



## *Leatherwood* / Hi-Lux Optics

### TOP-ANGLE SERIES



### RIFLESCOPE INSTRUCTIONS

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**CONGRATULATIONS!** You have just purchased one of our TOP-ANGLE focus series riflescopes; one of the best built. The needs of left handed shooters are neglected in today's optical market. Typically, adjusting parallax forces left handed shooters to remove their dominant hand off the trigger to adjust the side parallax knob on the left. Where as a right handed shooter would not have any problem using his or her left hand, adjusting left side parallax is not ergonomic for left-handed shooters. The TOP-ANGLE Series is our solution to this dilemma; by placing the parallax adjustment at a 45 degree angle from the vertical, left and right hand dominant shooters can ambidextrously adjust parallax using their off hand.

These scopes are loaded with the outstanding features that distinguish a fine scope from simply good sporting rifle optics. No short-cuts have been taken in the production of these scopes. All glass lenses are meticulously polished to photographic quality for exceptional clarity and light gathering capability, which is especially critical during the low light hunting conditions of daybreak and dusk.

**All models in this series feature:**

- A. **DiamondTuff** fully multi-coated 50mm lenses
- B. **Fast Focus Eye Adjustment** with a large diameter ocular lens
- C. **Tri-Center** spring tension for positive contact dial turns and precise adjustments
- D. Proprietary **Top-Angle Parallax Adjustment (US Patent # 7626760)**
- E. **Leatherwood/Hi-Lux PermaCoat** soft luster, black finish
- F. Rugged **All Terrain RifleScope (ATR)** design: Waterproof – Fogproof – Shockproof - Recoilproof

The **DiamondTuff** fully multi-coated 50mm lenses are photographic quality lenses that ensure outstanding target resolution. Combine the remarkable clarity of the of the Diamond Tuff glass with the convenient **Fast Focus Eye Adjustment**, and you have crystal clear sights and reticle that offer you the best opportunity to quickly acquire and aim at your target.

Next, add in the “Tri-Center” spring tension for precise and repeatable turret dial adjustments and the proprietary **Top-Angle Parallax Adjustment** technology, you will accurately “reach out and touch” targets without them ever knowing you are there.

Clarity and accuracy don't mean a thing if your optics can't keep up with the rugged requirements demanded by the modern shooter. Leatherwood/Hi-Lux is committed to providing today's shooter with the optical gear that meets these demands. The rigid aluminum scope tube is finished with

Leatherwood/Hi-Lux **PermaCoat** soft luster blue-black finish that's practically impervious to wear, ensuring this scope will maintain its good looks through years of hard service. Also, the Leatherwood/Hi-Lux Optics ATR Top-Angle Series scopes are manufactured with the **All Terrain Rifle Scope** (ATR) design which leverages the latest scope manufacturing technology for Clarity, Accuracy AND Durability.

Here is a riflescope that's built to take on anything that Mother Nature can dish out. You can pay more, a lot more, but why? With the Leatherwood/Hi-Lux TOP-ANGLE riflescope, you get Quality, Precision and Ruggedness at a price that doesn't break your budget. You simply cannot buy a brighter, more precise or tougher built scope...anything else is second best! If you're looking to take your shooting to the professional level, you need one of these scopes on your rifle.

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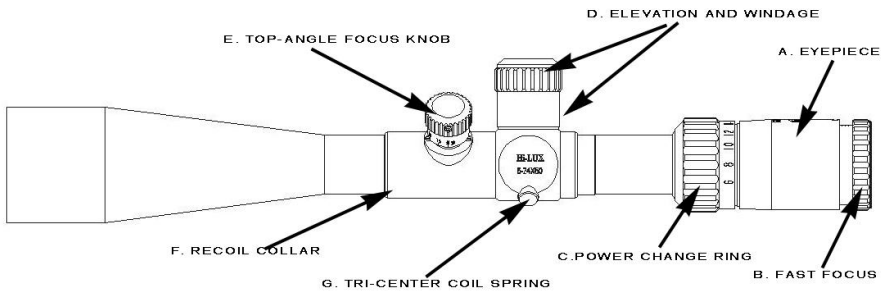
# SECTION 1: SPECIFICATIONS AND BASIC DEFINITIONS

