter of a 5-shot group is the most common method for measuring accuracy. This method works well for bragging rights because it is simple and everyone understands it. It works well in Benchrest competitions because it lets any shooter beat better shooters on a lucky day. It also makes the game more fun. However, the diameter of a 5-shot group only tells you how well 2 out of 5 shots did perform, and is a poor predictor of how well the next 1,000 rounds will perform. If you want a good prediction of how well the next 1,000 rounds of that load will shoot, there is a better way to measure groups. Throughout these tests each group was measured in four ways.

First, I measured the “radial standard deviation” of each group. This is not a measurement of accuracy. Rather, it measures how consistently a load will produce similar groups. I used this measurement with the more accurate powders, the primers, and the bullet tests to ensure that I had shot enough groups to be 95% confident that the results accurately predicted how the next 1,000 rounds of that load would shoot.

Second, I measured accuracy using the “average radius method”. Measuring the diameter of a 5 or 10-shot group completely ignores the information received from the other 3 or 8 shots. The average radius method averages the distance of every hole from the mathematical center of the group. This method is more complex (at least for the “arithmetically challenged”), but it results in a much more reliable prediction of the true accuracy of any load. The charts included in this report present an accuracy number for each powder, primer, and bullet tested. Because most hand loaders are used to measuring the diameter of a 5-shot group, I converted my measurements of average radius to the equivalent average diameter of a 5-shot group. Therefore, the accuracy numbers in the charts are approximately equal to the average diameter of a 5-shot group.

Third, every shot in these tests was shot over a chronograph, and I calculated the standard deviation (SD) of velocities in each load. SD is a measurement of consistency. A low SD means that the velocity of all shots in the group didn’t vary by much, and a high SD means that they varied a lot. How to calculate SD is not relevant here, but the meaning of low and high SD is. A low SD does not mean that the load is accurate. Many loads with low SD shoot groups like a shotgun. However, you will never find a load with a high SD to be accurate at long distances. High SD loads shoot groups that string out vertically (the faster bullets at the top and the slower bullets at the bottom) at long distances. 300 yards is usually a long enough distance to see the inaccuracy of a high SD load.

Fourth, I measured the difference between the fastest and slowest bullet in each group. This “Extreme Spread” (ES) is important for safety reasons. The average velocity of a load with a very high ES might indicate a safe charge, but the fastest bullet in the group might have created pressures well above maximum – and it is the highest pressure in the group that will hurt us. My test of AA 2230 with 120 gr bullets is an excellent example. In the first 5-shot group, I had one round at 2979 fps (mild) and one round at 3201 fps (very hot) that gave me a heavy bolt. The second group had similar inconsistencies and I stopped testing. In my opinion, this is not a safe powder in the 284 with 120 gr bullets.
2. RIFLES: Four rifles were used to collect the data. The first is my ULA Model 20 with a 22”, #1 Contour, Douglas barrel. This barrel now has almost 4,000 rounds through it and its chamber has been set back once. It remains accurate and very predictable.

The second is a Savage Model 112 Series J (single shot) action that has shot with extreme accuracy using three prior barrels in various calibers. Melvin Forbes chambered a new 22” #1 contour Douglas barrel and fitted it to this action (thank you Melvin).

The third rifle is a Remington 700 owned by a friend. Originally a 7-08, its factory barrel has been re-chambered to 284 and shortened to 23”. This rifle was used to confirm some of the test results from the first two rifles.

The fourth rifle is a Remington 700 also owned by a friend, but it has a 22” Hart #3 contour barrel. It too was used only to confirm data developed in the first two rifles.

3. SCOPES: All rounds fired in the Model 20 and Savage were shot using Weaver and Leupold 36x benchrest scopes. Both scopes performed perfectly. The two Remingtons had Leupold 3.5x10 scopes.

4. BRASS: I started with 500 cartridges from a single lot of Winchester brass.

7 visibly damaged cases were excluded. 82 cartridges with case wall thickness variations of more than .002” (measured at the mid-point between the head and the shoulder) were excluded. 96 cartridges with neck thickness variations greater than .002” or thickness less than .014” were excluded. 4 cases with possibly off-center primer pockets were excluded.

The remaining 311 cases were then prepared to Benchrest standards. All necks were turned to .0141” (±.0001”), primer pockets and flash holes uniformed, and all were trimmed to length. All brass was then sorted into groups of equal weight (± 1%). One group of 153 has been used in my Model 20 since I received it. A second group of 48 was used for all of the Phase 2 powder tests in the Savage. 19 of these cases split their necks between the 23rd and 26th loading and I retired the remaining 29. A third group of 42 was used for all subsequent testing in the Savage. A fourth group of 43 cases has been set aside for future use and the remaining 25 cases did not fit into any group and were excluded.

5. BULLETS: After receiving my Model 20, and again after receiving the re-barreled Savage, I did an abbreviated bullet test similar the one reported in “SECTION 5 – BULLET TESTS” below. This preliminary test indicated that both Nosler Ballistic Tips and Sierra bullets shot very well in my rifles. I decided to use Nosler Ballistic Tips for all powder tests in the Model 20, and Sierra’s 120 gr Pro-Hunter (#1900), 140 gr Pro-Hunter (#1910), and 150 gr GameKing (#1913) for all powder and primer tests in the Savage. As discussed in Section 5, my decision to use these bullets was a good one.

6. PRIMERS: All primers used for the powder tests were Winchester Large Rifle. This also turned out to be a good decision.
7. **RELOADING:** All cases were full length sized after each shot using a Redding Body Die. For the Model 20, this die barely bumped the shoulder (about .001”). Because the Savage’s chamber is longer than the Model 20’s, its cases were sized about .003” each time.

All cartridges were neck sized with a Redding Competition Neck Die using a .309” Titanium Nitride bushing to squeeze the neck to .281” before any spring-back.

All powder was weighed, not measured. I use an RCBS PowderMaster electronic powder dispenser coupled to an RCBS PowderPro digital scale. However, because my PowderPro settles slowly, every load is put on a Dillon Determinator digital scale before going into the cartridge. This arrangement is very fast. All loads were accurate within ±0.1 gr.

All bullets were seated with a Redding Competition Seating Die. The Ballistic Tip seemed to be most accurate in the Model 20 when seated at least .030” off the lands and I used this seating depth throughout the tests. In the Savage, I found that the Sierra bullets had best accuracy anywhere between .020” and .090” off the lands. I chose .050” and I kept the seating depth constant for all tests.

I used a Forster Co-Axial press for all rounds. Finished ammo consistently had very little run out, averaging less than .002” (measured on the bullet immediately in front of the case neck), and very rarely more than .005”. The maximum run out I found throughout the tests was .009”. This bullet landed in the middle of the group and makes me wonder why I bother to measure such things at all.

