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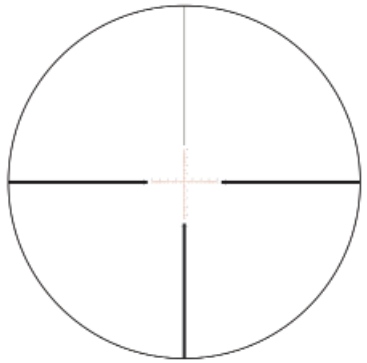
PRECISION
SHOOTING
TACTICAL

FIRST FOCAL PLANE

EBR-1 MRAD Manual
4—16x50 FFP Riflescope

Designed to maximize long distance shooting and ranging abilities, the EBR-1 MRAD 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 mrad specifications can be kept to the tightest tolerances possible. The fine center crosshair subtensions on the EBR-1 MRAD reticle were carefully chosen to provide the optimum balance between precision aiming and low light visibility.



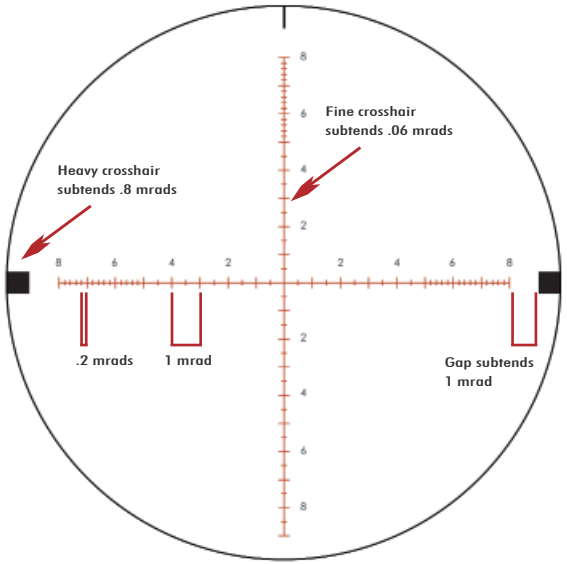
MRAD Subtensions

The EBR-1 MRAD reticle is based on the milliradian, or mrad for short. Mrad unit of arc measurements are based on the radian. A radian is the angle subtended at the center of a circle by an arc that is equal in length to the radius of the circle. There are 6.283 radians in a circle and 1000 milliradians in a radian for a total of 6283 milliradians (mrads) in a circle. An mrad will subtend 3.6 inches at a distance of 100 yards. Most riflescopes with mrad adjustments use .1 mrad clicks which subtend .36 inches at 100 yards.

Both mrad and MOA measurements are effective for ranging and bullet trajectory drop compensation in reticle designs. However, the mrad method used in the EBR-1 MRAD reticle has some important advantages over an MOA method. The primary benefit is that once learned, it is much simpler and faster to use. The mrad system will also be very easy for shooters familiar with the metric system and for those shooters with previous training in using mil dot reticles.

EBR-1 Mrad Reticle Subtensions

In a first focal plane riflescope, the listed mrad subtensions of the EBR-1 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 also extremely valuable in a high-stress situation, as the shooter does not have to remember to set the scope to one particular magnification to get valid holdovers—an action necessary with the more common second focal plane reticles.



Ranging

Mrad reticles such as the EBR-1 are very effective for ranging using simple formulas.

Mrad Ranging Formulas

$$\frac{\text{Target Size (Yards)} \times 1000}{\text{mrads Read}} = \text{Range (Yards)}$$

$$\frac{\text{Target Size (Meters)} \times 1000}{\text{mrads Read}} = \text{Range (Meters)}$$

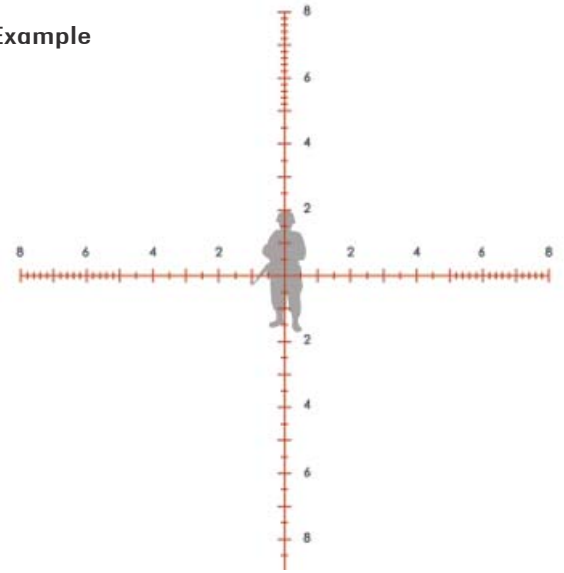
$$\frac{\text{Target Size (Inches)} \times 27.8}{\text{mrads Read}} = \text{Range (Yards)}$$

To use these formulas, you will need to know the measured size of the target or a nearby object. Using either the vertical or horizontal mrad scale, place the reticle on the target of known measurement and read the number of mrads spanned.

