

# **GOLDEN EAGLE**

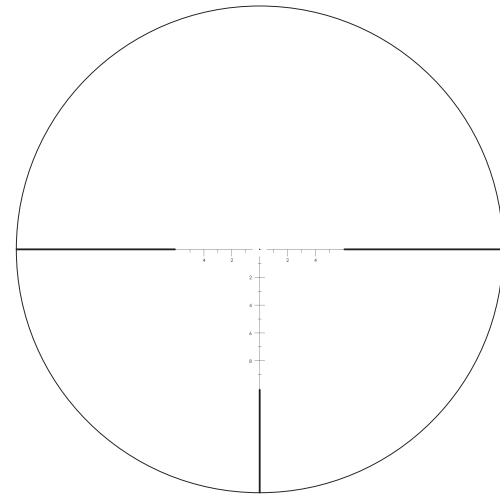
## **ECR-I RETICLE**

**[WWW.VORTEXOPTICS.COM](http://WWW.VORTEXOPTICS.COM)**



### The Vortex® ECR-1 MOA Reticle

Designed to maximize long-distance shooting and ranging abilities, the ECR-1 MOA reticle can be used to effectively determine ranges, holdovers, windage corrections and moving target leads. Ultra-precision laser etching on the glass reticle ensures that MOA specifications are kept to the tightest tolerances possible. The fine crosshair subtensions on the ECR-1 MOA reticle were carefully chosen to provide optimum performance for precision aiming.



Note: Reticle images shown in this manual are for representation only—images vary between scope models depending on magnification and reticle plane.

## MOA Subtensions

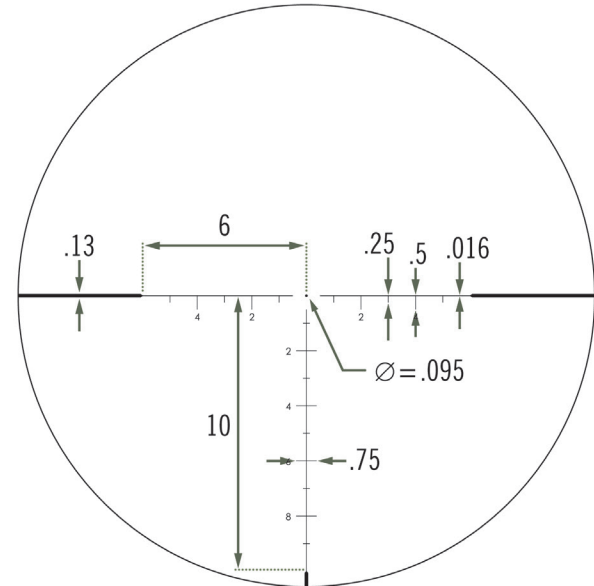
The ECR-1 reticle is based on minute-of-angle (MOA) subtensions. MOA measurements are based on degrees and minutes: 360 degrees in a circle, 60 minutes in a degree for a total of 21,600 minutes. These angular measurements are used to estimate range and correct for bullet trajectory drop in riflescopes.

In the this second focal plane riflescope, the listed MOA subtensions of the ECR-1 reticle are only valid at the 40x magnification level.

### 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.

## Reticle Subtensions



## 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 Formulas

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

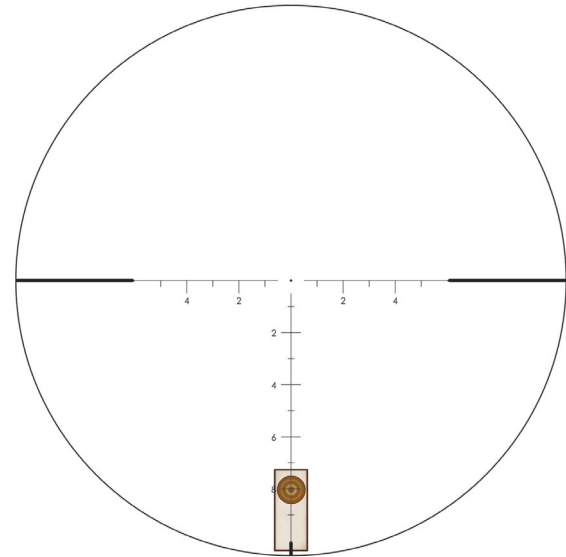
$$\frac{\text{Target Size (CM)} \times 34.37}{\text{Measured MOAs}} = \text{Range (Meters)}$$

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 1/4s if possible.

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.

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.

## Example



Ranging a 6-foot target (72 inches) at 8 MOAs yields 860 yards.

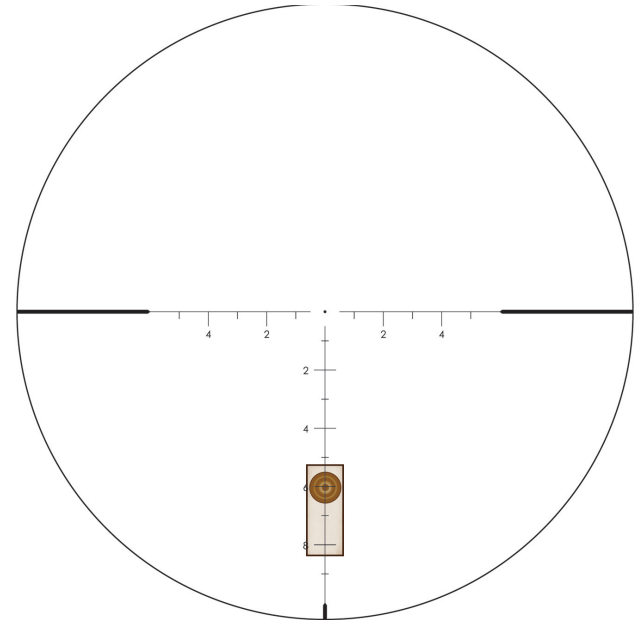
$$\frac{72 \times 95.5}{8 \text{ MOA}} = 860 \text{ Yards}$$

## Elevation Holdovers

Once the distance has been calculated using the ECR-1 MOA reticle, or a laser rangefinder, the ECR-1 can be used for rapid holdover correction for bullet drop of the cartridge being used. To get the most benefit out of the ECR-1 equipped riflescope, Vortex Optics highly recommends shooters learn their bullet drop numbers in MOAs rather than inches.