I measured the actual case length of the chambers and both were 2.190”, or .020” longer than the SAAMI maximum cartridge length of 2.170”. This gave me a generous allowance for cartridge growth and the Model 20’s cartridges have not been trimmed since the initial trimming. However, the Savage cases grew faster because they were sized more, and more frequently. They were trimmed twice during the tests. Nevertheless, I never lost any brass to excessive body sizing. The necks split first and the retired Savage cartridges had only minor thinning at the case head after 26 loadings. Winchester 284 brass is VERY durable stuff.

8. **POWDER POSITION:** Powder loads using less than 100% of a cartridge’s capacity usually produce different velocities if the ammo is stored bullet up (powder concentrated near the primer) or bullet down (powder concentrated away from the primer). Most of us take our ammo to the range in a case, either point up or point down, and load our rifles in a way that keeps the powder’s position in all rounds consistent. We rarely see the effects of varying powder position at the range, but hunting ammo is not shot with such consistency.

While hunting, some of us carry the rifle barrel down, others carry it barrel up. Some carry their ammo in their pocket, neither point up or down. We move the rifle constantly — from shoulder to shoulder, putting it on the ground while crossing a fence, holding it in our hands while fording a stream, or moving it around to avoid branches as we move through the trees. Rifle motion continually changes the position of the ammo’s powder. The only certainty regarding the powder position in hunting ammo is that it will be inconsistent.

Because the purpose of this project was to find the most accurate hunting ammunition, I simulated this inconsistency by placing half of all loads in the range box point up, and half...
point down. While loading, I tried to preserve the ammo’s powder position by placing each round in the chamber as gently as possible. Thus, the rounds fired in these tests probably had even greater powder position inconsistencies than ammo used in the field.

9. WEATHER CONDITIONS: Hunting ammo must be shot in varying temperature, humidity, and barometric pressure, and these conditions affect a load’s accuracy. Therefore, no more than one group of each powder/bullet combination was shot on the same day, and only three times was more than one such group shot in the same week. All powders tested were shot in varying temperatures (from 17 to 88 degrees), humidity, and barometric pressures.

   However, three weather conditions were consistent. All shots were taken in perfect or near perfect light, all shots were taken in calm conditions (at 100 yards, I stopped shooting if wind exceeded 3 MPH from the 7:00 O’clock position), and I did not shoot in rain.

10. BARREL BEDDING: Although this discussion has nothing to do with finding the most accurate load, I find the subject interesting and have included it.

   Everyone agrees that bedding a rifle’s action is a good thing, and that free floating target and varmint barrels is a good thing, but there is no such agreement whether a thin hunting barrel should float or be bedded to the stock. Many believe that extremely thin barrels are more accurate if fully bedded to the stock than if left floated. However, I believe that barrel bedding only significantly improves the accuracy of inherently inaccurate loads, and that a rifle’s most accurate loads cannot be improved much by either bedding or floating the barrel.

   Years ago I tested this theory with a Remington 700 Mountain Rifle in 308. I tested the accuracy of 155 gr MatchKings using seven different powders while the barrel was floated. The best averaged 1.1”, the worst averaged 3.6”, and the rest were everywhere in between. I then bedded the barrel for the full length of the stock and re-shot each of the loads. This test had three interesting results. First, the relative accuracy of all seven powders did not change (i.e. the fourth most accurate powder was still the fourth most accurate, etc.). Second, the most accurate powder was not affected – it still shot 1.1”. Third, the less accurate a load was before barrel bedding, the greater the improvement in accuracy after barrel bedding. After bedding, the least accurate powder shot groups averaging 1.9”.

   The performance of the Savage (floated barrel) supports, in two ways, my belief that barrel bedding only has a significant effect on inherently inaccurate loads. First, with the most accurate powders, the Savage’s accuracy was comparable to the Model 20’s (fully bedded barrel). However, with the least accurate powders, the Savage’s groups were fully 3 times larger than the Model 20’s. Second, after I completed the test of Ramshot Hunter with 150 gr bullets – the worst accuracy of any powder/bullet tested – I cut a plastic block to fit between the barrel and the stock giving a bit of pressure on the barrel. I then re-shot the Hunter and the RE15 tests. The RE15 groups were unchanged but the Hunter groups were almost half the size they were with the barrel fully floated.

   In my opinion, the accuracy difference between floated and bedded will likely be minor or nonexistent if you are shooting the rifle’s most accurate powder. However, I believe no hunting barrel should ever be floated because it leaves room for dirt, rocks, twigs and other gunk to wedge itself between the barrel and stock, causing a loss of zero.
SECTION III – POWDER TESTS

The powder tests were very involved and time consuming. Of the 2,727 shots fired in these tests, 312 were ignored when calculating a powder’s accuracy (either because the velocity was too low, too high, or I screwed up a test and had to re-shoot it). The number of shots included in the calculation of each powder’s accuracy is listed in the “Powders Tested” section below.

PHASE 1 – PRELIMINARY POWDER EXCLUSIONS: I needed a list of powders to test with 120 and 150 gr bullets. This list was compiled in Phase 1 without firing a shot.

284s are hunting rifles so I was only interested in data at or above acceptable hunting velocities. You must decide for yourself what velocity is acceptable, but I am not interested in velocities less than 3050 fps for 120 gr bullets, 2800 fps for 140 gr bullets, and 2700 fps for 150 gr bullets.

I used the QuickLOAD software to find every powder that could theoretically produce my minimum velocities at less than 87.5% of SAAMI maximum pressure (e.g., I excluded fast powders that needed more than 55,840 psi to shoot 150 gr bullets at 2,700 fps). I also excluded slow powders that could not generate 2,700 fps even with compressed loads. I also excluded powders that gave acceptable velocities only with fill ratios less than 80% of cartridge capacity.

The QuickLOAD data gave me a list of 42 powders for 120 gr bullets, and 34 for 150 gr bullets. However, many of these powders are common only in other countries, so I excluded SNPE, Norma, and other brands not generally available in the US. This narrowed the list to 28 and 25.

Nosler’s Mike Lake shared their accuracy data with me, thereby allowing me to exclude several powders from the tests (thank you Mike). For example, Nosler tested AA3100 with 150 gr bullets but got such erratic performance that they elected to not publish the results. I excluded RE15 from the 120 gr tests, and AA3100, RE19, and W760 from the 150 gr tests because of poor results at Nosler. The final list had 27 and 22 powders to test (see Table 1).

