Parallax Adjustment For Riflescopes

As applied to riflescopes, parallax can be defined as the apparent movement of objects within the field of view in relation to the reticle. Parallax occurs when the “primary image” of the object is formed either in front of, or behind the reticle. If the eye is moved from the optical axis of the scope, this also creates parallax. Parallax does not occur if the primary image is formed on the same focal plane as the reticle, or if the eye is positioned in the optical axis of the scope.

Riflescopes with high magnification, or scopes for long-range shooting should be equipped with a parallax adjustment because even slight sighting errors can seriously affect sighting accuracy. By adjusting the objective part of the optical system the target can be brought in the exact focal plane of the reticle at any distance. Tactical style riflescopes do not usually have parallax adjustment because the exact range of the target can never be anticipated. Lower magnification scopes do not usually have parallax adjustment either since at lower powers the amount of parallax is very small and has little importance for practical, fast target sighting accuracy.

Factors That Affect the Amount of Parallax in a Riflescope

Two main factors that cause and affect the amount of parallax in a riflescope. *First is the distance of the target to the objective lens of the riflescope.* Since the reticle is in a fixed position within the riflescope housing, the image of the target doesn’t always appear positioned in the same plane as the reticle. Targets that are closer are positioned farther away from the objective and targets that are farther away are positioned closer to the objective. The result is parallax. *Second, the distance the eye moves from the optical axis of the scope is determined by the exit pupil size.* As long as the eye is lined up exactly with the optical axis of the scope there is no parallax at any distance. To completely eliminate parallax would require a tiny exit pupil, which is impractical. In reality, there is some parallax in all riflescopes. However, there is usually a specific shooting distance at which there is no parallax. In most rifle scopes this one point of zero parallax is usually placed at a suitable mid-range point in the scopes' focal range.

There are other factors that can cause parallax. If the reticle is not precisely positioned at the correct distance from the objective, the result is that the distance of no parallax will be exaggerated. Reticles that are not securely mounted and are allowed to move only a few thousandths of an inch, will consistently have varying amounts of parallax. Parallax can also be caused as the result of optical deficiencies in the objective. Spherical or astigmatic aberrations not corrected in manufacture will cause images that are a considerable distance from the reticle. If the apparent movement of the reticle compared with the image viewed is different from when you move your eye up and down than when you move your eye side to side, it is the sign of a bad objective. No adjustment of the scope will eliminate these abnormalities or optical deficiencies.

You can check the parallax of any scope by sighting an object at normal shooting distance (not indoors), by moving your eye side to side (then up and down), as far as you can, keeping the sighted object within the field of view. The apparent movement of the reticle in relation the target is parallax.

Methods for Correcting Parallax

There are several methods to correct parallax:

1. REAR (SECOND FOCAL PLANE TYPE) CORRECTION

This method uses a numbered range ring from minimum yardage (usually 50) to maximum yardage (usually infinity). It is located directly in front of the eyepiece, similar to the usual variable power ring but controls the Parallax Adjustment. This feature is almost always found only on fixed power scopes. This adjustment is usually found on scopes of more than 8x and less than 20x.

Fig. 1

2. MIDDLE (TURRET/SADDLE TYPE) CORRECTION

This adjustment is usually located on left side of the turret. Yardage increments are printed around the radius of a third knob. The knob is designed to be easily located and adjustable with the left hand while looking through scope. See figure 1

3. FRONT (OBJECTIVE LENS TYPE) CORRECTION

This method is usually a fixed objective (pre-set at the factory and not adjustable unless special tools are used), or fully adjustable by hand. This method can be rugged and very resistant to abuse. Optically and mechanically, it is one of the most versatile systems available. See figure 2

Fig. 2