Since the ECR-1 reticle is scaled in MOAs, 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



6 MOA reticle holdover at 400 yards. No wind.

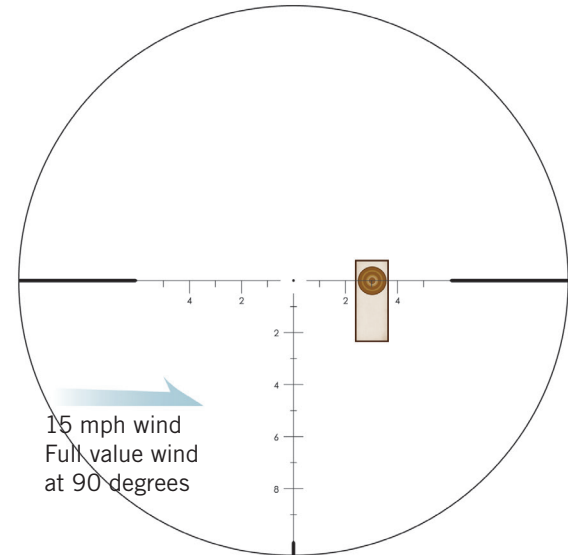
## Windage and Moving Targets

The ECR-1 MOA 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 weapons system's ballistic performance under varying conditions and 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.

### Example



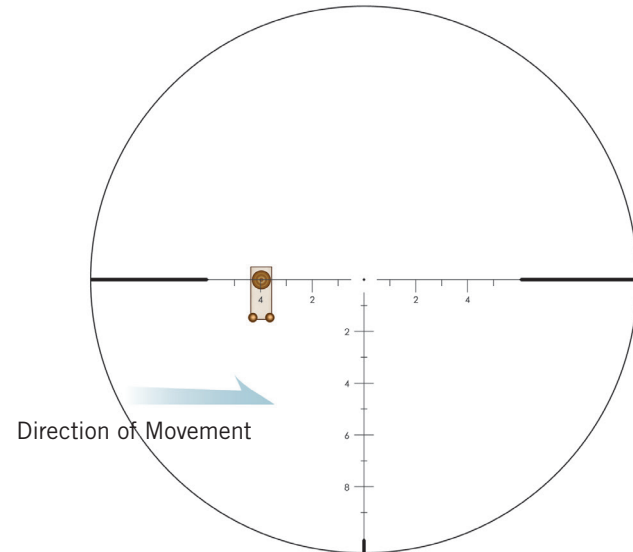
3 MOA correction for 15 mph wind at 700 yards. Elevation already dialed into turret.

### Basic moving lead correction

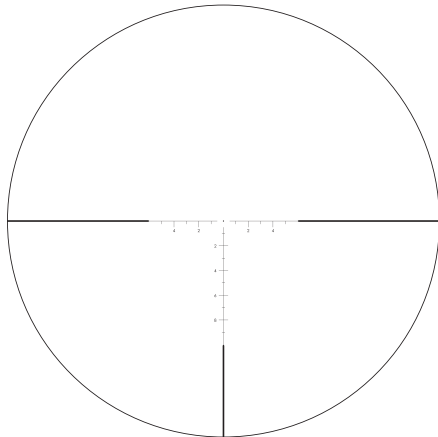
When estimating moving target leads, the mrad marks on the center horizontal crosshair can be used. Estimating moving leads will require knowing yardage distance, wind speed, moving target speed and total bullet flight times including rifle lock time. Bullet flight times can be roughly calculated based on fps velocities or a ballistic calculator.

Note: Correctly estimating moving leads is very difficult and requires considerable practice and knowledge beyond the scope of this manual.

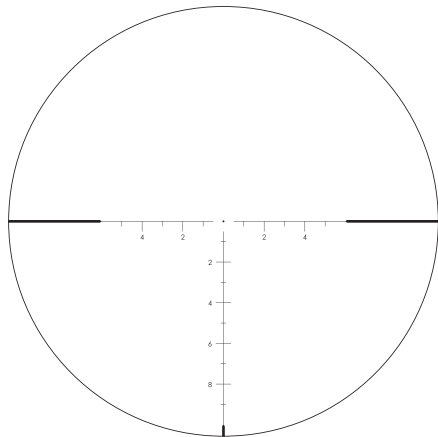
### Example



4 MOA reticle correction for a moving target 400 yards. No wind. Elevation dialed into turret.

**ECR-1 MOA**

LOW RESOLUTION

**ECR-1 MOA**

HIGH RESOLUTION

## THE VIP WARRANTY

We build optics based on our commitment to your absolute satisfaction. That's why Vortex products are unconditionally guaranteed and we make this Very Important Promise to you—a Very Important Person.

Rest assured that in the event your Razor HD Gen II becomes damaged or defective, Vortex Optics will repair or replace the riflescope at no charge to you. Call Vortex Optics at 800-426-0048 for prompt, professional, and friendly service.

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