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The Savage Model 25 Lightweight Varminter is one of three .22 Hornet rifles reviewed in this issue. Photo by Stan Trzoniec.

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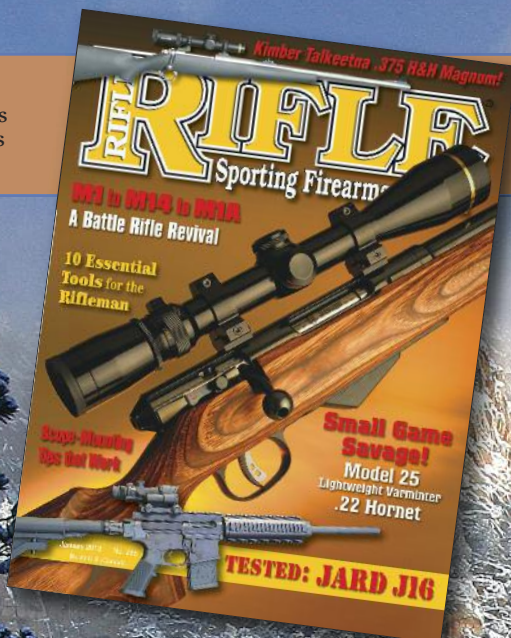
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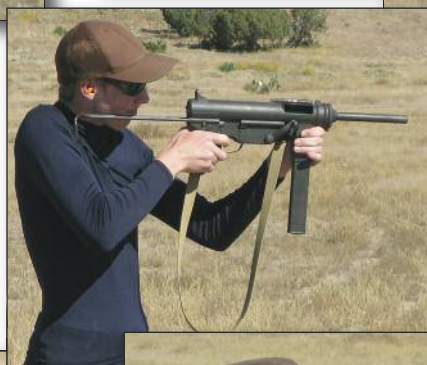
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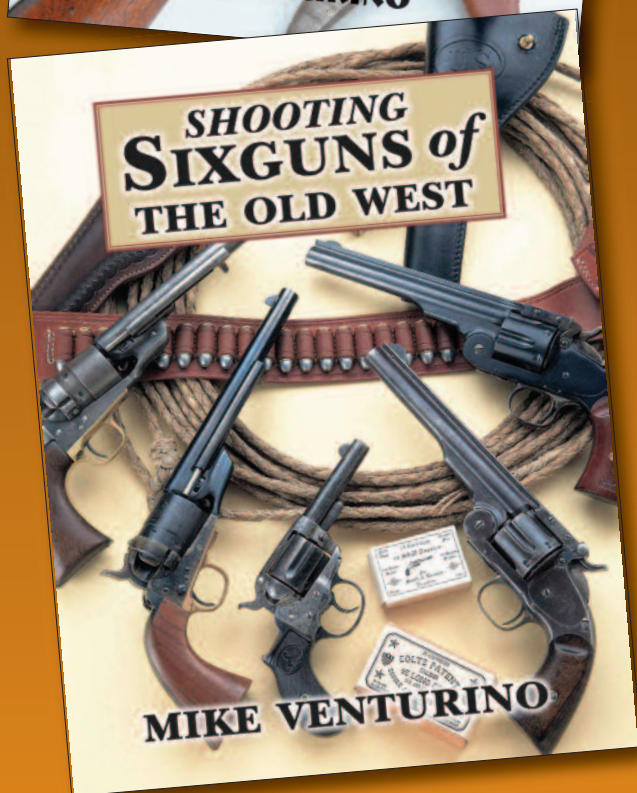
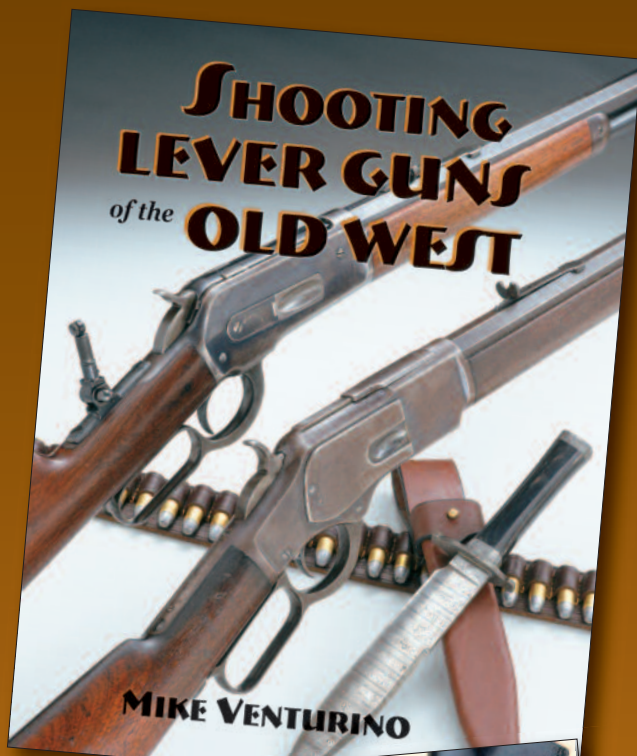
SPOTTING SCOPE

