

VORTEX
THE FORCE OF OPTICS®

VIPER® PST™

RIFLESCOPE

RIFLESCOPE MANUAL



THE VORTEX[®]VIPER[®]PST[™] RIFLESCOPE

Specifically designed for the tactical, law enforcement and committed precision shooting communities, the Viper[®]PST[™] series of riflescopes offer the highest levels of performance and reliability. With features such as matched turret/reticle subtensions, CRS[™] zero stop mechanisms and precision ranging reticles, the Viper PSTs are ready for any situation.

Fast Focus Eyepiece



RETICLE OPTIONS

The Focal Plane

All riflescope reticles can be termed either first focal plane (FFP) or second focal plane (SFP), depending upon their internal location within the riflescope. Many Viper PSTs are available in both reticle styles.

First Focal Plane Reticles

First focal plane (FFP) reticles are located near the windage and elevation turrets in front of the image-erecting and magnifying lenses.

This style of reticle will visually grow and shrink as you change the magnification. The main advantage of an FFP reticle is that the reticle subtensions used for ranging, holdovers, and wind drift corrections are consistent at all magnifications. The reticle is heavier at higher magnifications and finer at lower magnifications.

Second Focal Plane Reticles

Second focal plane (SFP) reticles are located near the scope's eyepiece behind the image erecting and magnifying lenses. This style of reticle does not visually change in size when you change the magnification. The advantage of an SFP reticle is that it always maintains the same appearance. Listed reticle subtensions used for estimating range, holdover, and wind drift correction are only accurate at one particular magnification.

The Subtension Scale: MOA or MRAD

Depending on which version you have purchased, your Viper PST riflescope will feature adjustments and reticles scaled in MOAs or mrads. If you are unsure of which scale is used, reference the top of the adjustment turret.



If the adjustment is in MOAs, the turret will display "1 Click = ¼ MOA".



If the adjustment is in mrads, the turret will display "1 click = .1 mrad".

Both minute-of-angle (MOA) and milliradian (mrad) unit of arc scales are effective when ranging or adjusting riflescope for bullet trajectory.

MOA Adjustments

MOA unit of arc measurements are based on degrees and minutes. There are 360 degrees in a circle and 60 minutes in a degree for a total of 21,600 minutes (MOA) in a circle. A minute of angle will subtend 1.05 inches at a distance of 100 yards. Viper PST riflescopes with MOA adjustments use 1/4-minute clicks which subtend .26 inches at 100 yards, .52 inches at 200 yards, .78 inches at 300 yards, etc.

MRAD Adjustments

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 all circles and 1000 milliradian 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. Viper PST riflescopes with mrad adjustments use .1 mrad clicks which subtend .36 inches at 100 yards, .72 inches at 200 yards (2 cm at 200 meters), 1.08 inches at 300 yards (3 cm at 300 meters), etc.

RIFLESCOPE ADJUSTMENTS

Reticle Focus

Vortex Viper PST riflescopes use a *fast focus* eyepiece designed to quickly and easily adjust the focus on the riflescope's reticle.

To adjust the reticle focus:

1. Look through the riflescope at a blank white wall or up at the sky.
2. Turn the eyepiece focus knob in or out until the reticle image is as crisp as possible.



Adjust the reticle focus.

Note: Try to make this particular adjustment quickly, as the eye will try to compensate for an out-of-focus reticle.

Once this adjustment is complete, it will not be necessary to re-focus every time you use the riflescope. However, because your eyesight may change over time, you should re-check this adjustment periodically.

Warning

Looking directly at the sun through a riflescope, or any optical instrument, can cause severe and permanent damage to your eyesight.

Windage and Elevation Adjustments

Vortex Viper PST riflescopes incorporate precision finger adjustable elevation and windage dials with audible clicks.

To make adjustments:

1. Turn the adjustment knob in the appropriate direction: Up/Down or Left/Right as indicated by the arrows.
2. Following the directional arrows, turn the knobs in the direction you wish the bullet's point-of-impact to go to.



MOA Adjustments

With each click of the Viper PST moving the point-of-impact 1/4 MOA, it will take four clicks of the knob to move a bullet's point-of-impact 1.05 inches at a 100 yard sight-in distance.