**Table 1**

<table>
<thead>
<tr>
<th>120gr Bullets</th>
<th>150gr Bullets</th>
</tr>
</thead>
<tbody>
<tr>
<td>H 414</td>
<td>RE 22</td>
</tr>
<tr>
<td>W 760</td>
<td>Viht N560</td>
</tr>
<tr>
<td>IMR 4350</td>
<td>XMR 4350</td>
</tr>
<tr>
<td>H 4350</td>
<td>H 414</td>
</tr>
<tr>
<td>Viht N550</td>
<td>H 4350</td>
</tr>
<tr>
<td>IMR 4895</td>
<td>H 4831SC</td>
</tr>
<tr>
<td>XMR 4350</td>
<td>IMR 4350</td>
</tr>
<tr>
<td>H 380</td>
<td>IMR 4831</td>
</tr>
<tr>
<td>Viht N560</td>
<td>Viht N160</td>
</tr>
<tr>
<td>W 748</td>
<td>Viht N550</td>
</tr>
<tr>
<td>IMR 4320</td>
<td>Viht N165</td>
</tr>
<tr>
<td>IMR 3031</td>
<td>IMR 4895</td>
</tr>
<tr>
<td>H BL-C2</td>
<td>H 380</td>
</tr>
<tr>
<td>RS BigGame</td>
<td>RE 15</td>
</tr>
<tr>
<td>Viht N150</td>
<td>Viht N150</td>
</tr>
<tr>
<td>AA 2520</td>
<td>RS Magnum</td>
</tr>
<tr>
<td>IMR 4064</td>
<td>IMR 7828</td>
</tr>
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<td>RS Hunter</td>
<td>IMR 4320</td>
</tr>
<tr>
<td>AA 2230</td>
<td>W 748</td>
</tr>
<tr>
<td>RS TAC</td>
<td>RS BigGame</td>
</tr>
<tr>
<td>Viht N160</td>
<td>H BL-C2</td>
</tr>
<tr>
<td>RE 19</td>
<td>RS Hunter</td>
</tr>
<tr>
<td>IMR 4831</td>
<td>Viht N540</td>
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<tr>
<td>Viht N140</td>
<td>Viht N135</td>
</tr>
<tr>
<td>H 4895</td>
<td></td>
</tr>
</tbody>
</table>

PHASE 2 – 100 YARD POWDER TESTS: Powders perform somewhat similarly in all rifles of the same cartridge. In other words, if Powder A is the least accurate powder in one 284, then it will not be the most accurate in any 284. Therefore, with each bullet weight, the 100 yard tests were used to exclude from further testing all powders that were not accurate in either rifle.

This required me to actually shoot each powder on the 120 and 150 gr bullet lists, and a smaller number of powders with 140 gr bullets. With few exceptions, each powder in Table 1 was tested by firing 5-shot groups of at least 4 powder loads with velocities higher than my minimums.
Data from all groups with average velocity less than my minimums was ignored. Data from all groups with any signs of high pressure was ignored.

Testing began with my Model 20 while Melvin Forbes was re-barreling the Savage. I tested 7 powders with 120 gr bullets and excluded 1 from further testing. I tested 6 powders with 150 gr bullets and excluded none from further testing. The Savage was used for the balance of Phase 2 testing. With 120 gr bullets, 21 of the remaining 26 powders were excluded and only the 5 powders listed in Table 2 progressed to the next phase. For 150 gr bullets, 18 of the 22 powders were excluded and only the 4 powders listed in Table 2 progressed to the next phase.

I then began testing 140 gr bullets. I have observed through the years that every cartridge’s most accurate powders retain their accuracy across a broad range of velocities and bullet weights. Said another way, if IMR 4350 is not accurate with either 120 or 150 gr bullets, it will not be the most accurate powder with 140 gr bullets. Therefore, selecting powders to test with 140 gr bullets was easy – I simply tested the most accurate powders for 120 and 150 gr bullets. A total of 7 powders were tested in both the Model 20 and the Savage and 3 were excluded. The 4 powders listed in Table 2 progressed to the next Phase.

**PHASE 3 – 300 YARD POWDER TESTS:** In Phase 2 I found that only seven powders had the potential to be the most accurate in the 284 (see Table 2). In Phase 3 I determined which powder is the most accurate with each bullet weight. My testing procedure for this Phase differed from that used in Phase 2 in only the following ways: First, all shots were taken at 300 yards. Second, all shots were taken in dead calm conditions – I did not shoot if a wind flag so much as twitched. Third, each powder was tested by shooting at least 3 10-shot groups in both rifles and the results were weighted averaged with the results from the 100 yard Phase 2 tests. In other words, the final determination of these powders’ accuracy was based on a minimum of 80 shots.

After Phase 3 was completed, I confirmed some of the results by shooting some groups with the Remingtons. I did not want to burn out my friends’ barrels, so I tested only a few powders in each and shot only a limited number of groups. The Remingtons produced results which were very similar to the data I had already collected using my rifles.

**POWDER TEST RESULTS – 120 GR BULLETS:** VihtaVuori powders fit the 284 with 120 gr bullets like a glove – all five fingers. As illustrated in the following chart, the five most accurate powders with 120 gr bullets are all made by VihtaVuori and the differences between all five are small enough to be irrelevant. However, there are other differences worth noting:

<table>
<thead>
<tr>
<th>TABLE 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>120 GRAIN</td>
</tr>
<tr>
<td>Viht N560</td>
</tr>
<tr>
<td>Viht N150</td>
</tr>
<tr>
<td>Viht N160</td>
</tr>
<tr>
<td>Viht N540</td>
</tr>
<tr>
<td>Viht N135</td>
</tr>
</tbody>
</table>

N150: This is the most accurate powder in both rifles. It gave excellent accuracy between 3050 and 3100 fps. I have been told this is one of VihtaVuori’s slowest sellers and is often difficult to find. If you choose this powder, buy a bunch when you find it.

N160: This is Nosler’s “Most Accurate Powder”. It produced excellent accuracy from 3050 fps to very high velocities in both guns. N160 is an excellent choice.
POWDER TESTS - 120 GRAIN BULLETS

N540:  Its accuracy is essentially equal to the other four at my minimum velocity of 3050 fps, but remained excellent down to 2900 fps. It would be my first choice if I were recoil shy.

N560:  Although N560 is very accurate in both rifles, in my opinion it is a poor choice. This powder produces a truly spectacular ball of flame at the muzzle about 5 feet in diameter.

N135:  Velocities varied widely depending on whether the ammunition was stored bullet up or down, but it kept shooting small groups. It is very accurate at my minimum velocity, but I suggest that N150 and N160 are better choices.