by Dave Scovill

A special thanks to Mike Venturino for making the trip from Montana to the Wolfe Publishing annual shoot near Prescott, Arizona. Mike brought his collection of machine guns that included a U.S. M1 Thompson .45 ACP, a German MP40 9mm, a German MP44 Sturmgewehr 7.92x33mm, a U.S. M3 "grease gun" .45 ACP and a Japanese Type 99 Light Machine Gun 7.7x58mm.







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WINCHESTER'S LEVERGUN CARTRIDGES

DOWN RANGE

by Mike Venturino

Between 1866 and 1895, Winchester introduced seven distinctively different models of lever-actuated firearms, all of which in turn were produced in rifle, carbine and even military-style musket configurations. Total sales ranged from slightly fewer than 64,000 for the Model 1876 to millions of Model 1894s. Perhaps this information is not exceptionally startling, but maybe this is: Using World War II as an arbitrary cut-off date, those seven levergun models were chambered for 36 different cartridges!

The first was the .44 Henry Rimfire in a Winchester levergun in 1866, although it was chambered in the Winchester forefather, the Henry, as early as 1862. The last pre-World War II Winchester chambering was the .218 Bee developed in 1938 and used briefly in some Model 92s. (I'm not going to get to developments, such as the Models 53, 63, 65 and 71. They deserve coverage of their own.)



Between 1866 and 1895, Winchester introduced seven distinctly different models of leverguns: (1) Model 1866 saddle ring carbine (Uberti replica), (2) Model 1873 round-barreled rifle, (3) Model 1876 round-barreled rifle, (4) Model 1886 octagonal-barreled rifle, (5) Model 1892 round-barreled rifle, (6) Model 1894 octagonal-barreled rifle and (7) 1895 takedown rifle.

Another interesting, if not actually startling, fact is that of those seven levergun models chambered for three dozen different cartridges, only three were sold in two different models: the .44, .38

and .32 WCFs, all introduced in the Model 1873 but carried over again in the Model 1892. Every other Winchester lever action had its own specific array of cartridges. The Model 1866 chambered the fewest with two. As said, there was the .44 Henry Rimfire, but toward the end of production a .44 Henry Centerfire version of the Model 1866 was made. The Model 1866 was not the only Winchester levergun chambered for both rimfire and centerfire rounds, however. The Model 1873 was made for the rimfire .22 Long, along with the three above-mentioned WCFs.

The model offered in the most chamberings was the 1886. It was made for 10 different rounds if one considers the .50-110-300 and .50-100-450 as different. Both used the same 2.40-inch case and could be fired in rifles marked for either one. However, the rifling twist rates of .50-caliber rifles differed

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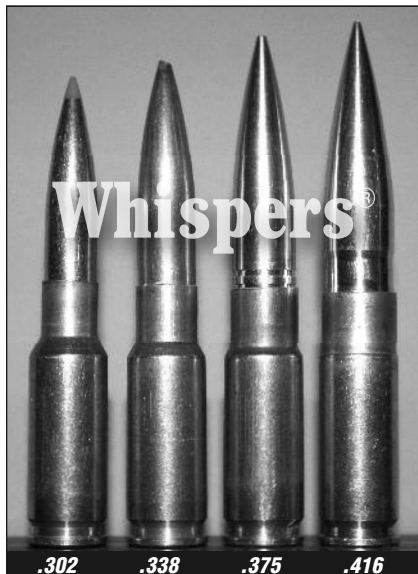
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Left, Mike's remaining Winchester leverguns are chambered for seven cartridges:

(1) .38 WCF, (2) .44 WCF, (3) .32-40, (4) .38-55, (5) .45-60, (6) .40-82 and (7) .405 Winchester. Below, a Winchester Model 1894 .38-55 has consistently delivered the best accuracy over the years.

by the specific round for which they were intended. Such specifications are hard to pin down, but to the best of my knowledge the .50 caliber with 300-grain bullets had barrels cut with one-in-60-inch rifling, while the other round carried 450-grain bullets and used a one-in-54-inch twist. I've never seen an original .50-100-450 Model 1886. Only a few hundred were made, so I don't know for sure how they were caliber stamped. I do know from owning a .50-110-300 that it was marked ".50 Ex."

