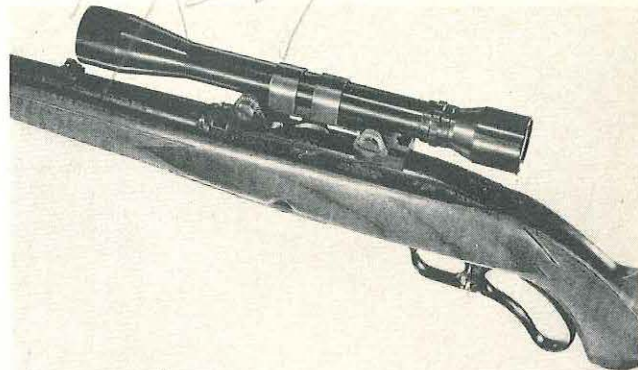


SHOOTING

Jack O'Connor



Better keep this



This Bausch & Lomb scope has its adjustments built into the mount

How to Sight In



R. F. Chatfield-Taylor uses bench rest to sight in. Note chronograph on table at right



Shooter turns top knob on Lyman 48 receiver sight, sets elevation

Remington .22/.250 has micrometer mount, 1/4-min. graduations



I WAS ONCE on a hunting trip with a wealthy European who was armed with a .300 Magnum. The rifle had the bases for a telescope mount, but I noticed that my friend never used the scope. Instead he did a very good job of shooting with the open iron sights. Actually he owned several handsome rifles with scopes, but he was pretty sour on scopes in general, as we shall see.

The scope for his .300 was of one of the better German makes. I thought the reticle a bit odd, but otherwise it was all right. So one day I asked this chap why he never used the scope on the .300.

"Not accurate with the scope," he said.

I gathered that by saying it was not accurate he meant that he couldn't hit anything with it. I put the scope on the rifle, examined it thoroughly. The mount was not precisely my dream mount, but it looked solid enough. I told him that the rifle must not be sighted in with the scope.

"Of course it is," he said. "That

rifle was built by Finnegan and Katz, the world's greatest and most famous builders of rifles. This rifle was built to my measurements and specifications, and it cost me 300 quid. Not sighted in? That's preposterous."

I asked the guy if he had enough cartridges so that I might shoot up 10 or 15. He said he did.

I removed the bolt from the rifle, rigged up an improvised rest, and maneuvered the rifle so that when I looked through the breech I could see a white rock about 100 yd. away right in the middle of the bore. I then took a look through the scope without touching the rifle. That was enough to tell me why my friend wasn't using the musket with scope attached.

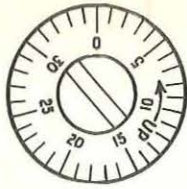
There was nothing much wrong except that the scope and the barrel weren't looking in the same direction. The top of the post, which was the aiming point, was to the left of the white rock and above it.

It takes no genius to see that if the hole in the barrel is pointing low and right of where the aiming point of the

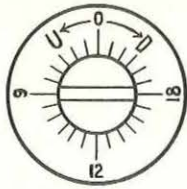
scope is resting, the rifle will probably put the bullets low and to the right. I then got my friend to hold the rifle while I jockeyed the windage and elevation dials until the top of the post was resting on the same white rock that could be seen through the bore.

What I had done is called "bore sighting"—in other words lining up the sights with the bore. It can be done as I have described it, by putting the rifle in any sort of a rest so it will stay put while whoever is trying to adjust the sights can compare bore and sights without touching either. The best method, of course, is to put the rifle in a vise.

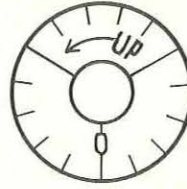
I have bore sighted many rifles by



Sketch shows elevation dial on Browning scope, min. of angle graduations



Leupold 4X: graduated in minutes, no click. Turn toward "U" raises impact



Weaver K4 elevation dial has 1/4-min. clicks. Arrow points way to lift impact

resting them in "V's" of the right depth I have cut in cardboard grocery boxes. Then the bore can be aligned on some object 50 or 100 yd. away and the sights adjusted to rest on the same place. For years I lined the bores of rifles I was sighting by using as an aiming point the electric light meter of a neighbor's house. A gunsmith I knew used a light-colored brick in a wall about 100 yd. away.

The same thing can be done with an optical collimator, an exceedingly useful instrument most gunsmiths have. With this, a "spud" inserted in the barrel exactly aligns an optical gadget with the bore. Then it is possible to look through the scope and compare the alignment of scope with that of the bore and make the necessary adjustments to bring scope and bore into line.

