

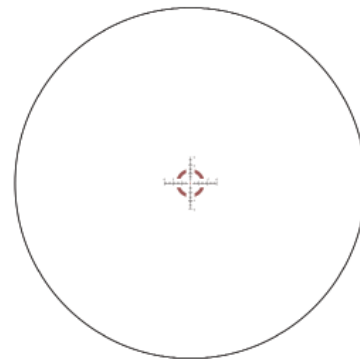
VORTEX®
VIPER® PST PRECISION
SHOOTING
TACTICAL

SECOND FOCAL PLANE

TMCQ MRAD Manual
1—4x24 Riflescope



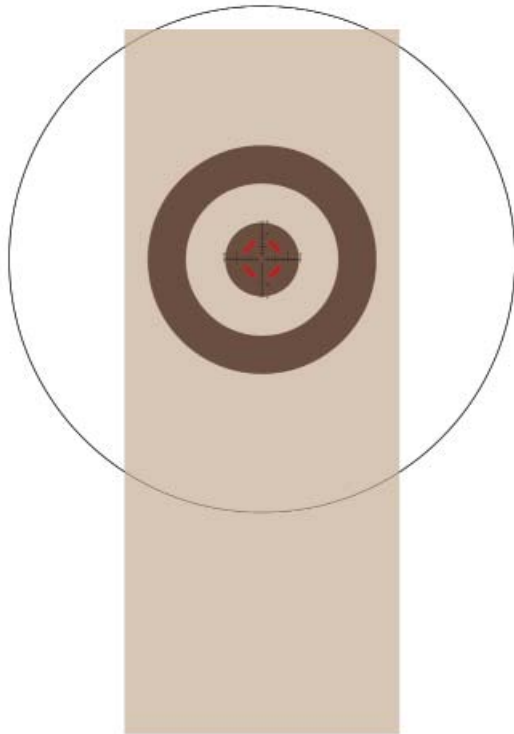
Designed to maximize the performance of the Viper PST 1—4x24 in close and mid-range shooting situations, the TMCQ mrad reticle can also be used to effectively determine ranges, holdovers, windage corrections and moving target leads.



Once the Viper PST 1—4x24 rifle scope has been sighted-in and the turret caps indexed (see the Viper PST rifle scope owner's manual), it is ready to be used in the field. The following suggestions are based on using the TMCQ mrad reticle on an AR15 style rifle chambered in most popular 5.56mm loads and sighted in at 100 yards. If you are using a different rifle and ammunition, your results will differ somewhat, but the basic information will still apply.

Using at Close Ranges

At short range distances inside of 25 yards, maximum performance will come from using the PST 1–4x24 riflescope set down to lowest 1x magnification and shooting with both eyes open using the heavy outer circle and illuminated center crosshair dot to quickly center the target. On most centerfire applications, actual point-of-impact will be just below the crosshair intersection—typically 1–2 inches low from 0–25 yards.



Using at Intermediate Ranges

For distances of 50–175 yards, more magnification may be used if desired and main crosshairs should still be used in a dead-on hold. For most centerfire applications, actual point-of-impact will typically be .2 inches below the crosshair intersection at 50 yards, dead on at 100 yards and 2.4 inches below crosshair intersection by 175 yards.



Using at Long Ranges

Once distances approach 200 yards and beyond, the reticle subtension lines can be utilized to compensate for bullet drop. If necessary, reticle subtensions can also be used to help estimate range.

Note: When used in the second focal plane PST 1–4x24 rifle scope, the mrad subtensions listed in the following diagram are *only* valid at the 4x magnification. On these riflescopes, all ranging and holdover corrections using the reticle subtensions should be done at 4x.

MRAD Adjustments

The TMCQ 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. These angular measurements are used for ranging and to correct for bullet trajectory drop in riflescopes. An mrad will subtend 3.6 inches at a distance of 100 yards. The Viper PST 1–4x uses .2 mrad clicks which subtend .72 inches at 100 yards.

