



Leatherwood/ Hi-Lux Inc

MULTI-DIAL™ SERIES

A Revolutionary Multiple Zero Scope

Designed and Patented by

Jim Leatherwood.

Patent No 6,772,550



RIFLESCOPE INSTRUCTIONS

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CONGRADULATIONS! You have just purchased what will very likely be the most versatile riflescope you will ever own! And one of the best built. Jim Leatherwood developed and patented the Multiple Zero scope system on which all other multiple-zero scopes are now based upon. So, it shouldn't come as any surprise that Leatherwood/Hi-Lux, Inc. is now offering the most compact and user-friendly scopes of this design.

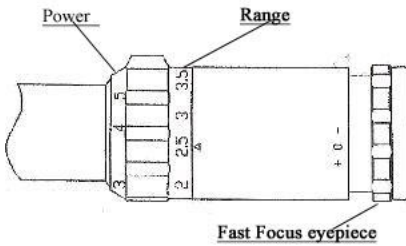
Here is a riflescope that's built to take on anything that Mother Nature can dish out. Leatherwood / Hi-Lux, Inc. Multi-Dial riflescope is **waterproof...fogproof...shockproof...recoilproof...and** pretty much foolproof. Here is a scope that can take more punishment than the shooter and hunter. If you can stand it, a Multi-Dial scope can stand it - and more.

This scope is designed and constructed to keep the elements out and sight settings on! The scope features include fully multi-coated lenses for the brightest and sharpest sight picture possible; tough and wear resistant finish for long lasting good looks; positive click adjustment windage and elevation that keeps this scope zeroed; all new "Posi-Trac" spring tension that insures positive scope adjustment; quick-focus eye-piece that allows easy multi-shooter use. The Leatherwood / Hi-Lux, Inc. Multi-Dial scope is built to meet the wants and needs of American shooters.

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SECTION 1: 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: EVER LOOK AT THE SUN WITH THIS PRODUCT OR EVEN THE NAKED EYE. IT MAY PERMANENTLY DAMAGE YOUR EYES.

SECTION 2: 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. The scope should be mounted as low as possible without touching either the barrel or the receiver. 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. Rotate the scope in the rings until the reticle pattern is perpendicular to the bore and the elevation turret is on top. 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 3: PRE-ZEROING

Pre-zero sighting can be done either manually or with a bore-sighting device. To bore sight manually, 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. If your scope has parallax adjustment, set it for the range to the target. Set the variable-power scope to low power. With the firearm in a rested position, remove the caps from the windage and elevation screws. Look through the bore and center the target in the bore. Adjust the windage and elevation screws to position the reticle on the center of the target. For

windage adjustment, turn the windage adjustment screw clockwise to move the point of impact **LEFT** and counterclockwise to move the point of impact **RIGHT**. 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. 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 4: 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.

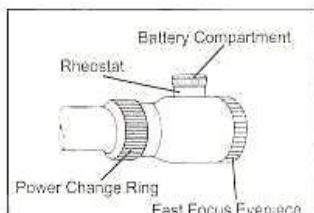
The zero range will depend on your hunting conditions. In general, if most of your shots will be at short range, zero-in at 100 yards. But, for long-range shooting at big game, most experienced shooters zero-in about three inches high at 100 yards. If the scope has parallax adjustment set it to the range to the target. Set variable-power scopes to the heist power. From a rested position, fire three rounds at the target. 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. Repeat as necessary.

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. 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 ½ minute indicated on the adjustments by 2 and the adjustment at 200 yards is 1 inch per click. For 400 yards, you would multiply ½ by 4 and that would give 2 inch per click and so on. Once the zeroing of the rifle is completed, you need to put the windage and elevation caps back to protect the zeroing from moving.

