

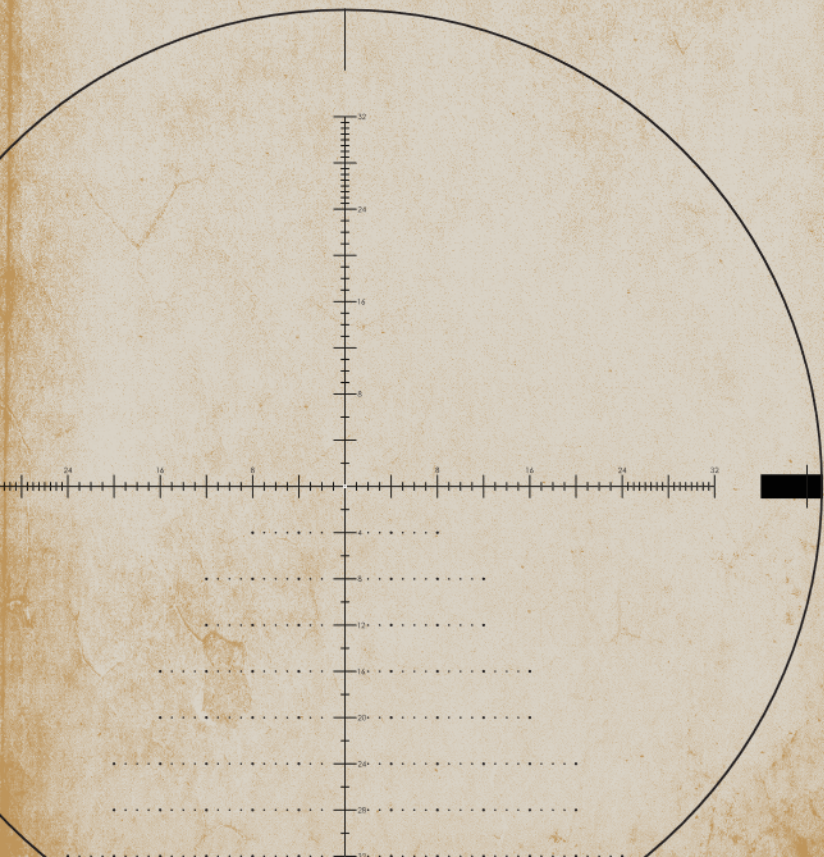
VORTEX
THE FORCE OF OPTICS®

VIPER® XLR™



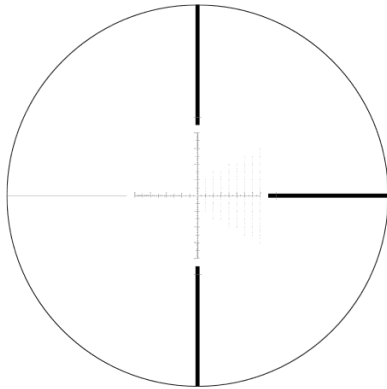
First Focal Plane Reticle Manual

XLR RETICLE (MOA)



The Viper[®] XLR Reticle

Designed to maximize long distance shooting and ranging abilities, the Viper[®] XLR MOA reticle can be used to effectively determine ranges, holdovers, windage, and moving lead corrections. Ultra-precision laser etching on the glass reticle ensures that MOA specifications will be kept to the tightest tolerances possible. The fine center crosshair subensions on the XLR MOA reticle were carefully chosen to provide the optimum balance between precision aiming and low light visibility.



XLR Reticle with MOA Subenclosures

Note:

The XLR reticle images are shown as seen through the Viper HS LR 6-24x50 rifle scope. The appearance of the XLR reticle in other models may have slight variations.

MOA Subtensions

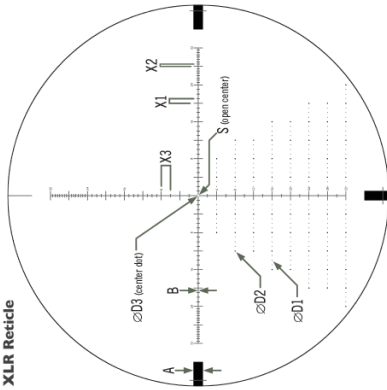
The XLR reticle is based on minute-of-angle (MOA) subtensions. MOA measurements are based on degrees and minutes: 360 degrees in a circle, 60 minutes in a degree for a total of 21,600 minutes. These angular measurements are used to estimate range and correct for bullet trajectory drop in riflescopes. 1 MOA will correspond to 1.05 inches at a 100 yard distance, 2.1 inches at 200 yards, 3.15 inches at 300 yards, and so on.