Of those 36 different levergun cartridges, by my count 25 were Winchester developments and carried such names as .30 WCF, meaning .30 Winchester Center Fire.



Later "centerfire" was dropped and they became simply .35 Winchester or .405 Winchester. Except for the .22 Long, all chamberings of the Models 1866, 1873 and 1876 were by Winchester. Starting with the Model 1886 Winchester, engineers borrowed from other organizations for some of the company's cartridges – sometimes putting them under Winchester's name and sometimes not. An example is the .45-70 Government. Winchester didn't try to claim it. It did see fit to put its name on the .40-65 WCF, which was identical to the .40-60 Marlin used in the Model 1881 five years before it became a Winchester offering. Marlin's .40-60 should not be confused with the .40-60 WCF. The two were/are not interchangeable.

Something else worthy of note is that Winchester seemed to try not to carry over black-powder terminology into the smokeless era. Whereas the company usually did label rifles meant specifically for black powder with the dual set of digits, such as .45-60 or .38-55, it tried to desist from the habit in the smokeless era. For example, what we all call .30-30 today was marked on Winchester leverguns ".30 WCF."

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There was also the .32 Winchester Special, which was caliber stamped ".32 W.S." The sole smokeless powder exception of which I am aware is the .25-35. Of course, most, if not all, the rounds for which Winchester chambered Models 1886, 1892, 1894 and 1895 made the transition to smokeless.

The Winchester levergun that used the fewest rounds labeled "Winchester" was the Model 1895. It was offered for nine cartridges, of which only four were engineered by the company. Of those, the .40-72 and .38-72 started with black powder and lead bullets. The other two were smokeless-powder, jacketed-bullet rounds from the beginning. Those were .35 and .405 Winchesters. All five of the others were developed for military use by the United States, Britain or Russia. Today we call them .30-40 Krag, .30-03, .30-06, .303 British and 7.62x54mm Russian.

Of the 36 Winchester levergun cartridges chambered by the company prior to 1941, all but the two rimfires were reloadable. Of those 34, I've had handloading experience with 27, ranging from a few dozen .40-70 rounds for a friend's Model 1886 to many thousand for the various 1873s and 1892s I've owned over the decades. I even borrowed a centerfire Model 1866 and by tinkering with cases and bullets got it to feed and function with 200-grain, .44-40 bullets in .44 Russian cases. Of course, black powder was the propellant.

Upon selling off many of my Winchester leverguns, I kept those chambered for the following cartridges: .44 WCF (Models 1873 and 1892), .38 WCF (Models 1873 and 1892), .45-60 (Model 1876), .40-82 (Model 1886), .32-40 (Model 1894 saddle ring carbine), .38-55 (Model 1894 rifle) and .405 Winchester (Model 1895). Those are the ones I've come to appreciate most. If I could only have one, it would probably be the .38-55 Model 1894. It was my first, and it has consistently delivered the best accuracy over the years.

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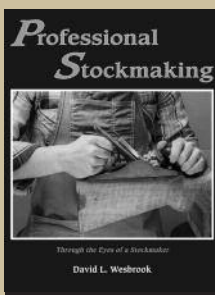
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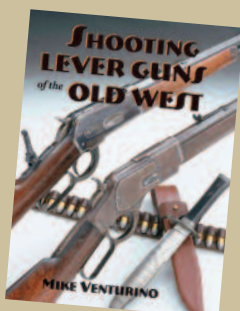
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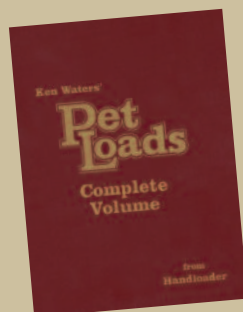
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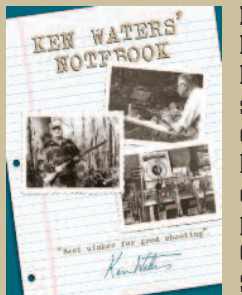
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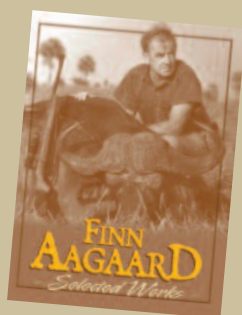
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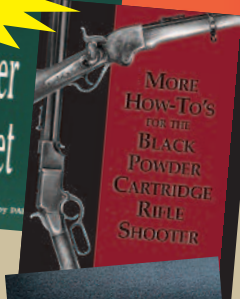


