For Patent Information go to https://goo.gl/2z62aS

GLX™ FIRST FOCAL PLANE RETICLE MANUAL

MIL-DOT

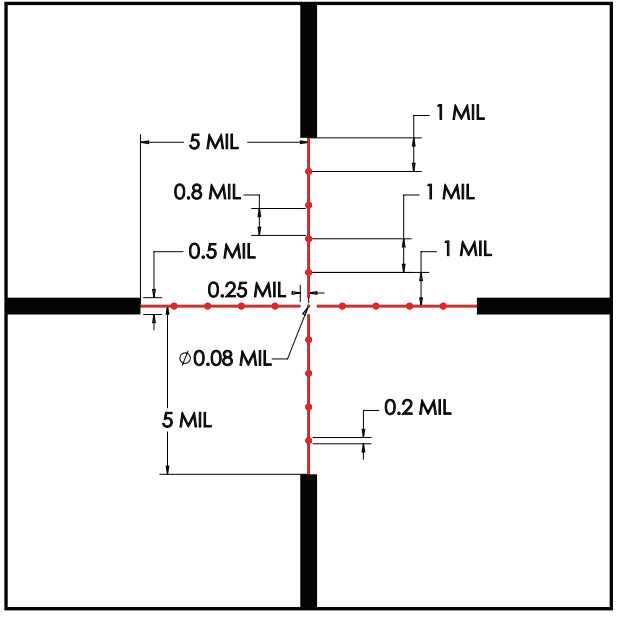
PRIMARY ARMS OPTICS

THE MIL-DOT RETICLE

The MIL-DOT reticle may appear simple to the eye, but every detail is a tool that can help you make accurate ranging estimates at extended ranges.

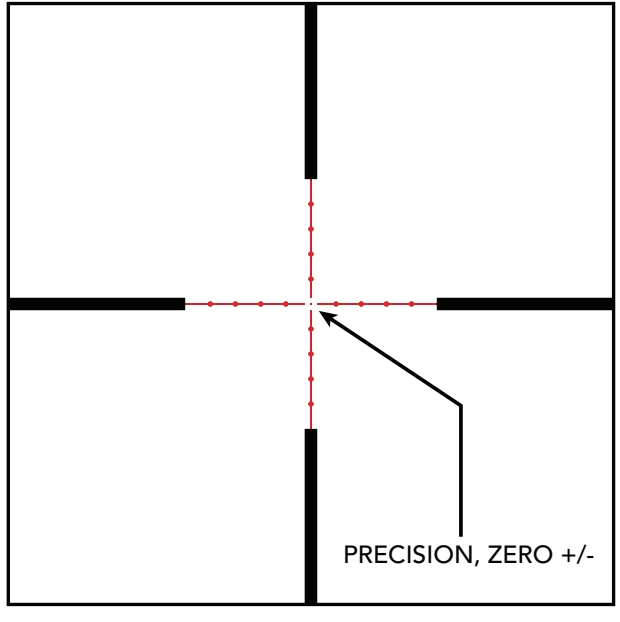
The namesake of the MIL-DOT reticle comes from the dot-shaped stadia that run along both the horizontal and vertical crosshairs. These dots are exact subtensions, spaced 1 Milliradian (MIL) apart. Each dot is .2 MIL in diameter, meaning the space between the edges of each MIL dot equal to .8 MIL. Each crosshair runs 5 MIL from center to the end of the bar, which is .5 MIL thick. Because the bar point starts at exactly 5 MIL, the distance from the edge of the 4th MIL dot to the end of the bar is .9 MIL. At the center of the reticle is a fine aiming point, which floats between the crosshairs. The center point itself is .08 MIL across, and the distance from the center point to the starting edge of any crosshair is .25 MIL.

Since these subtensions are true at every level of magnification. You can use these known measurements with the ranging formula on the next page to establish a distance to target in yards.



ESTABLISHING ZERO

Using a bipod or sandbags, preferably on a bench or in the prone position, turn the Power Ring to a high magnification to see your target as easily as possible. Dial in point of impact to coincide with the center dot. When sighting in your rifle, if your shots are hitting low, turn the Elevation Knob counterclockwise to bring the point of impact up. If your shots are hitting to the left, turn the Windage Knob counterclockwise to bring the point of impact right.



RANGING WITH A MIL-DOT RETICLE IN INCHES, YARDS, AND METERS

There are two common systems of measurement in the optics world: MOA and MIL. MOA reticles using Minute of Angle subtensions, which equal 1.047” at 100yds and usually adjust in .25 MOA increments. MIL reticles use Milliradian subtensions, which equal 3.6” at 100 yards and usually adjust in .1 MIL increments.