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

SECTION 5: SCOPES WITH ILLUMINATED RETICLE



If your scope has an illuminated reticle, you are able to use the rheostat to vary the brightness of the reticle. For best results in low light it is recommended to set the brightness as low as possible and still be able to clearly see reticle. The rheostat is located on eyepiece. The batteries, which are included with the scope, are coin style lithium batteries

CR2032 (3V). The battery is replaced by first moving the battery compartment cover located on the top of the rheostat adjustment. Then remove the old battery, insert the new one "+" side up and replace the cover.

SECTION 6: PARALLAX CORRECTION

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. Riflescopes equipped with parallax adjustment allow for parallax correction at various user-select ranges.

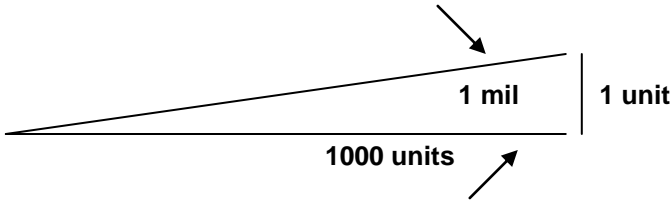
NOTE: THE LOCATION OF THE PARALLAX ADJUSTMENT MAY VARY BETWEEN MODELS. THE ADJUSTMENT MAY BE LOCATED EITHER ON THE TOP-ANGLE OR ON THE SIDE OF THE SCOPE. YOUR SCOPE MAY OR MAY NOT HAVE A PARALLAX ADJUSTMENT.

SECTION 7: NO-MATH MIL-DOT RETICLE USE

(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:

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



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. The range is determined by dividing the number of mils subtended by object by the actual width of the object in meters, then dividing that result into 1000 meters. 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 :

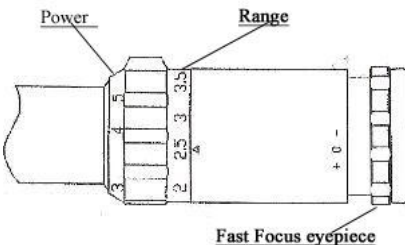
$$\text{Range} = 1 \times 1000/2 = 500 \text{ meters}$$

If the object is 1.5 meters tall and in the scope it fits between the center of 2 and 1/2 mil-dots, then the range solution is as :

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

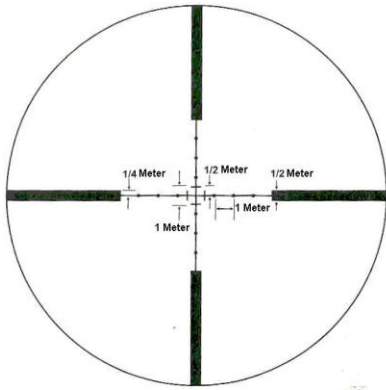
Doing the math necessary can become a problem under certain situations. For this reason we designed the NO-MATH MIL-DOT system.

(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.



As you can see the 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.

Figure 1. NO-MATH Mil-Dot Reticle

The **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.

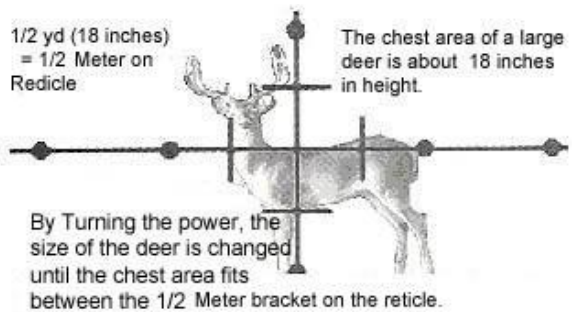


Figure 2 Framing

(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.