| Model        | Power  | Obj. (mm) | F.O.V. @ 100 Yds (Feet) | Eye Relief (Inch) | Length (Inch) | Weight (O.Z.) | Exit Pupil Range (mm) | Tube (mm) |
|--------------|--------|-----------|-------------------------|-------------------|---------------|---------------|-----------------------|-----------|
| TP312X50 MD  | 3x-12x | 50        | 40.3-10.2               | 3                 | 13.6          | 25.6          | 10-3.3                | 30        |
| TP416X50 MD  | 4x-16x | 50        | 24.1-6.3                | 3.25              | 14.1          | 26.5          | 10-3                  | 30        |
| TP416X50 MLR | 4x-16x | 50        | 24.1-6.3                | 3.25              | 14.1          | 26.5          | 10-3                  | 30        |
| TP730X50 MOA | 7x-30x | 50        | 10.6-3.5                | 3.30              | 17.2          | 29.8          | 6.9-2.3               | 30        |

## (1) TOP-ANGLE SERIES SPECIFICATIONS :

All the air-glass surfaces are fully multi-coated using the special technology to maximize the light transmission. The click adjustments for both Elevation and Windage are ¼ MOA.

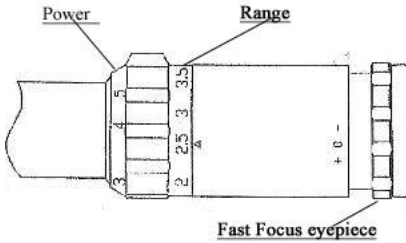
## (2) BASIC DEFINITIONS:



**A. EYEPIECE; B. FAST FOCUS; C. POWER CHANGE RING; D. ELEVATION AND WINDAGE ADJUSTMENT KNOBS; E. TOP-ANGLE FOCUS KNOB; F. RECOIL COLLAR\*\*; G. TRI-CENTER COIL SPRING.**

\*\*The recoil collar is a special sleeve we put in the center part of the scope to secure the Elevation Knob, Windage knob, and the Top-Angle focus knob. This collar also prevents the scope from moving forward under recoil.

## SECTION 2: EYEPIECE FOCUSING



Hold the scope about three or four inches from your eye and look through the eyepiece at a featureless, flatly lit bright area such as a wall or open sky. If the reticle is not sharply defined instantly, you need just to turn the quick focus eyepiece in or out for adjustment until the reticle appears in sharp focus.

**WARNING: NEVER LOOK AT THE SUN WITH THIS PRODUCT, OR EVEN THE NAKED EYE. YOU COULD PERMANENTLY DAMAGE YOUR EYES.**

## SECTION 3: MOUNTING

To achieve the best accuracy from your rifle, the scope must be mounted properly. You should use a high-quality mount with bases designed to fit your particular rifle. To mount the scope:

- A. The scope should be mounted as low as possible without touching either the barrel or the receiver.
- B. Before tightening the mount rings, look through the scope in your normal shooting position. Adjust the scope (either forward or backward) until you find the furthest point forward (to ensure maximum eye relief) that allows you to see a full field of view.
- C. Rotate the scope in the rings until the reticle pattern is perpendicular to the bore and the elevation turret is on top.
- D. Then tighten the mounting screws.

**WARNING: AVOID OVER-TIGHTENING THE RINGS. THIS CAN DAMAGE THE SCOPE, AFFECTING PERFORMANCE OR RENDERING IT INOPERABLE. THERE SHOULD BE A SLIGHT EVEN GAP BETWEEN THE RINGS AND THE SCOPE. BE SURE THAT THE SCOPE IS MOUNTED FAR ENOUGH FORWARD. ITS REARWARD MOTION MAY INJURE THE SHOOTER WHEN THE RIFLE RECOILS.**

## SECTION 4: PRE-ZEROING

Pre-zero sighting can be done either manually, or with a bore-sighting device. To bore sight manually,

- A. It is necessary to be able to see through the bore from the breech end. In the case of a bolt action, this usually means removing the bolt.
- B. If your scope has parallax adjustment, set it for the range to the target.
- C. Set the variable-power scope to low power.
- D. With the firearm in a rested position, remove the caps from the windage and elevation screws.
- E. Look through the bore and center the target in the bore and adjust the windage and elevation screws to position the reticle on the center of the target.
- F. For the Windage adjustment, turn the windage adjustment screw clockwise to move the point of impact right and counterclockwise to move the point of impact left.
- G. In the same manner, adjust the Elevation by turning the elevation adjustment screw clockwise to lower the point of impact and counterclockwise to raise the point of the impact. \*\*If a large amount of adjustment is required to align the reticle, make approximately one-half of the windage correction, then approximately one-half of the required elevation correction.
- H. Finish by applying the balance of windage and elevation correction.