First Focal Plane Reticles

When used in a first focal plane rifle scope, such as this Vortex Viper HS LR rifle scope, the MOA subtensions of the XLR reticle are valid at all magnification levels. This means the shooter can use the magnification level most appropriate for the situation and still have effective holdover and windage reference marks.

This is extremely valuable in a high-stress situation because the shooter does not have to remember to set the scope to one particular magnification to get valid holdovers—an action necessary in the more common second focal plane reticles.

Viper XLR Reticle



XLR Reticle Subtensions (MOA)

| Model | A | B | D1 | D2 | D3 | S | X1 | X2 | X3 |
|-----------|------|-----|-----|-----|-----|-----|----|----|----|
| 2.5-10x32 | 2 | .21 | .24 | .33 | .2 | .6 | 1 | 2 | 2 |
| 4-16x50 | 3.13 | .15 | .26 | .39 | .15 | .45 | 1 | .5 | 2 |
| 6-24x50 | 2.08 | .10 | .17 | .26 | .1 | .3 | 1 | .5 | 2 |

Estimating MOA

Although 1 MOA is very commonly corresponded to 1 inch at 100 yards, this is not quite correct. 1 MOA at 100 yards equals 1.05 inches. Calling 1 MOA an inch per 100 yards may be acceptable at shorter distances, but it will cause a five percent error in ranging and holdover adjustments. This will result in missed shots at longer distances.

Ranging

MOA measurements are very effective for ranging using a simple formula. To use this formula, the shooter needs to know the size of the target, or nearby object, in inches.

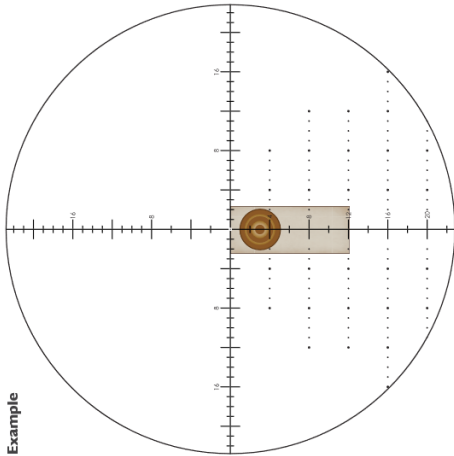
MOA Ranging Formula

$$\frac{\text{Target Size (Inches)} \times 95.5}{\text{Measured MOAs}} = \text{Range (Yards)}$$

Using either the vertical or horizontal MOA scale, place the reticle on a target of known dimensions and read the number of MOAs spanned. You will obtain maximum accuracy in ranging by calculating exact MOA measurements. MOAs should be estimated in $1/2$ s if possible. To help calculate this, the XLR reticle uses 1 MOA graduations on inner portion of horizontal crosshair and $1/2$ MOA graduations on outer part as well as upper part of vertical crosshair. Windage dots are marked in 1 MOA increments.

Accurate measuring will depend on a very steady hold. The rifle should be solidly braced using a rest, bipod or sling when measuring. Once you have an accurate MOA reading, use the formula to calculate the distance.

Example



Ranging a 6-foot target stand (72 inches) at 12 MOAs yields 573 yards.

$$\frac{72 \times 95.5}{12 \text{ MOA}} = 573 \text{ Yards}$$

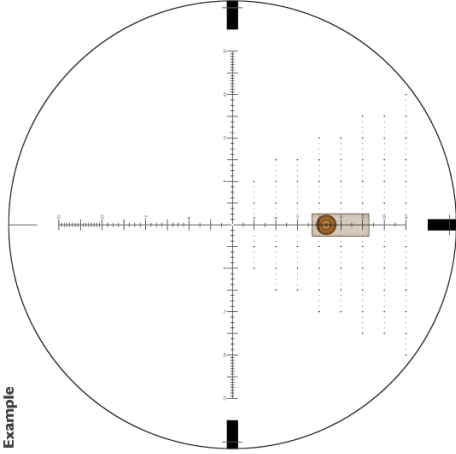
Note: In the MOA ranging formula, a shooter may substitute 100 for 95.5 in the interest of speedier calculations. Be aware that this will produce a five percent *over-estimation error* of the yardage distance obtained.

Elevation Holdovers

Once the distance has been calculated using the XLR reticle or a laser rangefinder, the XLR can be used for rapid holdover correction for bullet drop of the cartridge being used. To get the most benefit out of the XLR equipped riflescope, Vortex Optics highly recommends shooters learn their bullet drop numbers in MOAs rather than inches.