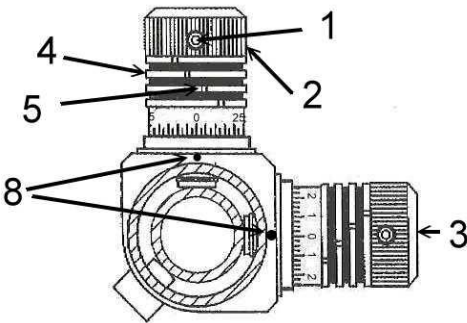
2. Halving the Range

You can also halve the range by halving the framing dimensions. For example the 3x-9x ranges from 200 meters to 600 meters when one meter is framed. By framing 1/2 meter instead of one meter, the range is divided by two to give 100 meters to 300 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: INSTRUCTION FOR ZEROING THE MULTI-DIAL SCOPE

Our new Multi-Dial is the most versatile scope ever invented. It can be used in at least 3 ways



1. As a multiple zero scope for a single load and each setting is for a different range.
2. As a multiple zero scope for different loads for a single cartridge, for example: a different zero for different bullet weights.

3. As a multiple caliber scope for use on a gun with different barrels of different calibers.

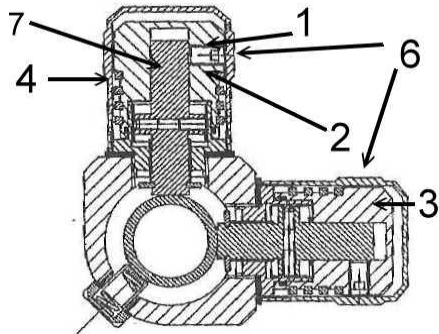
There are undoubtedly other uses that will become known as the scope enjoys more application. The procedure for zeroing in the scope is essentially the same no matter the way in which it is used. We will begin with the procedure that is the easiest:

Zeroing a single load at different ranges.

There is one graduated scale that is engraved on each knob (2,3) and 4 moveable indicators (4). This makes it possible to indicate 5 different ranges

with the vertical adjustment. The windage adjustment will be used in the conventional manner to secure a windage zero. For purposes of illustration, the ranges of 100 to 500 yds will be used.

- 1 After removing the knob covers (6), loosen the 3 setscrews (1) at the top of the elevation and windage knob. This disconnects the knobs from the adjusting shafts (7).



2. Raise each knob until there is a space about the thickness of a dime between the bottom of the knob and the scope body. Then retighten the setscrews (1). This is to give plenty of movement to the knobs to get an initial zero.
3. You should now zero the scope at 100 yds in the conventional manner using the windage and elevation knobs. Once zero is achieved be sure not to move the knobs and go to step 4.
4. Without moving the knobs (2,3), loosen the three setscrews (1) again. Be sure they are no longer locking the knobs to the adjusting shafts (7). Now turn the knobs until the zeros on the scales are aligned with the index marks (8) on the scope body.
5. Push each knob down until it bottoms against the scope body making sure the zeros are still aligned with the index marks. Now retighten the setscrews(1) in each knob. Now a zero can be established for 200, 300, 400 and 500 yds. This can be done either by actual shooting or using a ballistics table that shows the bullet drop for these ranges using a 100 yd zero. However the data is obtained, the correct setting is done as follows
6. For example: a 308-168gr. load has about 5 inches of drop at 200 yds. This means the scope needs to be adjusted up 2.5 minutes of angle ($5/2$) to hit dead-on at 200 yds (one inch equals about 1 minute of angle per 100 yds of range). Using a bullet point or some similar implement, each indicator ring can be rotated to the appropriate location by inserting the bullet point in the notch (5) in each indicator ring and rotating it about the knob. They are friction tight: similar to piston rings. Therefore the first ring would be rotated until the center of the notch (5) is above the first mark past the two

on the scale on the knob. Actual shooting should produce the same result and the 200 yd zero will be the first mark past the 2.

7. The remaining rings are set in turn for 300, 400 and 500 yds in the same manner.

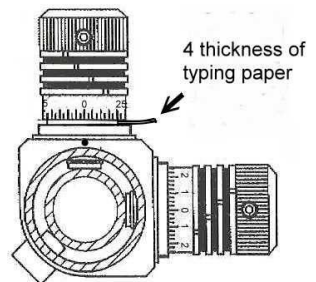
Zeroing a single cartridge with different loads **Or different barrels on the same rifle**

There is one graduated scale that is engraved on each knob (2,3) and 4 moveable indicators (4). This makes it possible to indicate 5 different zeros with the vertical adjustment and windage adjustments.