If you can't see through the bore then it will be necessary to use some type of bore-sighting device. When using a bore-sighting device, follow the instructions provided with the device.

NOTE: If your mounting system allows for adjustment of the scope, the gross adjustments should be made in the mount and then the final adjustments made with the scope's internal adjustment system.

FOR FINGER-ADJUSTABLE SCOPES: remove the protective caps and rotate the finger-adjustable windage and elevation turrets to center the reticle in the same manner as described above.

## **SECTION 5: ZEROING**

**DANGER: IF A BORE SIGHTING COLLIMATOR OR ANY OTHER BORE OBSTRUCTING DEVICE WAS USED; IT MUST BE REMOVED BEFORE PROCEEDING. AN OBSTRUCTION CAN CAUSE SERIOUS DAMAGE TO THE GUN AND POSSIBLE PERSONAL INJURY TO YOU AND OTHERS NEARBY.**

The zero range will depend on your hunting conditions.

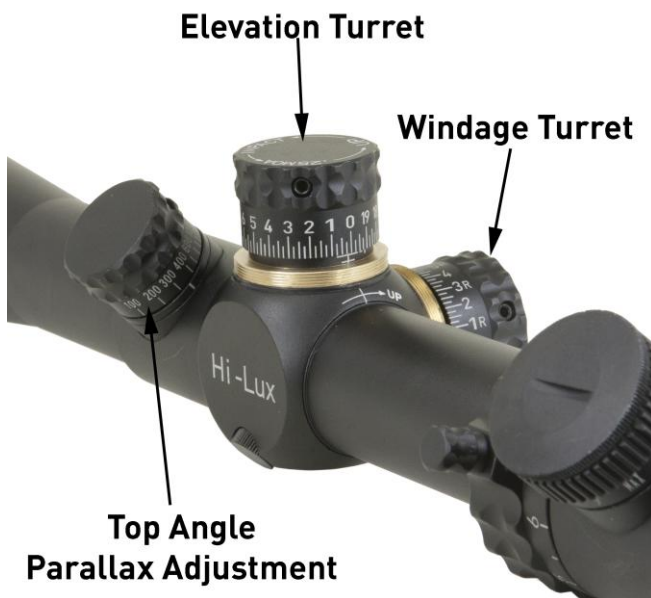
- A. In general, if most of your shots will be at short range, zero-in at 100 yards. For long-range shooting at big game, most experienced shooters zero-in about three inches high at 100 yards.
- B. If the scope has parallax adjustment set it to the range to the target. Set variable-power scopes to the highest power.
- C. From a rested position, fire three rounds at the target.
- D. Observe the center of the points of impact on the target and adjust the windage and elevation screws as needed to bring the point of aim to the desired relationship to the points of impact. The point of impact moves in the direction indicated on the adjustment and by the amount indicated.
- E. Repeat as necessary.
- F. Once the zeroing of the rifle is completed, you need to put the windage and elevation caps back on to protect your zero from moving.

Each click of the adjustment changes bullet impact at 100 yards by the amount indicated on the windage and elevation adjustments. The adjustments are calibrated in Minutes of Angle (MOA). One minute of angle is very close to 1 inch at 100 yards. To calculate the click value at distances other than 100 yards, use the following formula: divide the distance (number of yards) by 100. Then multiply this number by the click value stated on the windage and elevation adjustments. This will tell you the actual click value of the scope at that distance. For Example: your range is 200 yards. Divide 200 by 100 and that equals 2. Multiply the  $\frac{1}{2}$  minute indicated on the adjustments by 2 and the adjustment at 200 yards is 1 inch per click. For 400 yards, you would multiply  $\frac{1}{2}$  by 4 and that would give 2 inch per click and so on. Once the zeroing of the rifle is completed, you can reset the zero marking by loosening the three screws on the windage and elevation knobs.