These collimators tell some interesting stories. One of them is that both scope and barrel are relatively sensitive to pressure. You can have scope and barrel lined up and then put a little pressure on the scope. It is unsettling to see how it moves. Strictly speaking there ain't no such thing as a rock-solid scope-and-mount combination.

I know a couple of persnickety gunnut hunters who always take collimators with them on long hunts and check scope and bore alignment with them every day or two. This is much less noisy than trying a few shots.

But to get back to my story. When I had the scope and the bore of my European friend's rifle both looking at the rock, I improvised a little black bulls-eye on a piece of white paper and set it up so I could shoot at it. I paced off 25

yd., sat down, and fired two shots from a sitting position. The bullet holes were about 1 in. below the bull and about 1/2 in. left.

The adjustment dials of the scope were not graduated in minutes of angle. The elevation dial was marked 100, 200, 300, 400, 500—yards or meters were not specified. The windage dial was, however, marked R and L for right and left. By firing three or four more shots and doing a bit of judicious jockeying of the adjustment dials, I had the .300 hitting precisely where the top of the post rested at 25 yd.

I may or may not have been the first person to use the now popular 25-yd. method of lining up a scope-sighted rifle, but I do know that I was the first to publicize the system. It is now widely used and has often been written about. The W. R. Weaver Company makes a very convenient plastic sighting-in guide that employs this method. It consists of a plastic envelope with transparent windows. Names of various calibers and bullet weights are printed on it. Inside is a cardboard sheet on which appropriate figures are printed.

In order to find out where his bullets will land at 25, 50, 100, 150, 200, 250, 300, and 350 yd. when his scope-sighted rifle is putting them at point of aim at 25 yd., all the rifle owner has to do is to point a black arrow at the caliber and bullet weight he is using and he will see the distances above and below point of aim where the bullets will strike.

Let's take the widely used 180-gr. factory load for the .30/06, for example. I put the arrow to 180—.30/06, then



Group fired at 100 yd. after sighting in at 25 shows need for checking. The impact is 1 min. right, 1 1/2 min. high



Proof of pudding: .270 group's center is 2 1/2 in. high at 100 yd. Man called 3 o'clock shot, so it is disregarded

look at windows at the top of the card. They look like this:

25—50—100—150—200—250—300—350
0 +1 +2 1/4 +2 1/4 +3/4 -2 1/2 -8 -16 1/4

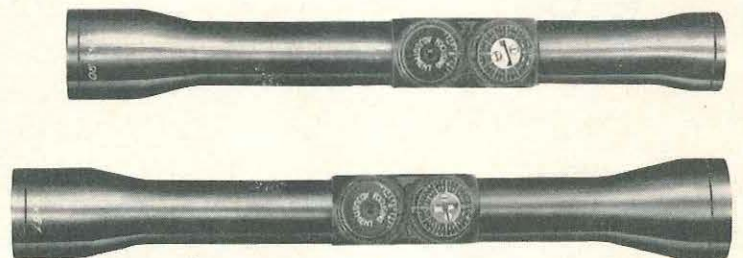
The figures are there for everything from the .22 Long Rifle to the .458 Winchester Magnum. I do not know of a better way to invest the buck these sighting-in guides cost.

My next step in getting my friend's .300 sighted in was to pace off 100 yd.

(continued on page 82)



OUTDOOR LIFE



Weatherby scope turrets: front for focus, rear for windage and elevation

Les Bowman (left) and O'Connor examining targets while sighting in

Big man, big gun

The man/Maine woodsman Ash Peasley. The gun/Marlin 336 Fighting forest fires for up to 120 straight hours, braving 40° below temperatures, tracking lost hunters — it's all part of the job for Forest Ranger Ash Peasley.

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and fire three shots. This checking of the 25-yd. sighting should always be done whenever possible. The reason is that any error made at 25 yd. is multiplied by four at 100 yd., by eight at 200 yd., and by 12 at 300 yd. An error of ½ in. is not difficult to make at 25 yd., particularly when shooting from a sitting position as I had done that time. That ½-in. error becomes 2 in. at 100 yd., 4 in. at 200, and 6 in. at 300.

In this case, though, my 25-yd. sighting worked out just about right. I fired three shots at a target with the .300 Magnum rested over a bedroll. The group was about 2½ in. I considered this good under the circumstances, as the only place where rifles always group into an inch is in magazines.

Knowing that the .300, which was now sighted in with the 150-gr. British Kynoch factory load, would be on at somewhere around 260, I picked out another white stone about 1 ft. in diameter and about that far away. I suggested that my friend take a shot.

He was a bit innocent about technical matters involving rifles, but he was a very good shot. When he lined up the .300 and squeezed the trigger, the white dust flew from the middle of the white rock. He fired two more shots with the same results.