Because the XLR reticle is scaled with 2 MOA drop increments, it is an easy job to quickly select the correct drop reference line once the shooter knows the bullet drops in MOAs. If the shooter prefers to dial come ups for bullet drop using the elevation knob, knowing bullet drops in MOAs rather than inches will allow for much faster adjustments as the MOAs can be quickly read on the elevation knob.

Example



17.5 MOA reticle holdover for 625 yard shot. No wind.

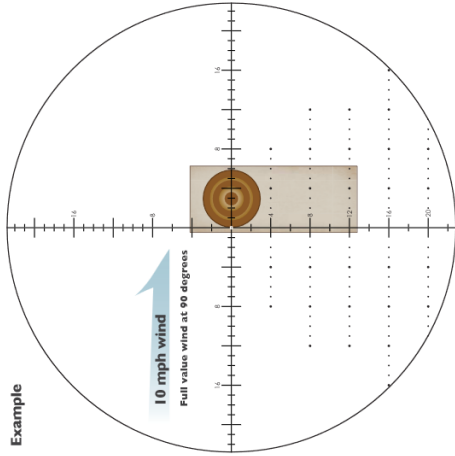
Windage and Moving Targets

The XLR reticle is highly effective when used for wind and moving target leads. Using the reticle for effective windage and moving target leads will require thorough knowledge of your cartridge's ballistic performance under varying conditions as well as experience in reading wind strengths and target speeds. As in bullet drops, it is important for the shooter to learn a particular weapon's windage/moving target corrections in MOAs rather than inches. Always hold the reticle into the wind.

Basic windage correction on center crosshair

When dialing elevation come ups, the center horizontal crosshair will be used for windage or moving lead corrections. MOA marks on the horizontal crosshair are graduated in 1 MOA increments out to 24 MOAs, and at 1/2 MOA increments beyond that.

Example



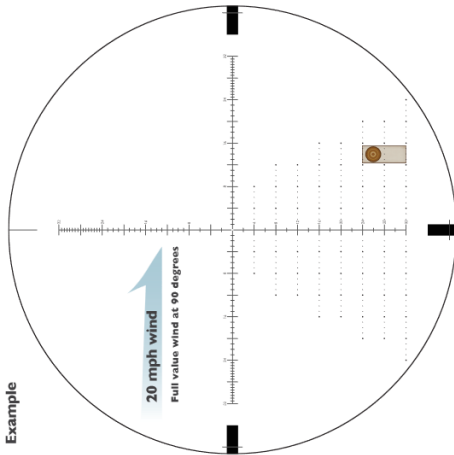
3 MOA reticle windage correction for 400 yard shot in 10 mph crosswind using center crosshair. Elevation adjustment already dialed into riflescope.

Basic windage correction using drop line on reticle

When using the reticle for elevation correction rather than dialing, the windage dots will be used for windage and moving lead corrections.

The windage dots are graduated in 1 MOA increments and provide increasingly greater span in the lower part of reticle, corresponding to the need for greater windage correction at longer distances. The supplied windage dots will accommodate crosswinds up to 20 mph for most popular high-powered applications. Remember to hold the reticle into the wind.

Example



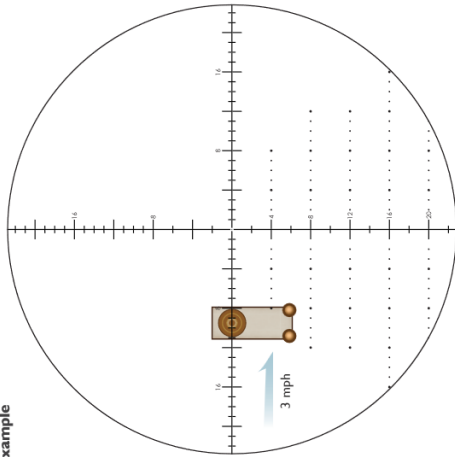
1-4 MOA reticle windage correction for 20 mph wind at 800 yards using the 26 MOA reticle drop line.

Basic moving lead correction

The MOA marks on the center horizontal crosshair and the windage dots can be used to estimate moving target leads. Estimating moving leads will require knowing yardage distance, wind speed, moving target speed and total bullet flight times including rifle lock time. Bullet flight times can be calculated using a ballistic calculator.

Note: Correctly estimating moving leads is very difficult and requires considerable practice and knowledge.

Example



9.5 MOA reticle correction for a target moving at 3 mph at a distance of 800 yards. No wind. Elevation adjustment already dialed into riflescope.

In this example, the total bullet time of flight from moment of trigger pull is 1.5 seconds—during which a target travels 6.6 feet. Elevation already dialed into turret.

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