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John Barsness

Fifty years ago most of us hunted happily with 4x scopes, and just about anybody could sit at the kitchen table and attach a scope to a new rifle with nothing more than a screwdriver. Those relatively low-powered scopes had plenty of adjustment, so hunters rarely encountered any problem when sighting in.

Skip forward to the twenty-first century, and the typical 3-9x scope is considered an absolute minimum by most deer hunters and on the small side by varmint shooters, with many using much more magnification. Many centerfire rifles have short actions with less space between the scope rings, accentuating any slight error in alignment.

As a result, the guy who mounts a scope at the kitchen table (or the workbench in his man-cave) often finds his scope running out of adjustment after driving 57 miles to sight in at the nearest range. This usually elicits exotic words directed at the rifle manufacturer that (the shooter assumes) drilled the scope-mount holes off-line. While some factory rifles do create scope-mounting problems, the main culprit usually isn't rifles but scopes with far less adjustment range than the scopes our grandfathers used.

In addition, today there are two primary subspecies of rifle shooter, average and loony. Average shooters want to sight in their rifles and have it go *bang* every time, while loonies want everything to be "just so." Fifty years ago, rifle loonies obsessed over nice walnut, fine checkering and beautiful bluing. Today many loonies shoot rifles with all the exterior charm of kitchen gadgets. Instead of exterior aesthetics, their owners are obsessed with interior mechanics. The riflescope "discovery period" has gone through several distinct phases during this period.

First we discovered our scope mounts didn't quite

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The Scope-Tru Alignment Bar makes sure both rings are lined up with each other and the barrel.

line up with each other. This, we were told, could result in a slightly bent scope tube, throwing the delicate internal mechanisms off-kilter or marring the pristine surface of our Star-Gazer 6.5-32x. We started lapping or reaming the insides of our rings, so they wouldn't stress our scope. Our intent was admirable, but modifying the rings often caused other problems. First, the average obsessive-compulsive human tends to overdo everything: If lapping scope rings helps, then extra lapping or even reaming should help even more. In reality, overdoing either lapping or reaming can result in rings too loose to hold a scope reliably. Consequently, we often had to really reef on the ring screws, which *did* stress our scope.

Along with lapping bars and ring

reamers, many rifle loonies started using alignment rods to make sure rings lined up correctly. Unfortunately, the first (and still most common) were a pair of rods with one end of each rod tapered in a precise cone shape. These were primarily designed for aligning what are today called "Leupold"-style scope mounts, the front ring with a dovetail rotating into the front base and the rear ring held between a pair of large windage screws.

This mount was actually first devised by the Redfield company almost a century ago, when few scopes had internal adjustments, and those that did only had an elevation adjustment. Windage changes were made with the rear mount. The Redfield system was particularly handy when older rifles (factory or "sporterized" military) were

drilled and tapped by garage gunsmiths. The scope-mounting holes didn't always align precisely, so most shooters were familiar with using the opposing screws in the rear base to align the scope.

Consequently, the Redfield/Leupold system became quite popular. However, the turnable front ring didn't always align precisely with the rear ring. The first alignment bars were supposed to cure this: If the points of the two cones met, then the rings were aligned. Just because two dogs touch noses doesn't mean their bodies line up, however. Cone-type alignment rods can work but only if a straight-edge is placed alongside both rods – or the rods are turned around so their flat ends butt against each other.

A single rod spanning both rings is better yet, and if we're going that far, why not make the rod long enough to help line up the rings with the barrel? This is exactly the reasoning behind the Scope-Tru Alignment Bar (www.parabolallc.com) designed by Montana hunter and shooter Jerry Schmidt. The bar comes in either one inch or 30mm diameter and is 18 inches long with a point at one end. It's really easy to use: Mount the bar firmly in Leupold/Redfield-type rings with the pointed end forward, then use the windage screws on the rear mount until the point is centered above the barrel. Not only are the rings lined up with each other, but they're lined up with the bore.