"Why, this is magic!" he said beaming. "This is wonderful! The rifle is now accurate with the scope. You must explain what you did!"

"Your rifle is now sighted in for about 260 yards," I said. "At 300 the bullet will strike a bit low, but with a hold on the center of the chest you would still hit most animals. At 150 and 200 yd. the bullet will strike a little high but not enough to worry about."

Then my friend looked at the elevation dial on the scope. His face registered a look of surprise and horror.

"You say my rifle is sighted in for somewhere around 250 yd.," he said. "This can't be. Look at the markings on the elevation dial. It says the rifle is sighted in for 400 yd."

I looked, paying attention to it for the first time. Sure enough it did.

"Don't pay any attention to what the markings say," I told him.

I explained that the only thing he should worry about was where the bullets hit. I also told him that a scope graduated in yards was really good for only one bullet weight, even if the graduations were correct, and that anyway the thing to do was to sight in for the longest range that would not cause mid-range misses and then to hold right on for all except very long shots. After cracking several stones at ranges from 100 to 300 yd. he believed me.

Some months later I was in the office of the managing director of Finnegan & Katz, the famous rifle-making firm. I saw several scopes identical to the one my European friend had on his .300 Magnum. All had elevation dials graduated in hundreds of yards.

"What is the caliber of the rifles these scopes are to be installed on?" I asked the managing director.

"Oh, various calibers," he replied,



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“In that case these dials graduated by hundreds of yards don't mean very much,” I said.

“I quite agree with you,” he said, “but the blokes who buy rifles with telescope sights always insist that the dials be marked this way. It gives them a bit of a lift, you know! Anyway, they haven't the remotest idea how to adjust iron or telescope sights on a rifle. Many of these chaps are fine shots, but they are simply not very knowledgeable about firearms. We simply mark the dials to humor them!”

This is indeed true. Most British and continental sportsmen would no more think of attempting to sight in a rifle by themselves than they would think of extracting their own teeth. To them, adjusting the sights of a rifle is a job to be left strictly to the pros.

American riflemen are the world's most knowledgeable, but this happy state has not always existed. I can remember when most Americans were as innocent of all rifle theory as most Europeans are today, when sights on American rifles were graduated in hundreds of yards, and when most shooters regarded the markings with innocent faith.

Today in the United States scope and receiver sights have adjustment dials or slides (in the case of receiver sights) graduated in minutes of angle. A “minute” has the value of 1 in. per 100 yd. of range. A change of 1 minute on the elevation dial of the scope in the “UP” direction means that the point of impact of the bullet will move up 1 in. at 100 yd., 2 in. at 200 yd., 3 in. at 300 yd., and so on. Windage dials are also marked for changes Right and Left.

Except as emergency sights, the open iron sight is obsolete in United States—or at least obsolescent. Manufacturers still put them on rifles, as they are relatively inexpensive and they give the owner something he can start out with. Manufacturers know that most of the new, better quality big-game and varmint rifles will have scopes or receiver sights mounted not long after they are bought.

Mounts for target-type scopes used on the range and to some extent on varmints are externally adjustable by micrometer-type rear mounts. These move the rear of the scope tube up and down, right and left. The rear mounts are graduated in minutes of angle (for a certain fixed distance between front and rear mount) and generally click in ¼ min. of angle so the target shot can adjust by “feeling” the clicks.

Some mounts for hunting scopes are also adjusted externally. The present Bausch & Lomb mount adjusts with two pairs of cones. One pair moves right or left to control windage. The individual cones of the other pair move toward each other or away from each other to control elevation. Redfield and Buehler scope mounts have opposing screws in the rear of the mounts which can be used to control windage in case the scope has elevation only.

No matter whether scopes or iron

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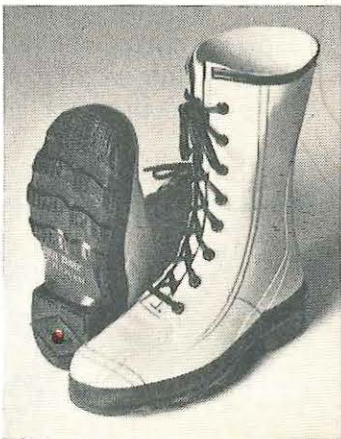
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sights are used, the principles are the same: to move the point of impact, the rear sight must be moved the way you want the bullet to move.

If the rifle is shooting high, the rear sight must be lowered. If the rifle is shooting low, rear sight is raised.

The front sight is moved in the opposite direction. If, for example, the rifle is still shooting too high with the lowest adjustment of the rear sight, the only cure is a higher front sight, which results in the same thing as a lower rear sight. If you want the rifle to shoot more to the right, the front sight is moved left.