Accurate measuring will depend on a very steady hold—the rifle should be solidly braced using a rest, bipod or sling. Once you have an accurate mrad reading, use any of the listed ranging formulas to calculate distance.

Maximum accuracy in ranging will be obtained by calculating exact mrad measurements—mrads should be estimated in tenths if possible.

Example



Ranging a man (1 meter from groin to top of head) at 2 mrads yields 500 meters.

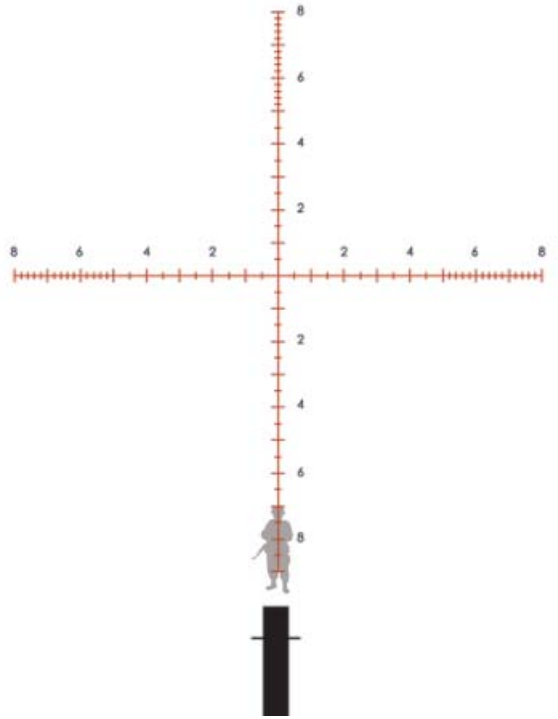
$$\frac{1 \times 1000}{2 \text{ mrads}} = 500 \text{ Meters}$$

Elevation Holdovers

Once the distance has been calculated using the EBR-1 MRAD reticle or a laser rangefinder, the EBR-1 can be used for rapid holdover correction for bullet drop of the cartridge being used. To get the most benefit out of the EBR-1 equipped riflescope, Vortex Optics ***highly*** recommends shooters learn their bullet drop numbers in mrads rather than inches or MOAs. (Remember that 1 mrad equals 3.44 MOA or 3.6 inches per 100 yards).

Since the EBR-1 reticle is scaled in mrads, it is an easy job to quickly select the correct drop reference line once the shooter knows knows their bullet drops and windage/lead corrections in mrads. If the shooter prefers to dial ***come ups*** for bullet drop using the elevation knob, knowing bullet drops in mrads will allow for much faster adjustments as the mrads can be quickly read on the elevation knob.

Example



7.7 mrad correction for 800-yard shot. No wind.

Windage and Moving Targets

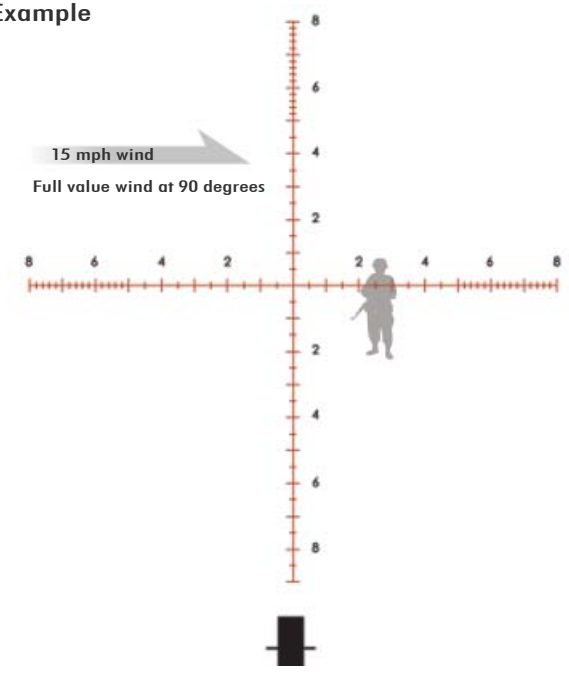
The EBR-1 reticle is highly effective when used for wind and moving target leads.