MRAD Adjustments

With each click of the Viper PST moving the point-of-impact .1 mrad (.36 inches), four clicks will move the bullet's point-of-impact 1.44 inches at a 100 yard sight-in distance. At 100 meters, four clicks will move the point-of-impact four centimeters.

Image Focus and Parallax Correction

Select Viper PST riflescopes feature a side focus knob which should be used to fine-tune the image focus. When the image is sharply focused, parallax error will also be eliminated.

Using the Side Focus

1. Be sure the reticle is correctly focused (see *Reticle Focus* section on page 6).
2. Turn the side focus knob until the target image is as sharp as possible. The yardage numbers referenced on knob should closely match the actual yardage to the target.
3. Check for parallax error by moving your head back and forth while looking through the scope. The focus is correct if there is no apparent shift of the reticle on the target. If you notice any shift, adjust the focus knob slightly until all shift is eliminated.



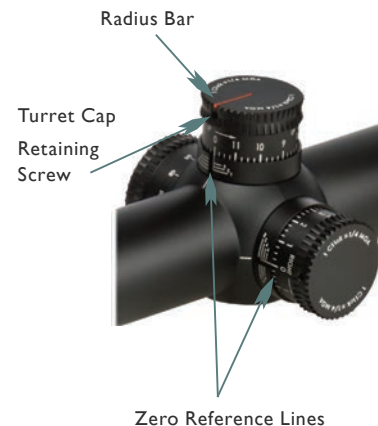
Side Focus Knob

Parallax is a phenomenon that results when the target image does not quite fall on the same optical plane as the reticle within the scope. This can cause an apparent movement of the reticle in relation to the target if the shooter's eye is off-centered. Correctly focusing the target image will allow it to fall on the same optical plane as the reticle within the rifle scope.

Turret Rotation

Vortex Viper PST riflescopes incorporate Vortex's patented *Radius Bar* to visually assist in keeping track of turret rotations. The radius bar provides a quick visual reference that allows the shooter to confirm:

- Knob orientation is correct and has not shifted as a result of accidental contact.
- Knob orientation is at the zero point when using the CRS feature.
- By watching the position of the bar while making elevation adjustments, the shooter is able to quickly track full, half and quarter rotations.



To get these benefits from the Radius Bar, the "0" mark on the turret must be indexed with the zero reference line on turret post (see *Setting the CRS Stop and Indexing Elevation Knob* section on page 17).

Variable Power Adjustments

To change magnifications, turn the magnification ring to the desired level. The Vortex *MagView* system will provide a low light reference for magnification level.

Illumination Adjustments

The Vortex Viper PST riflescopes use a variable intensity reticle illumination system to aid in low light performance. To activate the illumination, rotate the adjustment knob in either direction.



The illumination knob allows for 10 levels of brightness intensity; an *off click* between each level allows the shooter to turn the illumination off and return to a favored intensity level with just one click.

Replacing the Battery

1. Unscrew the outer cap with a coin.
2. Remove the battery.
3. Replace with a new CR 2032 battery.
4. Re-install the outer battery cap and be sure to fully tighten it down.



Customizable Rotational Stop (CRS[™])

Vortex Viper PST riflescope elevation turrets incorporate the unique **CRS** rotation stop feature. After the rifle is sighted in, the design of the CRS allows a shooter to quickly and easily return to an original zero point when using the elevation turret to dial-in temporary bullet drop corrections.

The CRS feature is particularly useful when dialing large multi-revolution elevation corrections. Without this feature, the shooter must pay very careful attention when dialing these large corrections. If the shooter loses track of the number of revolutions, the original zero point may become lost when returning the adjustment. Viper PST riflescopes equipped with the CRS allow the elevation dial to be quickly spun back to original zero without having to carefully count revolutions or clicks.

Once the CRS shims are installed after sight-in, the elevation dial will stop turning shortly past the original zero point when being returned (turning clockwise direction) from a temporary elevation adjustment. The shooter can then turn the elevation knob a partial turn in a counter-clockwise direction until the zero reference and radius bar are correctly aligned—achieving the original zero point.

See CRS shim installation in the Bore Sighting and Final Range Sight-in sections.



RIFLESCOPE MOUNTING

To get the best performance from your Vortex Viper PST rifle scope, proper mounting is essential. Although not difficult, the correct steps must be followed. If you are unsure of your abilities, it would be best to use the services of a qualified gunsmith.