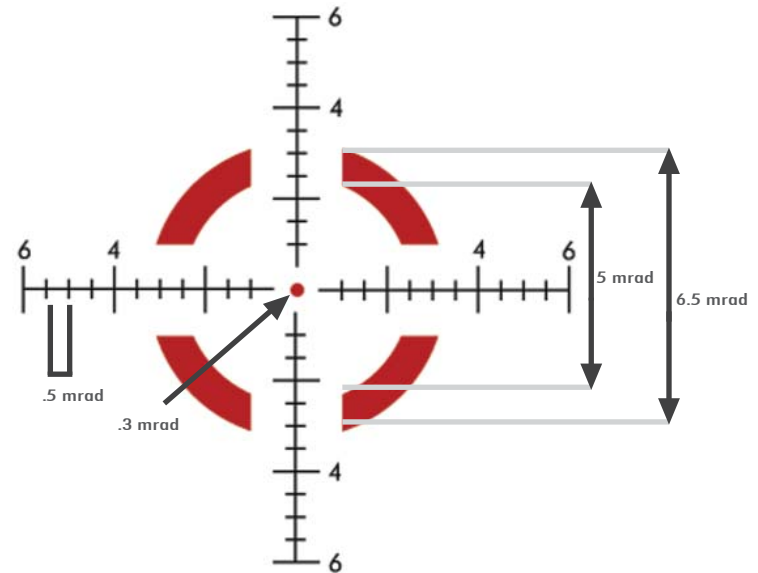
Both mrad and MOA measurements are effective for ranging and bullet trajectory drop compensation in

reticle designs. However, the mrad method used in the TMCQ 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.

TMCQ Reticle Mrad Subtensions

Numbers refer to mrads.

Crosshair thickness subtends .06 mrads.



Ranging

The TMCQ mrad reticle can be used for approximate range estimations using simple formulas. To use these formulas, it will be necessary to know the size of the target or a nearby object.

Begin by turning PST 1–4x24 rifle scope to a magnification of 4x. Using the inner crosshair with listed mrad dimensions (see subtension diagram), match up to target object and estimate the number of mrad spanned by the object (see example).

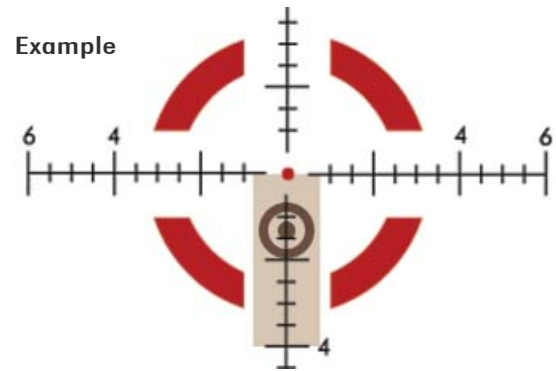
Maximum accuracy in ranging will be obtained by estimated mrad as closely as possible and will depend on a very steady hold. The rifle should be solidly braced using a rest, bipod or sling when measuring.

Mrad Ranging Formulas

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

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

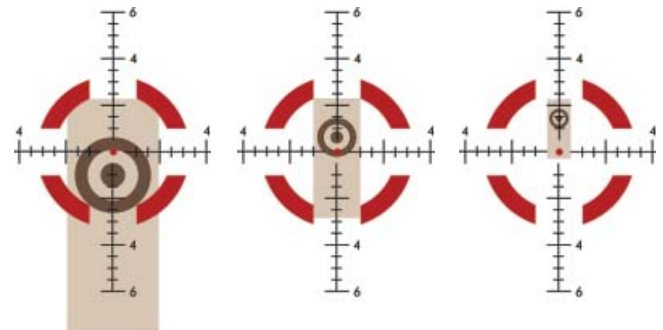
$$\frac{\text{Target Size (Inches)} \times 27.8}{\text{mrad Read}} = \text{Range (Yards)}$$



Ranging a 6-foot target (2 yards) at 4 mrad yields 500 yards.

$$\frac{2 \times 1000}{4 \text{ mrad}} = 500 \text{ Yards}$$

The inner heavy circle can also be used as a quick ranging reference. If the inner heavy circle spans half a 6-foot target's height, it will be approximately 200 yards away. If the standing target completely spans the inside of the circle, it will be approximately 400 yards away. If the target only fits inside half of the inner circle, it will be approximately 800 yards away.