For purposes of illustration, the range of 100 yds for a zero will be used.

1. After removing the knob covers (6), loosen the 3 setscrews (1) at the top of the elevation and windage knobs. This disconnects the knobs from the adjusting shafts (7).
2. Raise each knob until there is a space about the thickness of a dime between the bottom of the knob and the scope body. Then retighten the setscrews. This is to give plenty of movement to the knobs to get an initial zero.
3. You should now zero the scope at 100 yds in the conventional manner using the windage and elevation knobs. This should be done using your first load or barrel. Once zero is achieved be sure not to move the knobs and go to the next step.

4. Since other loads or barrels may be above or below or left and right of the present load or barrel, it is necessary to retain some movement in either direction with the knobs. A precise way to do this is first loosen the setscrews (1) taking care not to move the knobs. Place a piece of writing paper folded twice (4 thicknesses) between the bottom of each knob and the scope body. This will give about 1/3 turn past the zero mark but still not allow a full



turn. This should be enough to cover the different impact points. Remember different loads may have different windage as well as different elevation settings, so you will need to do this for both knobs. Now turn the knobs until the zeros on the scales are aligned with the index marks (8) on the scope body. Push each knob down until its bottoms against the paper spacer Retighten the setscrews (1) in

each knob. The paper spacer can now be removed by turning the knobs and freeing the paper spacer.

5. Next a zero can be established for the other loads or barrels. Both elevation and windage will possibly change for each load or barrel. This should be done by actual shooting.
6. Using a bullet point or some similar implement, each indicator ring (4) can be rotated to the appropriate location by inserting the bullet point in the notch(5) in each indicator ring and rotating it about the knob. They are friction tight: similar to piston rings. Therefore the first ring would be rotated until the center of the notch (5) is above the next zero point for the load or barrel being used. It is recommended that some notation be made as to what ring is what load or barrel.
7. The knobs will accommodate up to 5 different loads or barrels.

Note: The elevation knob has 30 minutes of movement in one rotation and is not blocked to just 1 turn in the up direction. This allows a shooter to adjust past one full turn up but still know where his bottom zero is. However the knob is blocked to not rotate a full turn beyond the bottom zero. So if there is any doubt that the knob is on the correct mark, it can be screwed all the way down and then back up to the correct mark. If a zero point is desired that needs more than one full turn up then the shooter needs to make a notation for reference that shows that this is the case.

SECTION 9: MAINTAINING YOUR RIFLESCOPE

Your scope, though amazingly tough, is a precision instrument that deserves reasonable cautious care. Do not attempt to disassemble or clean the scope internally. The external optical surfaces should occasionally be wiped clear with the lens cloth provided or an optical quality lens paper. Keep the protective lens covers in place when the scope is not in use, Remove any external dirt or sand with a soft brush so as to avoid scratching the finish. Wipe the scope with a damp cloth, following with a dry cloth. Then go over the metal portions of the scope with a silicon treaded cloth in order to protect the scope against corrosion.

Store the scope in a moisture-free environment. Avoid storing the scope in the hot place, such as the passenger compartments of the vehicles on hot days. The high temperatures could adversely affect the lubricants and sealants. A vehicle's trunk, a gun cabinet or a closet is the preferable. Never leave the scope where direct sunlight can enter either the objective or the eyepiece lens. Damage may result from the concentration(burning glass effect) of the sun's rays.

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

SECTION 10: 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.**, and which are determined by the manufacturer to 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 one-year warranty 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 \$15 to cover postage and handling.

Attn.: Warranty & Service Dept.

Hi-Lux, Inc.

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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.