My Model 20 and the 22” barrel Remington clearly prefer N150. The Savage shot N150 a bit more accurately than N160. The 23” barrel Remington seemed to shoot N160 a bit better than N150, but the difference was very small. I think any 284 owner intending to use 120 gr bullets should test both N150 and N160 to determine which his rifle prefers. However, I doubt the difference will be significant. I suggest that N560 and N135 not be used in hunting rifles, and that N540 should only be considered by those who must minimize recoil.

POWDER TEST RESULTS – 140 GR BULLETS: Every powder tested with 140 gr bullets was very accurate (as would be expected because each was very accurate with 120 and/or 150 gr bullets). However, N150 is clearly more accurate than the others in both of my rifles, and performed superbly in both Remingtons. Both of my rifles shot this combination more accurately than any other powder/bullet combination tested. At 300 yards, every 10-shot group was less than 3 inches wide. This powder is my 1st choice for my Model 20’s hunting load.

If N150 did not exist, I would have a difficult time deciding whether to use N160, RE 15, or H 4831SC (notice that these are the three Nosler accuracy powders for 120, 140, 150, 160, and 175 gr bullets). All were very accurate in my rifles. I suggest that N560, though equally accurate, not be considered due to its flame ball.
POWDER TEST RESULTS – 150 GR BULLETS: The three Powder Test Charts illustrate that 150 gr bullets were less accurate in my rifles than lighter bullets. In both rifles, the best and worst powders for 120 gr bullets produced smaller groups than the best and worst powders for 150 gr bullets. This is the opposite of Nosler’s experience. Their test barrel shot smaller groups with 150s, larger groups with 120s, and 140s were in between. This difference could be due to many reasons, but after thousands of bullets fired through my rifles I am certain that both preferred lighter bullets and to about the same degree.

Although most powders were generally less accurate with 150 gr bullets, N150 and RE 15 both gave excellent accuracy in my rifles. Choosing between these two powders is difficult. The
Savage, the Model 20, and the 22” Remington all preferred N150. The 23” Remington preferred RE 15. N150 ran out of steam at about 2725 fps and increasing the powder charge gave only small increases in speed. On the other hand, RE 15 held its accuracy all the way up to 2832 fps. I think I would choose RE 15 over N150 with 150 gr bullets, but I will never have to make that choice – N150 with 140 gr bullets is unbeatable in my rifles.

Nosler’s accuracy powder for 150 gr bullets is H 4831SC, but this powder placed third in my tests. I don’t find this surprising, nor do I think this casts a shadow on Nosler’s data. Indeed, H 4831SC performed exceptionally well, being only slightly less accurate than RE 15 (Nosler’s accuracy powder for 140, 160, and 175 gr bullets) and N150 (a powder Nosler did not test). Nosler’s barrel may have preferred H 4831SC because it is 2 inches longer, because its vibration characteristics are different, or because lady luck affected data taken from fewer shots.

POWDERs TESTED:

Accurate 2230: Tested with 120 gr bullets only (10 shots). This powder produced huge velocity variations. My first 5-shot group had velocities ranging from 2979 fps (mild) to 3201 fps (very hot) and a heavy bolt with an ES of 222, the worst of any powder tested. The second group had similar inconsistencies. I stopped testing before I got any reliable data.

Accurate 2520: Tested with 120 gr bullets only (10 shots). Performance was almost as erratic as AA 2230, and I stopped testing before I got any reliable data.

Accurate XMR 4350:

120 gr bullets (20 shots): This had better than average accuracy, and was less sensitive to powder position than most. Accuracy was consistent from 3064 fps (56.5) up to 3127 fps (57.8). It gave me no signs of high pressure at these velocities. SDs were in the 30s.

150 gr bullets (20 shots): This powder is a good example that a low SD does not indicate good accuracy. SDs were very good at 10 to 20 but all groups were very large. Velocities ranged from 2718 fps (51.5) to 2835 fps (53.1) with no signs of high pressure.

Hodgdon 380:

120 gr bullets (20 shots): This powder produced truly miserable accuracy. SD averaged 12. I tested from 3052 fps (54.0) to 3102 fps (55.2).

150 gr bullets (20 shots): Again, SD was good at an average of 18, but accuracy was poor. 49.0 gave me 2701 fps and 50.5 gave me 2770 fps with no pressure signs.

Hodgdon 414: SD was very good in both rifles at 10 to 25.

120 gr bullets (50 shots): This was the only powder that shot more accurately in the Savage than the Model 20. I shot many groups hoping that the trend would reverse, but it never did. H 414 loves speed. I got over 3210 fps from 57.5 with no pressure signs, but I know this load is hot. 55.0 gave me 3056 fps.
150 gr bullets (25 shots): Accuracy was ugly. 50.4 gave me 2704 fps and 52.5 gave me 2826 fps without pressure signs.

**Hodgdon 4350:**

120 gr bullets (25 shots): I tested 55.5 (3054 fps) up to 57.2 (3147 fps) and accuracy was never better than ugly.

150 gr bullets (30 shots): Again, accuracy was ugly. 50.5 gave me 2726 fps and 53.0 gave me 2829 with no pressure signs.

**Hodgdon 4831SC:** I use this powder in several calibers and like its insensitivity to temperature. It shot well in my 284s with the heavier bullets. Average SD was always exceptional at 10.

140 gr bullets (85 shots): Excellent accuracy from 2813 fps (55.5) up to 2883 fps (58.0). This latter load was heavily compressed and I simply could not get more powder in the case.

150 gr bullets (90 shots): Excellent accuracy from 2712 fps (54.0) up to 2823 fps (56.0). Above 56.0 the loads were compressed and accuracy began to fall off.

**Hodgdon 4895:** Tested with 120 gr bullets only (15 shots): This powder showed no potential as the most accurate powder so I stopped testing after 3 groups. Groups were large and evenly dispersed. This powder seemed particularly sensitive to powder position. Each group had a maximum velocity spread of about 100 fps. I tested 45.5 (3048 fps) to 46.5 (3078 fps).

**Hodgdon BL-C(2):** This was the only ball powder I elected to test with 140 gr bullets.

120 gr bullets (20 shots): With this bullet weight, BL-C(2) had average accuracy and average velocities. I tested 49.5 (3048 fps) to 51.0 (3133 fps) without pressure signs. It shot a bit more accurately at the higher velocities, but it was then only a bit better than average.

140 gr bullets (40 shots): Its accuracy was reasonably good, but still it was the worst of all powders tested with this bullet weight. I started at 47.5 (2819 fps) and stopped at 49.1 (2946 fps) with no pressure signs.