**WARNING:** ALL SHOOTING SHOULD BE DONE AT AN APPROVED RANGE, OR SAFE AREA. EYE AND EAR PROTECTION IS RECOMMENDED.

## **SECTION 6: TOP-ANGLE™ PARALLAX CORRECTION**

The TOP-ANGLE parallax adjustment allows for parallax correction at various user-select ranges from 50 or less yards up to infinity. To be parallax free, the target must be located at the distance for which the scope is focused. Target at any other distance will cause parallax. Parallax manifests itself as apparent movement of the reticle against the stationary target. Leatherwood/Hi-Lux proprietary Top-Angle Parallax Adjustment is easily accessible to either hand.



**CAUTION:**

**THE LOCATION OF THE TOP-ANGLE PARALLAX ADJUSTMENT KNOB IS ON THE TOP 45° ANGLE ON THE LEFT SIDE AS THE ABOVE PICTURER INDICATES. THE TOP-ANGLE FOCUS IS A PRECISION ADJUSTMENT FOR YOUR SCOPE. ALWAYS AVOID HITTING THE TURRET WITH A HEAVY OBJECT, OR BUMPING IT AGAINST ANYTHING SOLID. WHEN TRANSPORTING YOUR RIFLE WITH THE SCOPE INSTALLED, LAY THE RIFLE OR THE GUN CASE CONTAINING THE RIFLE, SO THE TOP-ANGLE FOCUS TURRET FACES UPWARD AND DOES NOT BUMP AGAINST ANYTHING SOLID, SUCH AS THE FLOORING OF YOUR VEHICLE TRUNK. NEVER LAY THE RIFLE WITH THE TOP-ANGLE FOCUS TURRET FACING DOWNWARDS, OR THIS MAY RESULT IN DAMAGE TO PARALLAX ADJUTMENT.**

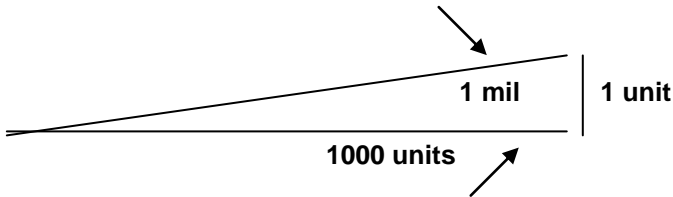


## SECTION 7: NO-MATH MIL-DOT RETICLE GUIDE

### (1) What is a Mil?

1 mil is 1/1000 of a radian or a milli-radian. It is an angular measurement with the following values:

1 mil = 1 milli-radian =  $\text{ArcTan}(.001) = 3.44 \text{ minutes} = 0.57 \text{ degree}$



How does a conventional mil-dot system work?

By knowing the width of an object in meters and observing the number of mils that the object subtends on the reticle, it is possible to determine the range to the object. Dividing the number of mils subtended by object by the actual width of the object in meters, then dividing that result into 1000 meters determines the range. Or use the formula directly as:

$\text{Range} = \text{Object size in meters} \times 1000 / \text{Mills subtended by the object}$

For example:

If the object is 1 meter tall and in the scope it fits between the center of 2 mil-dots, then the range solution is as:

$$\text{Range} = 1 \times 1000 / 2 = 500 \text{ meters}$$

If the object is 1.5 meters tall and in the scope it fits between the center of 2 and ½ mil-dots, then the range solution is as:

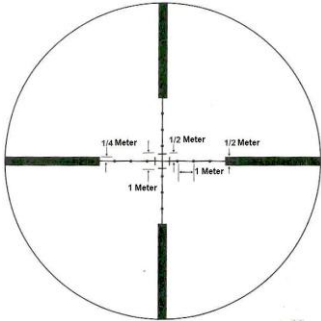
$$\text{Range} = 1.5 \times 1000 / 2.5 = 600 \text{ meters}$$

Doing these mental math calculations can become a challenge under certain situations. For this reason we designed the NO-MATH MIL-DOT system.

### (2) What is the NO-MATH MIL-DOT and how does it work?

We call the new reticle the **No-Math Mil-Dot**, because you determine the range by just framing a meter, multiple meters or fraction of a meter of the target and then reading the range on the power change rings. This is much simpler than solving the above math equation. If you frame the target in meters then you read the range in meters. If you frame the target in yards, then you read the range in yards. Meters are used in the explanation, but yards also work the same way.