A Milliradian, by definition, is an angular measurement that equals 1/1000th of the distance between the observer and the target. Therefore, 1 MIL represents 1 yard at a 1000-yard distance. This ratio is true regardless of what measurement unit you choose. 1 MIL equals 1 foot at a 1000-foot distance, and 1 MIL equals 1 meter at a 1000-meter distance. That’s why MIL-based scopes are so popular: the MIL system is robust and easy to communicate.

The ranging process involves size estimation, comparison, and mathematics. Start by making an estimate of the target in your desired units. The easiest units are meters and yards, since it has unit consistency between distance-to-target and target size. Inches have some extra math associated in converting inches to yardage. Here’s an example of a ranging process:

Let’s say I see a window at a distance, and I know that window is 18” tall (or 0.5yd). This is my starting point.

Once you have an estimated size of target, find the size of the target in MILs by using your scope reticle for comparison. For SFP scopes, this must be done at maximum magnification, while FFP scopes can range at all magnification levels. Using the known subtensions of your reticle, determine the size of the target in MILs.

Let’s say our window is 1 MIL tall when looking at it through the scope. This is your Target MIL Measurement.

You now have everything you need to make a range estimation. For yards and meters, the math is simple:

Target Distance in Yards/Meters = Target Size in Yards/Meters * 1000 / Target MIL Measurement

For the window, this math equals: 0.5yd * 1000 / 1 = 500yd. The window is 500 yards away.

Inch-based measurements are more complicated, as the target size and target distance are different units. We must convert units, which means we divide the 1000 by 36 (inches/yard) to get 27.8. This makes the inch-MIL equation:

Target Distance in Yards = Target Size in Inches * 27.8 / Target MIL Measurement

For the window, this math equals: 18” * 27.8 / 1 = 500yd. The window is still 500 yards away.

As you can see, the MIL-DOT system is a powerful tool when applied correctly. Experts become proficient at estimating sizes of targets at a distance. Ranging with any MIL or MOA-based reticle requires constant practice to achieve this level of skill, but there are tricks that trained shooters can teach you to speed up and improve your accuracy.

MIL MEASURING TABLES

This page contains useful tables that show the comparative measurements of MILs at different distances. As you can see, the size of a MIL is always equal to 1/1000th the total distance. We've also included some handy conversions if you're moving between MIL units and MOA units. Generally, shooters should centralize on one system of measurement to build a stronger core proficiency.

DISTANCE (YARDS)	ONE MIL IN INCHES
100	3.6
150	5.4
200	7.2
250	9
300	10.8
350	12.6
400	14.4
450	16.2
500	18
550	19.8
600	21.6
650	23.4
700	25.2
750	27
800	28.8
850	30.6
900	32.4
950	34.2
1000	36

CONVERSIONS (100 YARDS):	CONVERSIONS (200 YARDS):
1 MIL = 3.438 MOA	1 MIL = 3.438 MOA
1 MOA = 1.047"	1 MOA = 2.094"
1 MIL = 3.60"	1 MIL = 7.20"

MIL LOAD DATA TABLE

Included here is an example of a Load Data table, which helps to guide a shooter with pre-calculated drop values at 100-yard increments. Every table will be different, depending on the rifle and cartridge details. Muzzle velocity is different with each combination, so finding your own unique details is very important. You can use online ballistic calculators or applications such as Strelok to generate your data to fill the rest of the table.

With this data table prepared, you can improve your speed on target by using the MIL-Dot reticle for holdovers. For example, if you were shooting at a target 500 yards away, this table tells you that your drop would be about 3 MIL. You can dial this into your elevation turret, or you can take the faster method and use the 3rd MIL dot below center as a vertical hold.

LOAD DATA SAMPLE FOR REFERENCE			
168gr Sierra Matchking		Muzzle: 2700FPS	G1 BC: 0.462
Distance (Yards)	**Drop (in)**	**Drop (MOA)**	**Drop (MIL)**
100 (Zero)	0.00	0.00	0.00
200	-3.00	-1.43	-0.42
300	-12.42	-3.95	-1.15
400	-29.42	-7.02	-2.04
500	-55.42	-10.59	-3.08
600	-92.24	-14.68	-4.27
700	-142.09	-19.39	-5.64
800	-207.71	-24.80	-7.21
900	-292.31	-31.02	-9.02
1000	-399.59	-38.17	-11.10

PRIMARY ARMS
OPTICS

LIFETIME WARRANTY

Your Primary Arms GLx scope is covered by the Primary Arms Lifetime Warranty. If a defect due to materials or workmanship, or even normal wear and tear has caused your product to malfunction, Primary Arms will either repair or replace your product. You can find more details about our lifetime warranty at www.primaryarmsoptics.com.

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