After developing the alignment bar, Schmidt designed the Reticle-Tru Alignment Device. Many people have a hard time squaring scope reticles. A tilted reticle causes the rifle to be canted slightly when aimed, causing shots to go increasingly wide at longer ranges. The Reticle-Tru fits over the ocular (rear) bell of the scope. Like the Scope-Tru, it has a little point, this time on the bottom, that is aligned with the center of the rifle's action.

ing Tools

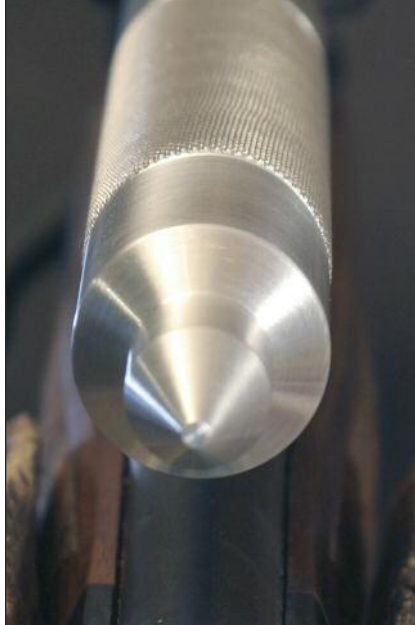


Scope-Mounting Tools

Probably 90 percent of centerfire rifles sold are bolt actions, and it's especially easy to align the point with the middle of the bolt, but it can also be aligned with the hammer of a traditional lever action, the rear scope base on a Remington 7600 pump or the tang safety of a Ruger No. 1. After the Reticle-Tru is aligned, you look through a thin slot at the reticle. If your scope is mounted squarely, the vertical crosshair will be perfectly lined up with the slot.

I've had better luck using the Reticle-Tru than any reticle-alignment device dependent on spirit levels. These work by first leveling the rifle in a vise, then placing a level on the elevation turret and twisting the scope until it's also level. This technique assumes, however, that the scope's reticle is square with the turret, and that's not always the case. Consequently, if there's any slight misalignment anywhere in the system, the reticle ends up canted. Also, some scopes don't have a flat spot anywhere on the elevation turret or its cap. The Reticle-Tru Alignment Device bypasses those potential pitfalls.

Other problems in scope mounting can be caused by the imprecision of the tops of many rifle actions, plus the slight amount of tolerance between the holes and screws in scope bases. The most common problem in factory rifles



The front point of the Scope-Tru Bar should be positioned right over the middle of the barrel.

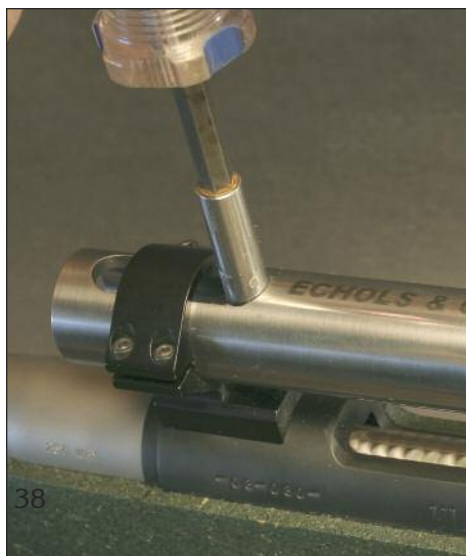
is an unevenly polished action, causing one or both scope mounts to tilt slightly. Tilting can also occur when a base is tightened down slightly to one side of the centerline of the action.

These days quite a few popular scope-mounting systems feature bases with at least one screw on either side of the rings, including Talley Lightweights (where the base also forms the bottom half of the ring) and Leupold Dual Dovetails, where both front and rear rings feature a dovetail that turns into a slot in the base. Both are very strong mounts, in fact much stronger than the standard Redfield/Leupold system, but any little misalignment can make it tough to

sight in some high-magnification scopes. Almost all riflescope rings end up between 3 and 6 inches apart. A misalignment of .02 inch (about the thickness of the average human fingernail) results in a foot of scope adjustment at 100 yards with a ring spacing of 6 inches and 2 feet with a 3-inch ring spacing.

Here's where the mount alignment bar designed by custom rifle-smith D'Arcy Echols comes in handy. Like the Scope-Tru bar, it comes in both one inch and 30mm diameters, but instead of being long and pointed, it's a little longer than the typical scope tube with a pair of lengthwise slots milled all the way through the bar, so the base screws can be tightened with scope rings mounted on the bar. Echols designed the tube for use with his own very stout scope mounts, but the bar also really helps when attaching some mounts to factory rifles.