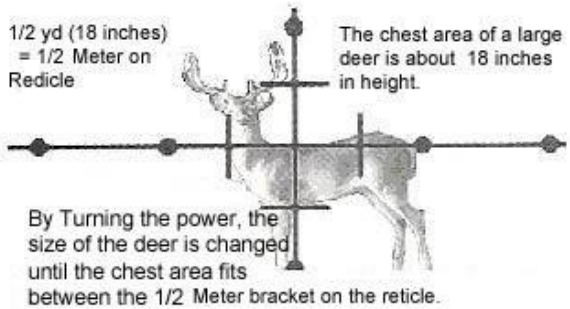
**Figure 1. NO-MATH Mil-Dot Reticle**



As you can see in Figure 1, there are numerous framing dimensions available on the reticle. Although not denoted, it should be clear that up to 8 meters in width or height could be used for framing. The total width between the heavy posts is 8 meters. The width of the thick posts on the side is 18".

Within the maximum and minimum range of each model's reticle specified, you can use these framing points indicated in the reticle to estimate the range. You just need to frame a known size target in between the appropriate framing brackets. Then you can estimate the range by reading the second set of numbers on the power ring.

**Figure 2** is an example how to frame and determine the range for a deer. Once the range is determined, the power may then be changed to whatever the setting the user desires.



**Figure 2 Framing**

### **(3) Doubling or Halving the range readout**

The shooter can double or halve the range capability by doubling or halving the framing dimensions between the mil marks.

#### **1. Doubling The Range**

You can double the range by doubling the framing dimensions. For example when one meter is framed between mil dots, the 3x to 9x ranges are from 200 meters to 600 meters. If two meters are framed between the dots or one meter is framed in the half-mil brackets, the scope ranges are doubled now. The doubled ranges are from 400 meters to 1200 meters. By doubling the

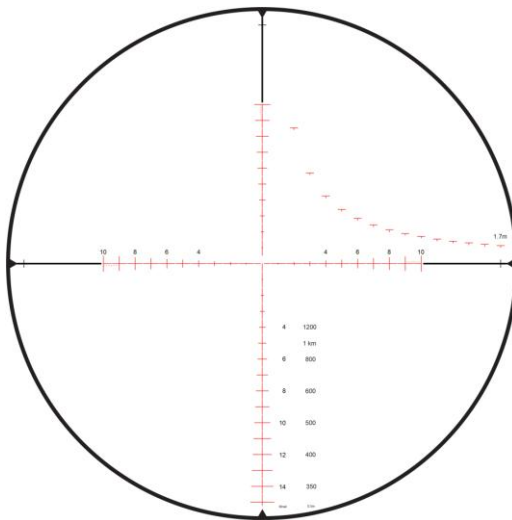
framing distance, you can easily double the range. Whenever you double the range, you can use the power readings as the range readings. You can directly read the range from the power reading in meters. You can use the same method to double the ranges with all other **No-Math Mil Dot** scope models.

## 2. Halving the Range

You can also halve the range by halving the framing dimensions. For example the 7x-30x ranges from 460 meters to 2000 meters when one meter is framed. By framing 1/2 meter instead of one meter, the range is divided by two to give 230 meters to 1000 meters.

The direct relationship of the framing dimension to the range allows a wider capability of the range determination. **It is that simple!! NO-MATH MIL-DOT !!**