150 gr bullets (55 shots): Accuracy was really quite good, but not in the same league with the most accurate powders. SD averaged 22. 47.0 gave me 2733 fps. 49.0 gave me 2822 fps and some signs of pressure.

**IMR 3031:** Tested with 120 gr bullets only (15 shots). This powder had no potential. It was inaccurate, sensitive to temperature, and was very sensitive to powder position generating ES’s above 100. 46.5 produced 3046 fps and 47.5 produced 3101 fps.

**IMR 4064:** Tested with 120 gr bullets only (75 shots). I tested this powder in the Model 20 and its accuracy was good, even though it had high SD and groups had minor vertical stringing. Because it had performed well in the Model 20, I also tested it in the Savage where its performance was dismal, consistently shooting large groups. I shot a lot of groups to confirm
that one rifle liked it and the other did not. 46.9 gave me 3041 fps and I got a heavy bolt lift in the Savage at 3131 fps with 50.5.

**IMR 4320**: I found two negative attributes with this powder. First, it was very sensitive to powder position giving high SDs of about 50. Second, I found it to be temperature sensitive, with significantly lower velocities in cold temperatures than it produced in hot temperatures.

120 gr bullets (60 shots): This is Sierra’s accuracy powder. It was accurate in both rifles, but not in the same class as the VihtaVuori powders. I found 3050 fps at 49.5 and started to see pressure signs at 3120 fps (51.0).

150 gr bullets (20 shots): 46.0 gave me 2724 fps and 47.5 gave 2863 fps with pressure signs.

**IMR 4350**: This is the powder used by most of the 284 owners I have met, but it performed poorly with both bullet weights in my rifles and one Remington. I repeated these tests with a second lot of powder given to me by the owner of that Remington. He was certain that it shot well in his rifle, until he shot some of my Viht N150. I suggest 284 owners save their IMR 4350 for some other cartridge. It seemed to be just a tad temperature sensitive. It was not sensitive to powder position with small ES and SDs less than 20 with both bullet weights.

120 gr bullets (85 shots): I started at 56.0 (3068 fps) and got a heavy bolt at 57.5 (3140 fps).

150 gr bullets (50 shots): I tested 51.0 (2711 fps) to 53.0 (2861 fps) with no pressure signs.

**IMR 4831**: Inaccurate and temperature sensitive in both bullet weights.

120 gr bullets (20 shots): This powder produced no noticeable powder position variations and the lowest SDs of any powder (all groups were either 8 or 9). Nonetheless, groups were about twice as large as the groups shot with Viht N150. I started with 57.0 at 3052 fps and ended with 60.0 at 3149 fps and no signs of high pressure

150 gr bullets (30 shots): Ugly – this powder/bullet combination shot the third worst groups of any tested. As with the lighter bullets, I found no variations in velocity due to powder position, but it gave me 72 fps more velocity at 72º than it did at 26º. 52.5 produced 2743 fps and 54.5 gave me 2842 fps with no pressure signs.

**IMR 4895**: This powder has wholly different characteristics with these two bullet weights. It is very finicky with the 120 gr bullets and produces very high SD and ES. On the other hand, it settled down with 150 gr bullets and acted like most other powders.

120 gr bullets (45 shots): Good accuracy, but seems to be temperature sensitive, and is very sensitive to powder position. I only shot 15 rounds in the Savage because ES was higher than I can accept. In those 3 groups, the difference between the fastest and slowest shot was 106 fps, 82 fps, and 156 fps. Small increases in load produced large increases in velocity – be careful! I started with 49.7 at 3033 fps and stopped with 50.5 at 3251 fps and a sticky bolt. This powder went from mild to very hot in only 0.8 gr. Again, be careful!
150 gr bullets (20 shots): This powder behaved better with the heavier bullet. Accuracy was still only average, but it was much less sensitive to powder position. SD averaged a very low 16. 46.5 gave me 2732 fps and 48.0 gave me 2831 fps with no pressure signs.

**IMR 7828**: Tested with 150 gr bullets only (20 shots). This is the fourth worst powder/bullet combination tested. Group size was ugly, even though it produced low SD and ES. 56.0 gave me 2744 fps and 57.5 gave me 2827 fps.

**Ramshot Big Game**: This is the ultimate example of an inaccurate powder with low SD. With 120 gr bullets Big Game produced an excellent average SD of only 14, but it was the least accurate powder. SD was also low with 150 gr bullets, and accuracy was even worse.

120 gr bullets (20 shots): Groups were very uniform and round, but they were also very large. 52.5 gave me 3041 fps and 54.0 gave me 3120 with no pressure signs.

150 gr bullets (20 shots): Again, uniform round groups that were also very large. I started at 50.0 for 2722 fps and stopped at 51.5 for 2836 fps with no pressure signs.

**Ramshot Hunter**: Don’t go here. This powder is the worst choice you can make for a 284.

120 gr bullets (20 shots): Accuracy was poor. I started with 55.0 for exactly 3050 fps, but I have no feel for how much speed it will give because I gave up on it before 3120 fps.

150 gr bullets (15 shots): Ugly, ugly, ugly. This combination produced the worst accuracy of any combination tested. One of the 5-shot groups was over 5 inches wide at 100 yards! I started at 50.0 for 2722 fps and gave up at 51.0 for 2793 fps.

**Ramshot TAC**: Tested with 120 gr bullets only (10 shots). This powder is a bad choice. Accuracy was average, but it produced SDs in the 50’s and groups showed vertical stringing at 100 yards. It was very sensitive to powder position, producing high ES of 149 and 160 fps. I gave up on this powder after two groups of 45.5 (3054 fps) and 46.0 (3093 fps).

**Ramshot Magnum**: Tested with 150 gr bullets only (15 shots). Ugly, ugly, ugly – the second worst powder/bullet combination tested. I tested from 2738 fps (61.0) to 2783 fps (62.0).

**Reloder 15**: This is Nosler’s accuracy powder with 140, 160, and 175 grain bullets. I expected it to perform well with the heavier bullets, and it did. (Note: RE 15 did not perform well in Nosler’s tests with 120 gr bullets. Before I began this project, I tried this combination in my Model 20 and also received poor accuracy.) I shot a lot of rounds with RE 15. It was always consistent and predictable. It did not seem sensitive to temperature or powder position. I would choose this powder when using 150 gr bullets.