Using the reticle for windage and moving leads will require thorough knowledge of your weapon system's ballistic performance under varying conditions and experience in reading wind strengths and target speeds. As in bullet drops, it is imperative the shooter learn the particular weapon's windage/moving target corrections in mrads rather than inches or MOAs.

Basic windage correction on center crosshair

When dialing elevation ***come ups***, the center horizontal crosshair will be used for windage or moving lead corrections.

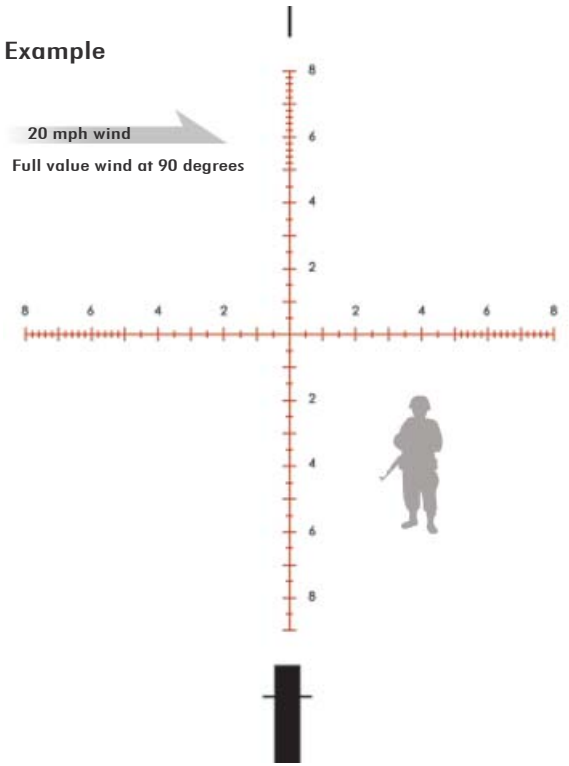
Example



2.6 mrad correction for 15 mph wind at 700 yards. Elevation already dialed into turret.

Basic windage correction using drop line on reticle

When using the reticle for elevation correction rather than dialing, the mrad marks on the center horizontal crosshair can still be used to help visually reference windage corrections.

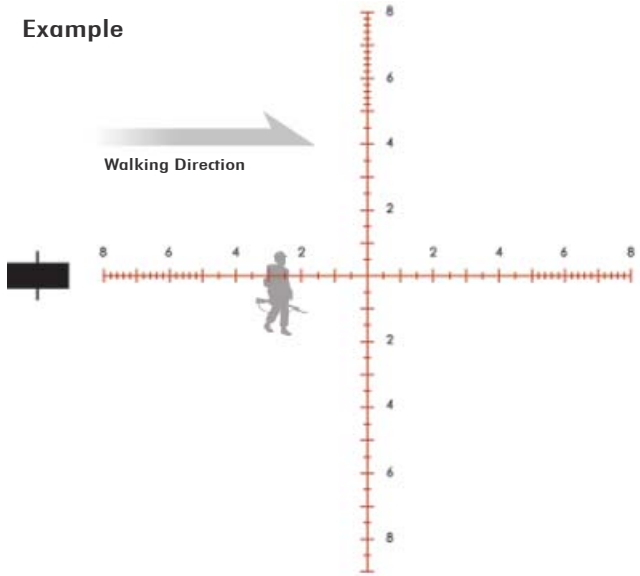


Using 3 mrad drop line at 500 yards, 4.0 mrad correction for 20 mph wind.

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.*



2.74 mrad correction for a man walking at 3 mph at 800 yards. No wind. Total bullet time of flight from trigger pull 1.5 seconds during which man travels 6.6 feet. Elevation already dialed into turret.

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Vortex Service and Repair Policy

Unconditional Lifetime Warranty

Vortex Optics wants you to shoot and use your Viper PST riflescope under any conditions with complete confidence—that's why our warranty is straightforward and simple:

Unconditional Lifetime Warranty

- Fully transferable
- No warranty card needed
- No receipt needed

Rest assured, if this riflescope should ever require repair, all you need to do is contact Vortex for absolutely free service. Call 800-426-0048 or e-mail service@vortexoptics.com.

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Patent Pending
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Manual #R-416F1-M