## SECTION 8: MID TO LONG RANGE (MLR) RETICLE (4-16X only)

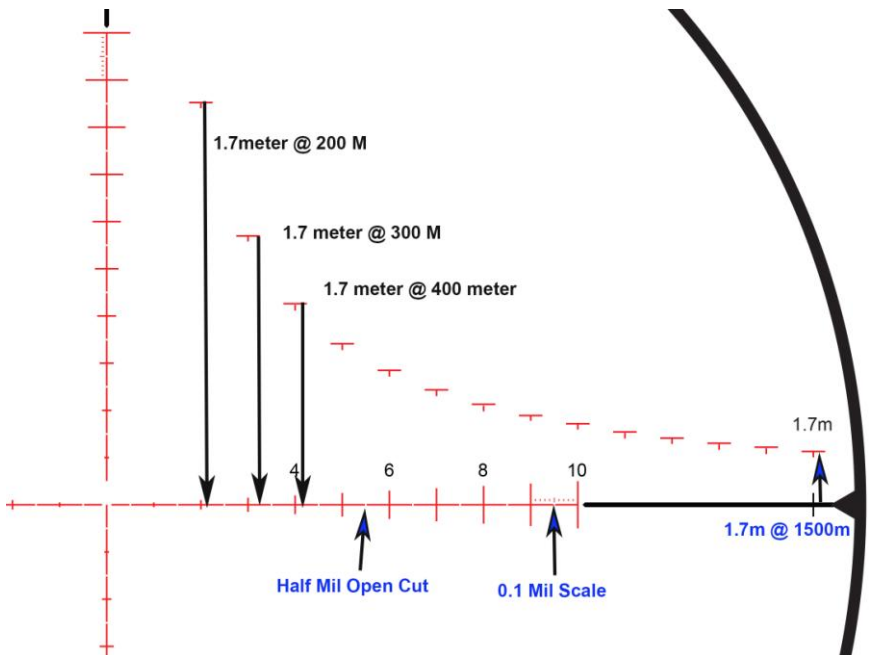


MLR Ranging Reticle

This is the Mid to Long Range (MLR) illuminated reticle. It comes in either red or green illumination. This reticle has a true mRad relationship at 10X. There are small spaces to indicate every half mRad increment. At the upper right quadrant there are 14 ranging brackets, which are used to frame 1.7 meters at 10X between the top line and the horizontal cross line. The ranging brackets from left to right are used to range targets from 200 to 1500 meters.

The ranging increases by 100 meter increments. At the lower right quadrant, the numbers 1200 to 350 are the ranges for framing a known size  $\frac{1}{2}$  meter target with the length of the horizontal mil reference bars at 10 X. The opening above the center cross is 0.5 mRad. The numbers 4 to 14 on the vertical crosshair and 4 to 10 on the horizontal cross lines are the measurements in mRad. The length of the 1<sup>st</sup> mil bar is 0.1 mil, the 2<sup>nd</sup> is 0.2 mil, the 3<sup>rd</sup> is 0.3 mil, and so forth up to the 14<sup>th</sup> which is 1.4 mil. The short black bars at both ends of the horizontal and top end of the vertical cross lines are the 15<sup>th</sup> mRad marking.

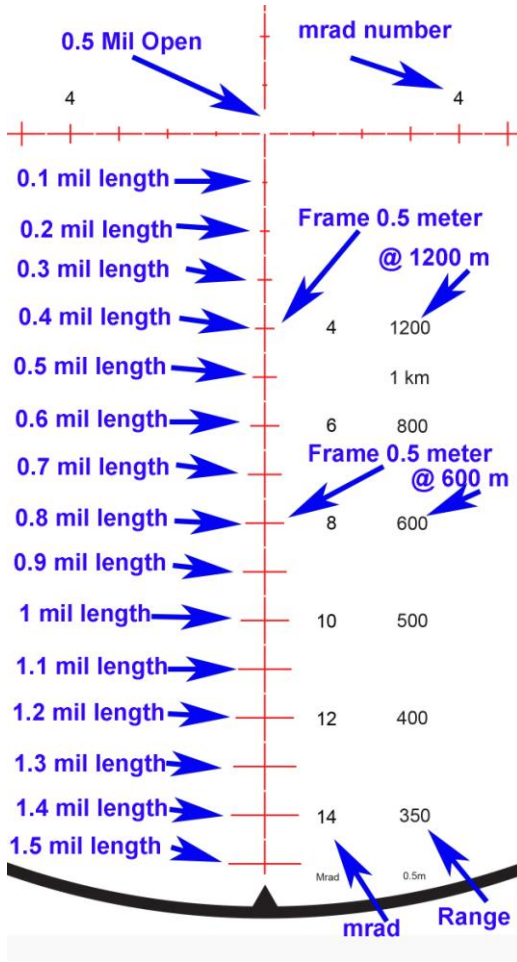
### 1) Right Side of the reticle



### Remarks:

The 14 brackets in the upper right quadrant are for the ranging purpose. The range is from 200 meters to 1500 meters.