140 gr bullets (100 shots): At 100 yards, this powder gave me excellent accuracy from 2814 fps (46.5) up to 2987 fps (49.3), where I began to get high pressure. However, SD was only average and I frequently got groups where the maximum spread in velocity exceeded 100 fps. This caused some vertical stringing at 300 yards.
150 gr bullets (125 shots): Although RE 15 liked 140 gr bullets, it liked 150 gr bullets better. This didn’t surprise me because it had performed so well with heavy bullets at Nosler. Accuracy was excellent all the way from 2698 fps (44.5) up to 2832 (47.1) where I began to get high pressure. Interestingly, the additional 10 grains of bullet caused its SD to drop to 11. 300 yard groups were small and round.

Reloder 19: Tested with 120 gr bullets only (35 shots). This was the least accurate powder shot with this bullet weight in the Model 20. I started with 58.5 (3064 fps) and ended with 60.0 heavily compressed (3120 fps).

Reloder 22: Tested with 150 gr bullets only (20 shots). This powder gave me average accuracy and an average SD of 29. It was not sensitive to powder position. 54.5 gave me 2710 fps and a compressed 56.0 gave me 2791 fps.

VihtaVuori N135: Tested with 120 gr bullets only (55 shots). N135 was very accurate in both of my rifles. However, I think it is a poor choice for hunting ammo. Velocities varied widely depending on whether the ammunition was stored bullet up or down. I should have seen vertical stringing at 300 yards, but didn’t and therefore I distrust my own data. I know that the laws of probability can not be cheated forever and believe that this powder’s velocity fluctuations will cause vertical stringing and inaccuracy at long distances, even though I did not see it in my tests. Both rifles started to give me pressure signs above 47.0 (3057 fps). Though accurate, there are better choices (like N150 and N160).

VihtaVuori N140: Tested with 120 gr bullets only (20 shots). Average accuracy, average sensitivity to powder position, and seemingly not very temperature sensitive. However, this powder was very sensitive to load at these velocities. For example, it gave me 2923 fps with 48.5 for a mild load, and 3109 fps and heavy bolt lift with 49.6. In other words, it went from mild to hot in 1.1 grains.

VihtaVuori N150: This powder was the star of the show. It was the most accurate powder with all 3 bullet weights and in both rifles. With N150, my Model 20 is a killing machine. I have been told this is one of VihtaVuori’s slowest sellers and is often difficult to find. If you choose this powder, buy a bunch when you find it.

120 gr bullets (80 shots): It gave excellent accuracy at velocities between 3060 fps (49.3) and 3107 fps (50.3) with exceptionally low standard deviations averaging approximately 11 regardless of powder position. Groups at 300 yards and some I shot later at 600 yards were round with no evidence of vertical stringing.

140 gr bullets (80 shots): This was the most accurate powder/bullet weight combination in both rifles. Excellent accuracy between 2816 fps (46.5) and 2869 fps (48.5) with standard deviations of about 14. N150 is nearing its maximum performance at about 2875 fps. At this velocity neither rifle showed any signs of high pressure, but increasing powder charges produced very little increase in velocity and large increases in SD. I have chosen 48.0 gr (2845 fps) as the final load for my Model 20.

150 gr bullets (80 shots): This powder is very accurate with this bullet weight, but reaches its performance limit near my minimum velocity. It gave excellent accuracy between 2709 and
2749 (45.0 and 46.5), but increases in powder gave small increases in speed. 2750 fps is at or near its upper limit. At all velocities above 2700 fps, standard deviations averaged 27 or more – worse than its performance with lighter bullets and resulting in minor vertical stringing at 300 yards.

**VihtaVuori N160**: This is Nosler’s accuracy powder for 120 gr bullets. It earned second place in my tests with 120 gr bullets, tied with RE 15 for second place with 140 gr bullets, and essentially tied H 4831SC for third place with 150 gr bullets. The powder was easy to work with, accurate through a broad range of velocities with all bullet weights, and produced very high velocity. It was not sensitive to powder position and seemed to not be sensitive to temperature.

120 gr bullets (140 shots): Excellent accuracy from 3037 (55.0) to far more than 3200 fps with no pressure signs in these rifles. (I won’t tell you how much more – this is a HOT load – and I suggest that 3100 fps (about 56.0) is a better choice.) SD was consistent with no group exceeding 20 and all groups at 300 yards were round with no vertical stringing.

140 gr bullets (90 shots): Excellent accuracy from 2834 (53.5) through 2951 fps (55.0) with good standard deviations in the low 20s and no signs of high pressure.

150 gr bullets (80 shots): I went as high as 2848 fps (53.5) with no pressure signs, excellent accuracy, and SDs in the low 10s. At the other end, accuracy seemed to fall off below 2721 (51.5) with SDs in the low 30s.

**VihtaVuori N165**: Tested with 150 gr bullets only (30 shots). This was the 6th most accurate powder with 150 gr bullets. I found no sensitivity to powder position or temperature. 56.5 gave me 2722 and 58.5 gave me 2788 with no pressure signs.

**VihtaVuori N540**: Tested with 120 gr bullets only (80 shots). Unlike the other VihtaVuori powders, this one did not like to be kicked in the ass. Its accuracy was essentially equal to the other four at my minimum velocity of 3050 fps (49.3), but was equally good at 2900 fps (48.0). SD at 2900 fps was poor and groups showed vertical stringing at 100 yards, but they were still small. I will not hunt with N540, but this powder would be my first choice if I were recoil shy. My Model 20 had a much reduced thump with the slower load.

**VihtaVuori N550**: I had hoped for accuracy similar to, and speed faster than, N150. I didn’t get what I hoped for. This was the least accurate VihtaVuori powder tested.

120 gr bullets (20): Excellent velocity but not very accurate. SDs were excellent at a minimum of 12 and a maximum of 20, and all 4 groups were round. They were also large. This is another example that low SDs do not mean good accuracy. My fastest load was 3172 fps (55.0) with no high pressure signs. 54.0 gave me 3087 fps.

150 gr bullets (20): Excellent velocity and poor accuracy. 49.5 gave me 2744 fps and 51.0 gave me 2881 fps.

**VihtaVuori N560**: This powder was not sensitive to either powder position or temperature, and was very accurate with all three bullet weights, but I cannot recommend it. Similar to a camera’s flash, it produces a truly spectacular ball of flame at the muzzle about 5 feet in dia-
meter. It is bright enough to degrade one’s vision at dawn and dusk. It is also bright enough to get a deer’s attention and, if the shot is very long, it is conceivable that a deer could flinch or move before the bullet arrived. N560’s accuracy is outweighed by the disadvantage of its muzzle blast. My experience with N560 in 243s and 270s is that the flame ball is reduced in longer barrels. N560 might be worth a try if your 284 has a 26” or longer barrel.

120 gr bullets (95 shots): Excellent accuracy and velocity. I started at 60.0 (3047 fps) and stopped at 62.5 (3218 fps) with no pressure signs, but I’m sure this load must be hot. SD averaged 18.