Centering of the Reticle

The Vortex Viper PST rifle scope is pre-set from the factory with the reticle in the center of the adjustment ranges.

If you have changed the settings and wish to approximately reset the reticle to the center, this can be done easily:

1. Turn the windage or elevation dial as far as possible in either direction. *Do not force the dial. As soon as any resistance is felt, stop turning.*
2. Carefully count the dial rotations while turning the dial back in the opposite direction. *Stop turning as soon as resistance is felt.*
3. Turn the dial the other direction to half the amount of rotations counted in step one.

Complete this procedure for both windage and elevation dials to approximately center the reticle.

Rings and Bases

Mount an appropriate base and matching rings to your rifle according to the manufacturer's instructions. The Vortex Viper PST riflescopes require 30 mm rings.

Vortex Optics highly recommends using the Vortex Precision Matched 30 mm ring sets which may be purchased from an authorized Vortex rifle scope dealer. These rings will mount to any Picatinny spec base.

Note: If shooting at distances in excess of 800 yards with 4–16x50 or 6–24x50 models, Vortex Optics recommends use of a 20 MOA canted Picatinny rail or 30 mm rings with adjustable offsets. These can be purchased through companies such as Badger Ordnance, Barrett Mfg., EGW, Burris, and others.



If using an aftermarket base and ring setup, use the lowest ring height that will provide complete clearance of scope and rifle—avoiding any contact with barrel, receiver, bolt handle or any other part of the rifle. A low mounting will help assure proper cheek weld, aid in establishing a solid shooting position, and promote fast target acquisition.

Eye Relief and Reticle Alignment

After installing the bottom ring halves on the mounting base, place the riflescope on the bottom ring halves and loosely install the upper ring halves. Before tightening the scope ring screws, adjust for maximum eye relief to avoid injury from recoil:

1. Set the riflescope to the middle of its magnification range.
2. Slide the riflescope as far forward as possible in the rings.
3. While viewing through the riflescope in a normal shooting position, slowly slide the riflescope back towards the shooter's face—paying attention to the field of view. *Just as the full view is visible, stop.*
4. Without disturbing the front-back placement, rotate the riflescope until the vertical crosshair exactly matches the vertical axis of the rifle. Use of a reticle leveling tool, a weight hung on a rope, flat feeler gauges, or bubble levels will help with this procedure.
5. After aligning the reticle, tighten and torque the ring screws down per the manufacturer's instructions.



Using bubble levels to square the riflescope to the base.

Bore Sighting

Initial bore sighting of the riflescope will save time and money at the range. This can be done by using a mechanical or laser bore sighter according to the manufacturer's instructions or by removing the bolt and sighting through the barrel on some rifles.

To visually bore sight a rifle:

1. Place the rifle solidly on a rest and remove the bolt.
2. Sight through the bore at a target approximately 100 yards away.
3. Move the rifle and rest until the target is visually centered inside the barrel.
4. With the target centered in the bore, make windage and elevation adjustments until the reticle crosshair is also centered over the target.



Visually bore-sighting a rifle.

Final Range Sight-In and CRS Stop Set

After the riflescope has been bore-sighted, final sight-in and CRS stop set should be done at the range using the exact ammunition expected to be used while shooting. Sight in and zero the riflescope at the preferred distance. 100 yards is the most common zero distance, although a 200 yard zero may be preferred for long range applications.

Be sure the reticle is in focus (see *Reticle Focus* section on page 6) and adjust the side focus knob if present until the target image is sharp and without parallax error (see *Using the Side Focus* section on page 8).

1. Following all safe shooting practices, fire a three-shot group as precisely as possible.
2. Next, adjust the reticle to match the approximate center of the shot group (see *Windage and Elevation Adjustment* section on page 7).
Note: If the rifle is very solidly mounted and cannot be moved, simply look through the scope and adjust the reticle until it is centered on the fired group.
3. Carefully fire another three-shot group and see if the bullet group is centered on the bulls eye.

This procedure can be repeated as many times as necessary to achieve a perfect zero.