The scope sight serves as both front and rear sight. With a scope mount adjustable for windage like the Redfield and Buehler, you move the rear of the scope tube the direction you want the point of impact to move. The scope reticle acts like the front sight and is moved in the opposite direction, down when you want the point of impact raised. However, since reticles of American scopes are marked for direction of point of impact, that is nothing to brood about.

I can remember when just about all rear sights on factory rifles had no windage adjustment at all and adjustment for elevation only in crude steps that had values of 3 to 6 minutes. With those sights anyone who wanted fine adjustments had to cut down one of the steps with a file. Factory rifles are usually sighted in by experts and are on or approximately so at 100 yd.

However, particularly with iron sights, no one can sight in a rifle for anyone else. Ways of seeing sights differ. Ways of holding rifles differ. Almost everyone cant a rifle to some extent, and few people cant their rifles exactly alike. Anyone who wants to be sure how a rifle is going to perform should sight it in himself. No one else can do a 100-percent job for him.

Actually, if anyone has a place where he can do a little shooting at 25 yd., he can skip bore sighting the rifle or having a gunsmith line up bore and scope with a collimator. All that bore sighting or collimating does anyway is to make certain that the rifle should be somewhere on the target at 100 yd.

Now and then a rifle that has been carefully bore sighted with the bore pointing a little above where the scope reticle rests to allow for bullet drop will be right on. I have a .270 Mauser built for me by Tom Burgess and Earl Milliron. It had never been fired when I got it, but Milliron had carefully bore sighted it. The factory loads with the 150-gr. bullets struck 2 in. high at 100 yd. My handload with 62 gr. of No. 4831 and 130-gr. bullets in Western cases struck 3 in. high.

Unless the rifleman is a pretty good shot, it is best for him to do the 25-yd. shooting from some sort of a rest—over a bedroll or a padded box is all right. Then the sighting should *always* be checked and refined at 100 yd. The best idea is to shoot a group of three shots and then to take the center of the group as the point of impact and adjust

from there. If the center of the group is 3 in. to the right of where you want it and 2 in. low, the thing to do is to come up 2 min. and left 3 min.

If you have, let us say, a Weaver K4 that clicks in $\frac{1}{4}$ min., that means you should come up 8 clicks and left 12 clicks. With the sights adjusted, it is a good idea to check once more. Generally the bullets will be right where you want them, but on occasion, because of backlash or something else, adjustments do not work perfectly. At any rate it is a great morale builder to see the bullet holes right where you want them.

Just how high should the bullets strike at 100 yd.?

That depends on the conditions under which the rifle is to be used, what creatures are to be hunted, and the trajectory of the cartridge. Since I do most of my big-game hunting in open country where I may have to take a 250 to 300-yd. shot, I generally sight in so the bullet strikes 3 in. above line of scope sight at 100 yd. With the .30/06 with the 180-gr. bullets this means that I am on at about 225 yd. and about 9 in. low at 300. With the .270 with the 130-gr. factory load or with the 150-gr. bullet in the 7 mm. Remington Magnum, I am on at about 275.

If a rifle is to be used at close quarters on game that is potentially dangerous, the bullet should hug a bit closer to the line of aim and should strike about 1 to $1\frac{1}{2}$ in. high at 100 yd. In a case of something like an elephant, which is almost always shot at close range and sometimes in the ear-hole to reach the brain, it isn't a bad idea to sight in with iron sights to put the bullet right at point of aim at 100 yd. It is only about $\frac{1}{2}$ in. high at 50 yd. This is a good system for any of the big elephant cartridges.

I think the varmint rifle should also be sighted about 1 to $1\frac{1}{2}$ in. high at 100 yd. because if the bullet lands much higher it is easy to overshoot on a chuck stretched out on a rock.

For general big-game hunting, even in the woods, I think it is foolish to sight in for 100 yd. With a rifle so sighted the bullet drop is excessive if an unexpected long-range shot is offered.

Most hunters sight a .30/30 in to hit right on the nose at 100 yd. So sighted with the 170-gr. bullet, the .30/30 has a drop at 200 of 8 in. and at 250 of 17 in. This 8-in. drop at 200 is, I think, the reason the .30/30 had such a reputation for breaking legs on deer when I was growing up in Arizona. As .30/30 users used to say, "She don't hold up too good much over a hundred and fifty yards!"

But sight even the poor old .30/30 in to put the 170-gr. bullet 2 in. high at 100 yd. and at 200 yd. the bullet only drops 3 in. So sighted the bullet drops only about 10 in. at 250.

The .30/30 sighted to hit 2 in. high at 100 shouldn't be a leg-breaker, and at 250 (which many hunters would call 400) a coarse bead might do the business!—*Jack O'Connor.*

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