140 gr bullets (90 shots): Consistently accurate with average SD of 17. 56.1 gave me 2804 fps and 58.0 gave me outstanding velocity of 3001 fps without pressure signs.

150 gr bullets (45 shots): This powder was the 3rd most accurate with the Model 20, but tied for 10th place in the Savage. I do not know why I received such disparate results. 55.0 gave me 2730 fps and 56.5 gave me 2851 fps with no pressure signs.

**Winchester 760:** Tested with 120 gr bullets only (20 shots). Velocity was very consistent (average SD was 14), but accuracy was ugly. 55.5 gave me 3062 fps and 57.0 gave me 3142 fps with no pressure signs.

**Winchester 748:** This powder performed reasonably well with 150 gr bullets, but was ugly with the light bullets. It was not sensitive to powder position. I found no temperature sensitivity in these tests, but have experienced such sensitivity with 748 in other cartridges.

120 gr bullets (15 shots): This was the 2nd worst performing powder with this bullet weight. Groups were large and ugly. 51.1 gr gave 3048 fps and I gave up at 52.0 gr at 3093 fps.

150 gr bullets (20 shots): Better than average accuracy and exceptionally consistent speed with average SD of 12. I started at exactly 2700 fps with 46.1 and stopped at 2762 with 47.5 and no signs of high pressure.
SECTION IV – PRIMER TESTS

Many hand loaders do not test primers in their rifles because they believe “all primers shoot about the same”. My response is “bovine excrement”. Primers DO make a difference, and in my 284s the difference is very large.

The powder tests had shown that both of my rifles preferred the same 4 powders – Viht N150, Viht N160, RE 15, and H 4831SC. The three most accurate powders with 120, 140, or 150 gr bullets in both rifles were always 3 of these 4 choices. I then began testing primers to find which was the most accurate with each of these powders.

I tested CCI BR2, Federal 210M, Remington 9.5, and Winchester WLR primers with each of the 4 powders using the following procedure. First, all shots were taken at 300 yards in windless conditions. Second, all tests were shot with the Savage only. Third, I tested all four primers with a) Viht N160/120 gr bullets, b) Viht N150/140 gr bullets, c) RE 15/150 gr Bullets, and d) H4831SC/150 gr bullets. Fourth, I tested each powder/bullet combination by shooting one 10-shot group with each primer (40 shots) in one day. I repeated each test on two more days for a total of 120 rounds for each powder/bullet combination, and a total of 480 rounds over 12 days to shoot all combinations. Although I had used WLR primers throughout the powder tests, they were re-shot in these tests to compare the accuracy of all primers in like conditions.

I needed about 3 hours of windless conditions to shoot each set of 40 rounds. I watched the weather forecasts, carefully picking the days I wanted to run a primer test. Fortunately, the weather Gods cooperated. On eleven days the conditions were dead calm for the full 3 hours I needed. On one day the wind flags started to twitch a bit after two hours, but I don’t think the wind ever exceeded 1 MPH and I don’t think the test was affected in any significant way.

The results of the Primer Tests are illustrated in the following chart. Several observations are particularly noteworthy:

1. With every powder/bullet combination tested, the accuracy difference between primers was, in my opinion, very large and very significant. Look at the results for RE 15/150 gr. 210M primers shot groups almost 75% larger than WLR primers! This is the same difference in accuracy between RE 15 and Ramshot Hunter, and Hunter’s accuracy was in the bottom 1/3rd of all powders tested! Even in the N160/120 gr bullet test, where the difference in primers was the smallest, BR2, 210M, and 9.5 primers shot groups at least 20% larger than WLR.

I cannot understand why so many hand loaders spend hundreds of dollars and dozens of hours at the range working up accurate loads, but fail to test the least expensive part of the recipe. Think of all the hours, and all the bullets and powder you have burned at 40¢ per round and more, trying to find an accurate load. Now look at the chart again and see what a 2¢ primer can do. If you still think all primers are the same, see my response above.

2. My rifle showed a very strong preference for Winchester Large Rifle primers in every powder/bullet combination. In each case, WLR produced more consistent velocities and better accuracy (the difference between WLR and BR2 with H 4831SC is so small that they are essentially tied).
After these tests were completed, I checked the results by re-shooting the N150/140 gr test in my Model 20. The results were almost identical to the results produced in the Savage.

In my opinion, primer accuracy depends more on the cartridge than the powder being used. I have generally found that a cartridge’s most accurate primer will hold its advantage across most or all powder/bullet combinations (as WLR was the most accurate in each of 4 powders and 3 bullet weights in this test). I cannot prove this theory, but it seems to hold true more often than not. Based only on my past observations, I use Federal’s 215 as my default primer for all cases larger than 30-06. WLR is my default for cases in the 30-06 range. I do not have a default primer for cartridges in the 22-250 through 308 sizes. In the 6BR down to 222 my default primer is Federal 205. I test primers in all cartridges I load, but these are the primers I use unless another proves itself to be more accurate.

I have also found a few loads where one primer was more accurate than the rest by an unusually large degree. For example, the 223 Rem. and W748 was significantly more accurate with CCI primers in 3 out of 3 rifles. The 308 Win. and Varget strongly preferred Federal primers in 4 out of 5 rifles. The 270 Win. and either Viht N560 or H 4831SC shot much better with WLR primers in 2 out of 3 rifles. The 300 Win. Mag. and H 4350EXT was significantly more accurate with Federal 215s in 2 out of 2 rifles. As my findings in these primer tests indicate, it appears that I can add the 284 Win. as yet another example.
SECTION V – BULLET TESTS

The most accurate load in my Model 20 is 140 gr bullets, Viht N150 at 2845 fps (48.0), and WLR primers. However, because all testing in this rifle was completed using Nosler Ballistic Tips, I did not know whether the BT was this rifle’s most accurate bullet. I have used BTs in my 270 for many years and am happy with them, but was curious how other bullets would perform.

Unlike the powder and primer tests, my bullet tests were not intended to be comprehensive for two reasons. First, because I shoot my 284 only at thin skinned, light boned, non-dangerous animals, I was only interested in bullets designed for such game. Second, based only on my own observations, I believe that if bullet accuracy was tested in 10 different 284s chambered with 10 different reamers, it is likely that several different bullets would be the most accurate in at least one of the barrels. I also believe that the most accurate bullet for any barrel frequently changes as the barrel and throat become worn. Therefore, I believe that the results of any bullet tests are only valid for the test barrel, and only valid temporarily because the results may change as that barrel ages.