Setting the CRS Stop and Indexing Elevation Knob

After obtaining a satisfactory zero, the CRS stop can be set if desired:

1. Loosen the three turret cap retaining screws on the elevation turret. Gently pull the turret cap straight up and off of the turret post, being careful not to rotate the turret post.
2. Slide the CRS shims on the center section of the turret post below the V-grooved part.



Alternate shim installation direction with each shim.

Use as many shims as necessary to completely fill up the space. Do not try to force in a last shim once the clearance is very close—a tiny remaining gap is normal.



3. After filling the center gap on the post with shims, replace the elevation cap.

4. Align the turret cap so the “0” mark on the cap matches up with the open slot of the turret shroud and the indicator line on the scope body. Again, be sure not to rotate the actual turret mechanism in the process.



Align the elevation turret cap.

5. Re-tighten the retaining screws, but do not overtighten. Use of thumb and forefinger on the short end of the hex wrench will provide sufficient force.

Indexing the Windage Knob

1. Loosen the three retaining screws on windage turret cap.

2. Carefully rotate the cap until the “0” mark on the cap matches up with the “0” reference line on the turret post. Be sure that the cap is freely turning and that you don’t rotate the actual turret mechanism.

3. Re-tighten the windage knob retaining screws, but do not overtighten. Use of thumb and forefinger on the short end of the hex wrench will provide sufficient force



Align the windage turret cap.

Once the windage and elevation knobs are correctly indexed to the zero mark, temporary corrections can be safely dialed into the scope without worry of losing the original zero.

Using the CRS Zero Stop

Once the CRS shims are installed, the elevation dial will stop turning shortly past the original zero point when being returned (turning clockwise direction) from a temporary elevation adjustment.

Turn the elevation knob a partial turn in a counter-clockwise direction until the Radius Bar is correctly aligned with scope axis and zero marks match. This setting will match the original zero point.



Point at which the knob stops turning.

Note: If re-zeroing at a future time, be sure to remove all CRS shims before sight-in.



Correct alignment for zero point.

MAINTENANCE

Cleaning

The fully waterproof and fogproof Vortex Viper PST riflescope requires very little routine maintenance other than periodically cleaning the exterior lenses. The exterior of the scope may be cleaned by wiping with a soft, dry cloth.

When cleaning the lenses, be sure to use products, such as the Vortex Fog Free cleaning products or Lens Pen, that are specifically designed for use on coated optical lenses.

- Be sure to blow away any dust or grit on the lenses prior to wiping the surfaces.
- Using your breath, or a very small amount of water or pure alcohol, can help remove stubborn things like dried water spots.

Lubrication

All components of the Vortex Viper PST riflescopes are permanently lubricated, so no additional lubricant should be applied.

Note: Other than to remove the turret caps, do not attempt to disassemble any components of the riflescope. Disassembling of riflescope may void warranty.

Storage

If possible, avoid exposing your Vortex riflescope to direct sunlight or any very hot location for long periods of time.

TROUBLESHOOTING

Sighting-in Problems

Many times, problems thought to be with the scope are actually mount problems. Be sure the mounts are tight to the rifle and the scope is secured so it doesn't twist or move in the rings. An insufficient windage or elevation adjustment range may indicate problems with the base mount, base mount holes drilled in the rifle's receiver, or barrel/receiver alignment.

Check for Correct Base and Ring Alignment

1. Re-center the scope reticle (see *Centering of the Reticle* section on page 12).
2. Attach bore sighter, or remove bolt and visually boresight rifle.
3. Look through the scope. If the reticle appears way off center on the boresighter image or when compared to the visually centered target when looking through rifle's bore, there may be a problem with the bases or rings being used. Confirm that correct base and rings are being used—and in the proper orientation.

Grouping Problems

There are many issues that can cause poor bullet grouping.

- Maintain a good shooting technique and use a solid rest.
- Check that all screws on rifle's action are properly tightened.
- Be sure rifle barrel and action are clean and free of excessive oil or copper fouling.
- Check that rings are correctly torqued per the manufacturer's instructions.
- Some rifles and ammunition don't work well together—try different ammunition and see if accuracy improves.

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 Viper PST 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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Visit www.vortexoptics.com for more information. Canadian customers may visit www.vortexcanada.net for customer service information.

Note: The VIP warranty does not cover theft, loss, or deliberate damage to the product.

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#PST-13B

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