# How We Tested

All three scopes were mounted in Leupold and Bausch & Lomb rimfire rings. The rings were affixed to a Walther .22 GX-1 free rifle for the alignment and tracking tests. Our goal was to use a proven firearm shooting lot-tested ammo to check the accuracy of the adjustments. We shot the scopes on a 50-yard smallbore range to minimize the effects of a light 6 o'clock wind. The conditions were overcast, with temperature around 70 degrees. We spotted and logged our shots using a Nikon ED78A Fieldscope. It is a 78-mm objective glass that ranges from 25X to 56X magnification.

***Above:*** *To check for fogging, we dunked each scope in a warm-water bath for 10 minutes, then cooled the scope in a freezer for 30 minutes.*

### ADJUSTMENT ACCURACY (OPTICAL)

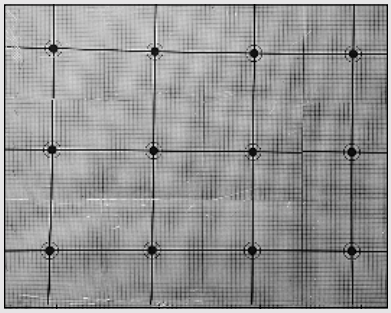
The scopes were tested for repeatability and tracking in two ways. First they were mounted on the Walther rifle. The gun was in turn clamped to a Ransom Rifle Rest benchrest, which was resting atop a concrete benchrest. Each scope was carefully monitored as it tracked across a solid grid of targets (with quarter-inch divisions) placed at 100 yards. To begin, we bottomed the horizontal and vertical adjustments and recorded the total number of clicks and the distance they traversed on the grid. Then we counted how many clicks each scope used to walk around a 6-inch-square box, and whether those adjustments were consistent in returning to zero. We also performed the same test on a 1-inch-wide bullseye, dialing in imaginary windage clicks and measuring how the point of aim changed.

### ADJUSTMENT ACCURACY (LIVE FIRE)

With the optical judgments made, we then used the Walther to check actual bullet impact changes when adjustments were made. Each scope was mounted on the rifle and, using RWS R-50 ammo, we zeroed the rifle at 50 yards. The adjustments were then turned 16 clicks to the right (2 inches of adjustment on the Leupold and 1 inch on the Weaver and B&L scopes) and a shot was fired, maintaining our zero sight picture. Then we dialed in 16 more clicks upward, back to the left, and downward. This "around-the-clock drill" pointed out if adjustments tracked accurately and returned to zero. In a similar test we call the "compass points" drill, we established a zero with the gun. We then clicked right 8 clicks with the Weaver and B&L scopes and 4 clicks with the Leupold (1/2 inch at 50 yards, reestablished our zero aiming point, and fired two rounds, which should have hit at 3 o'clock. We then clicked back to original zero and fired another zeroing round. Then we made the same adjustments for 12 o'clock, 9 o'clock, and 6 o'clock. We measured the distances each two-shot group was from the zero.

### RECOIL RESISTANCE

Then we mounted the scopes on a Ruger .25-06 M77 bolt action and shot the rifle 20 times with each scope aboard. We chose the .25-06 because it would produce more recoil than most varmint or benchrest rifles, which are often chambered for the light-kicking .22-250, .223, or 6 PPC rounds. Afterward, we reshot the two adjustment tests to see if recoil had affected the performance of any of the scopes.



***Right:*** *The scopes were tested for repeatability and tracking by counting how many clicks each scope used to walk around 6 inch-square boxes.*

### RESOLUTION (CLARITY)

Next, we produced an eye chart on a laser printer that consisted of the alphabet in successive lines with each one larger than the former. We placed the chart at 50 yards in full sunlight while the scopes were set up side by side on a solid platform under a cover looking out to the chart, so that glare would not be a factor. We then had three individuals try to read each line until they reached one they could not complete.

### EYE ALIGNMENT

The scopes were placed side by side on a table and the test subjects viewed each one and rated it for ease of eye alignment.

### PARALLAX

Next, we checked for parallax at common shooting distances from 50 ft to 400 yards. We were able to satisfactorily adjust each scope to remove parallax at 50 feet, 50 yards, 100 yards, 200 yards, 300 yards, and 400 yards.

### POINT OF AIM SHIFT

With the scope secured, we zoomed the adjustable objective from its minimum setting to its maximum setting to see if the aiming point changed.

### BRIGHTNESS

We ran two tests for brightness: one objective, one subjective. In the objective test, we put the scopes in a darkened room 20 feet away from a pure-white frosted, backlit screen to minimize hotspots. We aimed a 55-mm Nikkor lens attached to a Nikon 8008S camera through each scope and focused it on the crosshair and centered the crosshair in the viewfinder. In our test, a plus (+) sign means the scope was 1/3 stop brighter. A minus (-) sign meant the scope was 1/3 stop darker. In the subjective part of the test, we had three people view objects through the scopes, which were mounted side by side. This part of the test was conducted at dusk.

### GLARE

We pointed the scopes toward bright light sources (not the sun) and tried to see if we could induce glare or flare in the optics.

### WATERPROOF/FOGGING TEST

Last, we dunked each scope in a warm-water bath for 10 minutes, then cooled the scope in a 0-degree freezer for 30 minutes. Water intrusion into the scope would show up as fog or frost.