Therefore, do not give the results of these tests more credence than is warranted. Do not assume that the most accurate bullet in my rifle will be the most accurate bullet in yours, although this is probably a good place to start. These tests only demonstrate how these bullets performed in my rifle. Your mileage may differ.

The bullets were tested as follows. First, all testing was completed with my Model 20. This rifle has seen very heavy use in the 3 years I have owned it. I have shot more than 1,200 rounds through its barrel in each of those 3 years and its chamber has been set back once. Although I expect to retire this barrel soon, it is now only slightly less accurate than when it was new.

Second, like the primer tests, all shots were taken at 300 yards in dead calm conditions.

Third, I decided to test only the bullets listed below. Although I didn’t shoot enough of them to qualify as a “test”, I also shot the Hornady BTSP (poor accuracy), Swift Sirocco 150 gr (poor accuracy) and A-Frames (worse), Speer Grand Slam (worse yet), and Trophy Bonded (I can’t call it a group – it was more like a gathering).

- Barnes X Triple Shock 140 gr.
- Hornady InterBond 139 gr.
- Hornady SST 139 gr.
- Nosler AccuBond 140 gr.
- Nosler Ballistic Tip 140 gr.
- Nosler Partition 140 gr.
- Sierra GameKing 140 gr.
- Sierra MatchKing 130 gr.
- Sierra Pro-Hunter 140 gr.

Fourth, with each bullet (except the Ballistic Tip because I already had good data), after finding the best seating depth I shot four 10-shot groups for accuracy on four different days. A total of 415 shots were fired to complete the tests.
As the chart below illustrates, my Model 20 liked several bullets designed for thin skinned game. Some notes regarding these results are relevant:

1. I tested the Sierra MatchKing only to satisfy my curiosity. I used 49.5 gr of N150 (2964 fps) and WLR primers. I am pleasantly surprised that three hunting bullets produced accuracy within 20% of the MatchKing.

![140 Grain Bullet Test Chart]

2. The Nosler AccuBond’s accuracy was a very pleasant surprise. It is not as accurate as the BT in my rifle, but the difference is very small.

3. Sierra Pro-Hunter: This bullet was the fifth most accurate bullet in my Model 20. However, when I conducted an abbreviated bullet test in the Savage before I began this project, the Pro-Hunter was more accurate (in that rifle) than either the Ballistic Tip or the GameKing.

4. Barnes X Triple Shock: I have never been able to get a Barnes X bullet to shoot worth a damn in any rifle of any caliber – until Barnes released their new Triple Shock X bullet. I have now loaded this bullet in a 300 WM, my 270, my 338 WM, and my Model 20. In each case, it has shot better than any X bullet has ever shot for me before. In each case it has shot much more accurately than any other bullet designed for heavy boned, thick skinned, and/or dangerous game.

5. Hornady InterBond and SST: The poor accuracy of these bullets is a complete shock to me. I have always found the 30 caliber SST to be in the same accuracy league as the Ballistic Tip or the Sierra bullets, and have loaded this 139 gr SST in a 7-08 with outstanding accuracy. I have no idea why these bullets performed so poorly in my rifle.

So, what bullet have I chosen to use with my 284’s most accurate load? For practice, coyotes, vermin, and all-around general duty except during big game hunting season, the Ballistic Tip wins. For hunting anything larger than a coyote, the AccuBond wins. “What?” you say. “Why spend thousands of dollars and as many hours to find your rifle’s most accurate load, and then hunt with a bullet that is not the most accurate?” The AccuBond wins for three reasons.
First, we can control almost all of the elements of a clean kill. We control the reliability of our rifles and our ammunition. As hand loaders, we control our ammunition’s ability to shoot where we look. We shoot only when we are confident of a good shot. However, we can not control what our bullet does after impact. Will it crush bone and keep going or will it fall apart? Will the high velocity of a close shot cause a core separation? Most importantly, will it go through the animal? I believe that a bonded bullet will leave a wider wound channel than any other bullet design, that it will penetrate more deeply than a non-bonded bullet, and that a fast opening one is the best possible design for thin skinned animals. In short, when compared to the Ballistic Tip, I believe that the AccuBond’s 90%+ weight retention will reduce the future likelihood of needing to track a wounded animal.

Second, I believe that the small difference in accuracy will not cause me to miss a lethal shot. In my rifle, 10-shot groups at 300 yards will average 2.6” diameter with the Ballistic Tip and 3.1” diameter with the AccuBond. This means that about 9 out of 10 shots with the AccuBond will fall inside the trajectory cone of the Ballistic Tip. Therefore, an AccuBond will fall outside the Ballistic Tip’s accuracy only 10% of the time, and then only about ½” outside at 300 yards! Will this loss of ½” of accuracy at 300 yards for 1 out of 10 bullets ever result in a wounded animal instead of a dead one? Not in my lifetime, and not in yours either.

Therefore, the question is should I give up ½” of accuracy at 300 yards 10% of the time, in order to get the benefits of a high weight retention bullet all the time? The answer seems obvious to me – I’m going to hunt big game with the AccuBond.

The third reason is that my rifle shoots the Ballistic Tip and the AccuBond to the same point of impact. At all distances up to 300 yards, the difference between them is less than 1 click on my scope. Therefore, I can shoot each bullet interchangeably without making any adjustments.
SECTION VI – CONCLUSION

The completion of this project has allowed me to be certain, with a very high level of confidence, that the most accurate hunting load in my Model 20 is 48.0 grains of VihtaVuori N150, WLR primers, and 140 gr Nosler Ballistic Tip bullets. I use this load for killing vermin and for killing circles on paper. I use the same load with Nosler AccuBond bullets to kill anything bigger.

Completing this project has consumed more than 1,000 hours of my time. It has also consumed much more than that number of my dollars. It has been time and money well spent. Although any reasonably good load is accurate enough in my rifle to kill any animal I hunt, this project has allowed me the confidence of shooting my rifle’s most accurate load. The reward of simply knowing that I am receiving the last iota of performance my Model 20 can give is priceless. This project has also allowed me to share with other 284 owners information that was previously unavailable, and I am grateful for the opportunity to do so. But most importantly, this project, from start to finish, has been FUN, FUN, and more FUN. And I can think of only a few things more fun than trigger time.

This report only presents accuracy data in numbers and charts, not pictures. Therefore, I think it is appropriate to show you here how this load actually performs in my Model 20. The picture below is a 10-shot group of the final load with AccuBonds, shot at 100 yards, using a Leupold 2.5x8 scope at 8 power. It is not the smallest group, nor is it the largest. Rather, it is an average 100 yard group from this rifle.

I hope this report will help you tune your rifle to the same accuracy.