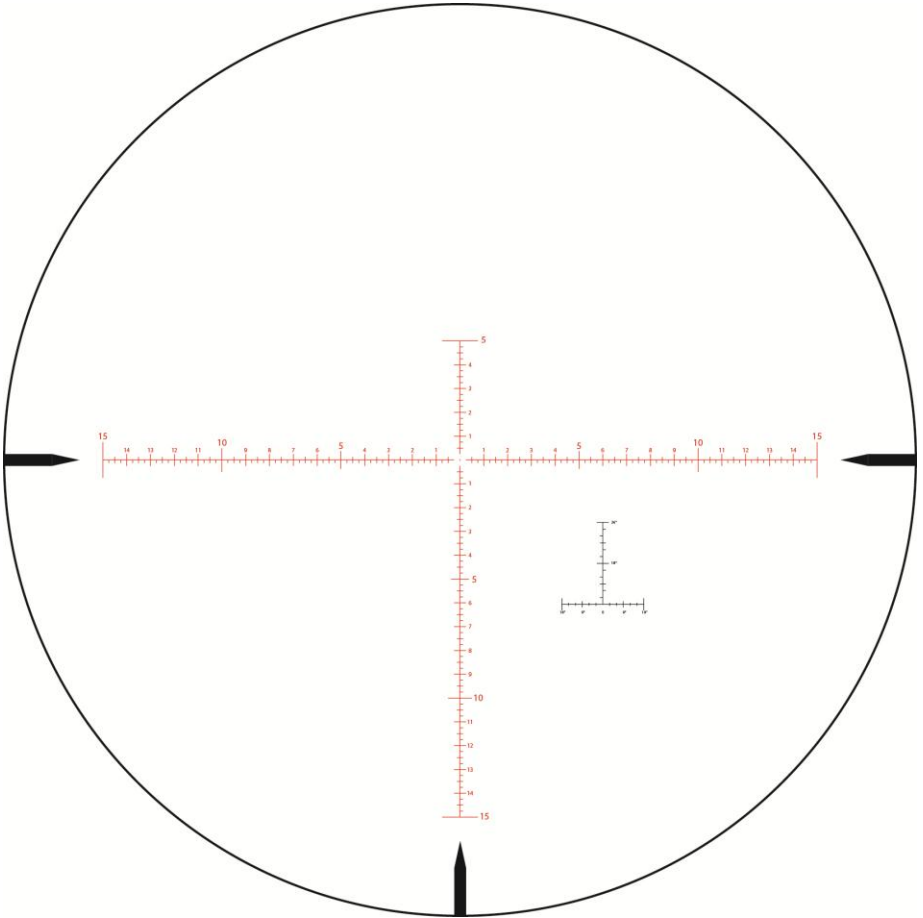
## 2) Lower Portion of the reticle :



### Remarks:

The two sets of the numbers on the right side of the lower vertical cross line are measurements in mRad and the distances for the estimated range, respectively. Using the short bar to frame the 0.5 meter target, you can read the appropriate range. The ranging capacity with this framing feature is from 350 to 1200 meters.

## SECTION 9: TP7-30X50 MOA RETICLE

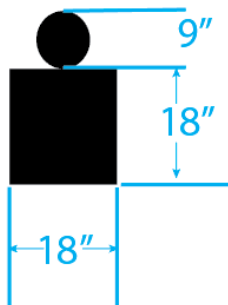


The new Top Angle 7-30X50mm MOA scope features a new MOA reticle for precision shooting. The Center features a 1/16 MOA dot. The center opening measures  $\frac{1}{2}$  MOA by  $\frac{1}{2}$  MOA. Both the horizontal and vertical crosshairs indicate quarter MOA subtensions.

The TP730X50 MOA reticle has a true MOA relationship at 28X. At 14X, the value of each reticle subtension is doubled. For example, the 1 MOA marking will be equivalent to 2 MOA of actual holdover at 14X. At 7X, the value of each reticle subtension is quadrupled.

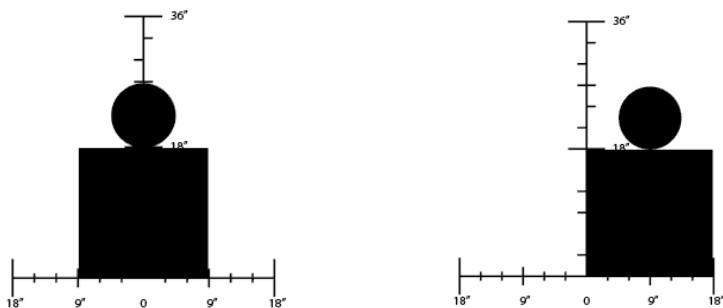
### 1) How to range using the Ranging Scale

Suppose we are shooting at a steel silhouette target that measures roughly 18" wide and 18 tall with a 9" head.