200 Yards

400 Yards

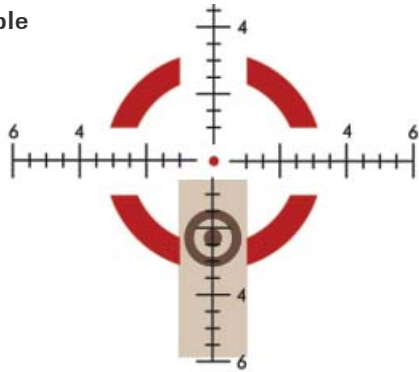
800 Yards

Holdovers

Once the distance has been calculated using the TMCQ mrad reticle or a laser rangefinder, the reticle can be used for rapid holdover correction for the bullet drop of the weapon system being used. To get the most benefit out of the TMCQ mrad equipped riflescope, Vortex Optics highly recommends shooters learn their bullet drop numbers and windage/lead corrections in mrad rather than inches or MOAs. Remember that 1 mrad equals 3.44 MOA or 3.6 inches.

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

Example



2.3 mrad correction for 400-yard shot using 5.56mm. No wind.

Example of a Custom MRAD Drop Chart for 5.56mm with 55 gr. FMJBT Bullets at 3000 fps MV

Note: Other cartridges and loads will vary. Charts like this are easily generated on many ballistics websites.

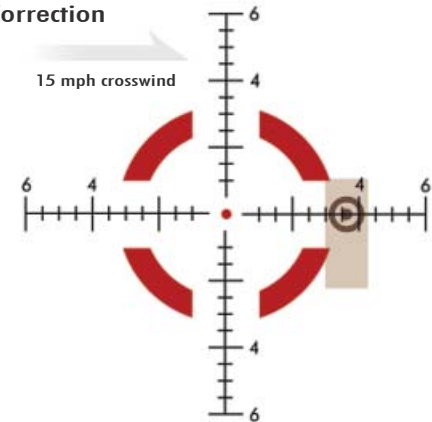
Range (Yards)	Drop (mrad)
25	-0.8
50	-0.1
75	0.0
100	-0.0
125	-0.1
150	-0.2
175	-0.3
200	-0.5
225	-0.7
250	-0.9
275	-1.1
300	-1.3
325	-1.5
350	-1.8
375	-2.0
400	-2.3
425	-2.6
450	-3.0
475	-3.3
500	-3.7
525	-4.1
550	-4.5
575	-4.9
600	-5.4
625	-5.9
650	-6.4
675	-7.0
700	-7.6
725	-8.2
750	-8.9
775	-9.6
800	-10.3

Windage and Moving Targets

The TMCQ mrad reticle can be effectively used for wind and moving target leads. Using the reticle for effective 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 their particular weapon's windage/moving target corrections in mrad rather than inches or MOAs.

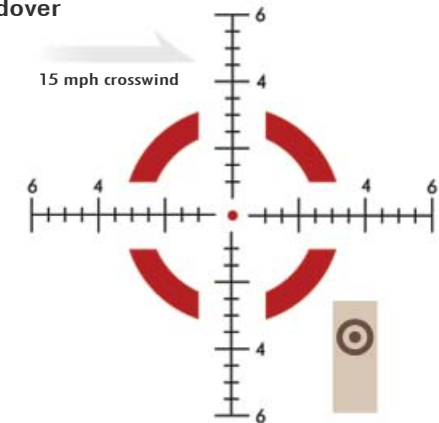
Whether dialing elevation *come ups* or using the reticle subtensions for holdover, the center horizontal crosshair can be used for windage or moving lead corrections. Mrad marks on the horizontal crosshair are graduated in .5 mrad increments.

Example when Dialing Elevation Correction



3.6 mrad correction for 5.56mm in 15 mph crosswind at 500 yards. Elevation correction dialed into turret.

Example when Using Reticle Holdover



3.7 mrad holdover and 3.6 mrad windage correction for 5.56mm in 15 mph crosswind at 500 yards.



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:

- 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.

Vortex Optics
2120 West Greenview Drive
Middleton, Wisconsin 53562
USA

Patent Pending
Dual Use: Shooting Tactical / Hunting



Unconditional Lifetime Warranty



**Dual Use: Shooting Tactical / Hunting
Manual #R-14ST-M**