Let's use Talley Lightweights as an example. Instead of screwing the bottom half of each mount to the rifle, begin by attaching both mounts to the bar. The ring screws should be just loose enough to allow the rings to slide on the bar. Next, place the bar and rings on top of the action and lightly attach whatever base screws can be reached with a screwdriver. Sometimes this will only be one screw on each mount, but that doesn't matter. Next tighten the



Left, the Echols mounting bar allows base screws to be tightened while the rings are perfectly aligned with each other, avoiding any misalignment. Above, once the rings are tightened to the action, the bar is removed and the scope mounted.

Scope-Mounting Tools

ring screws, afterward tightening the base screws. This guarantees the rings will be aligned with each other, without having to lap them. Finally, remove the bar and replace it with a scope.

The Echols bar can also be used

to test whether the bases make full contact with the top of the action. After mounting the bar, remove the base screws, leaving the rings still firmly attached to the bar. Apply a thin layer of bright lipstick to the top of the action and replace the bar and rings with the base screws just barely tightened, then remove the bar and rings again. There'll be lipstick on the bases anywhere they contact the top of the action. If the contact is only partial, the lipsticked areas on the bases can be filed slightly. Try the bases again afterward and see what progress has been made. Eventually, with enough trying and filing, the bases will make even contact with the action, removing that potential source of scope stress and making firmer contact with the action.

An alternative method is to epoxy-bed the bottoms of the bases, very much like epoxy-bedding an action in a stock. Apply an epoxy release agent to the top of the action



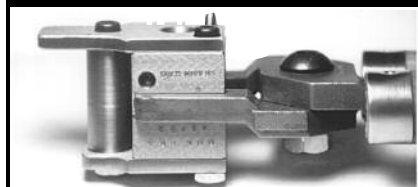
The Reticle-Tru fits over the rear bell of the scope, with the point at the bottom of the tool centered on the rear of the bolt.

and the base screws, then smear a very thin layer of epoxy where the bases will contact the action. Brownells ACAGLAS GEL works well, because it's thick enough not to drip and flow. Replace the bar and rings and lightly tighten the base screws. After the epoxy cures, the bar and rings can be pulled off, while a thin layer of epoxy remains on the bottom of the bases, providing perfect contact with the action. (D'Arcy Echols & Co., PO Box 421, Millville UT 84326, www.echolsrifles.com)

One last scope mounting tool I've tested lately is the Wheeler Engineering Laser Bore Sight. Like some optical collimators, it fastens with a magnet to a rifle barrel's muzzle, but instead of featuring a collimator grid, it projects a laser dot. A magnetic attachment is at least theoretically better than an arbor inserted into the muzzle of the barrel, which could possibly damage the bore, and unlike some other laser bore sighters that fit inside the rifle's chamber, the Wheeler laser can be used on rifles of any caliber, even rifled shotgun barrels.

Many shooters don't realize bore sighting doesn't guarantee a fire-arm will be close to sighted in, due to the barrel actually bending slightly during firing, the reason different loads often shoot to dif-

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The Reticle-Tru is easily attached to the scope with a rubber band.

ferent places. In bore sighting all we're really trying to do is get the sights and bore into reasonable alignment. Also, any collimator

featuring a bore arbor isn't going to be precisely repeatable, despite what you may read about using a collimator to check the zero of your rifle.

The best way to test the accuracy of any bore-sighting device is to attach it to sighted-in firearms. I checked the Wheeler laser on a dozen rifles, from rimfires up to a .375 H&H. It proved to be very repeatable, even when twirled on the muzzle to see if the dot changed place relative to the reticle. The directions suggest measuring the height of the scope above the center of the bore, then adjusting until the laser dot is half that height below point of aim at 25 yards. With most of my sighted-in centerfires, however, the dot was just about scope height below the point of aim at 25. (MidwayUSA, 5875 West Van Horn Tavern Road, Columbia MO 65203; 1-800-243-3220; www.midwayusa.com)

Wheeler Engineering's Laser Bore Sight is the most versatile and consistent bore-sighter John has ever tested.



None of these new tools is inexpensive, of course, and if you only mount a riflescope every year or two, the expense probably wouldn't be worth it. But if you're like me, mounting and remounting scopes more or less constantly, any of them will save time and even ammunition, and your scopes will tend to work more reliably as well.

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