The Top Angle Scope series takes advantage of the second focal plane reticle for range finding purposes. By using the scale provided in the lower right quadrant, adjust the magnification ring until the target subtends its real size on the ranging scale.

For example, here is the steel silhouette properly framed on the ranging scale:



Both of these targets are properly framed in the ranging scale. Notice how the width of the silhouette roughly measures 18" and the total height of the silhouette measures 27". If the target you are trying to frame is too small, increase the magnification. If the target you are trying to frame is too large on the scale, reduce the magnification.

To determine the approximate range to the target, read the second set of numbers below the magnification ring. This number will be the approximate distance to the target in yards.

## **SECTION 10: MAINTAINING YOUR RIFLESCOPE**

Your scope, though amazingly tough, is a precision instrument that deserves reasonable and cautious care. For normal maintenance:

- A. Do not attempt to disassemble or clean the scope internally.
- B. The external optical surfaces should occasionally be wiped clear with the lens cloth provided or an optical quality lens paper.
- C. Keep the protective lens covers in place when the scope is not in use.
- D. Remove any external dirt or sand with a soft brush so as to avoid scratching the finish.
- E. Wipe the scope with a damp cloth, followed by a dry cloth.
- F. Then go over the metal portions of the scope with a silicon treaded cloth in order to protect the scope against corrosion.
- G. Store the scope in a moisture-free environment.
- H. Avoid storing the scope in the hot place, such as the passenger compartments of a vehicle on hot days. The high temperatures could adversely affect the lubricants and sealants. A vehicle's trunk, a gun cabinet, or gun safe is the preferred storage locations.
- I. Never leave the scope where direct sunlight can enter either the objective or the eyepiece lens. Damage may result from the concentration of the sun's rays (burning glass effect).
- J. The Top-Angle Focus is a precision adjustment for your scope. ALWAYS avoid hitting the turret with a heavy object, or bumping it against anything solid. When transporting your rifle with the scope installed, lay the rifle or the gun case containing the rifle, so the Top-Angle focus turret faces upward and not against anything solid, such as the flooring of your vehicle trunk. Never lay the rifle with the Top-Angle Focus turret facing down, or this may result in damage to parallax adjustment.

**WARNING:** UNNECESSARY RUBBING OR USE OF A COARSE CLOTH MAY CAUSE PERMANENT DAMAGE TO LENS COATINGS.

## **SECTION 11: LIMITED LIFETIME WARRANTY**

**Hi-Lux, Inc.** warrants its products against defects arising from faulty workmanship, or materials, for the lifetime of the **original purchaser**. Any attempt to alter, dismantle or change the standard specifications of the



products, will make this warranty null and void. This warranty is made to the **original purchaser** of the goods, and applies only to the products purchased in the United States. The warranty is not transferable. Warranty obligation is limited to the repair or replacement of any product returned to **Hi-Lux, Inc.**, which is determined by the manufacturer to have defects arising from faulty workmanship, or materials that adversely affect the satisfactory operation of the product. It should be noted that on items containing an etched glass reticle that the occasional appearance of some small particles is common and not a warrantable repair. We only have a two-year warrantee for the electronic components that are contained on the products. **Hi-Lux, Inc.** reserves the right to request proof of purchase and purchase date. To guarantee warranty service, the enclosed warranty form must be completed and returned within ten (10) days of purchase to establish all warranty rights between you, the original purchaser, and **Hi-Lux, Inc.** We assume no liability for any incidental or consequential damages, or incidental expenses. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusion may not apply to you. No warranties are made, or are authorized to be made, other than those expressly contained herein. To file a claim under this warranty, please contact the Customer Service Department of **Hi-Lux, Inc.** at (310) 257-8142 to obtain a Return Authorization number (RA number). After receiving your RA number, please mark the number on the outside of the package; enclose the defective item with a brief explanation of the problem. Please be sure to include your name, address and phone number. Failure to obtain a RA number may result in either refusal upon delivery, or lengthy delays for warranty repairs and service required for the item returned to us. All returns are to be shipped prepaid direct to **Hi-Lux, Inc.** including a check or money order in the amount of \$21 to cover postage and handling.

**Attn.:** Warranty & Service Dept.

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In the event of a non-warranty repair, you will receive an estimate prior to any work being done. This warranty gives you specific legal rights and you may have other rights, which vary from state to state. As defined by federal law, this is a limited warranty.



***We Lead the Way***