WR ELR ADJUSTABLE SCOPE BASE MOUNT – GEN 2
USER MANUAL

Rev: 20210601

The Waters Rifleman Gen 2 ELR Sight Base – showing both the MIL-RAD and MOA version.

INTRODUCTION

Thanks for purchasing the Generation 2, WR ELR Pro adjustable scope mount, by David Waters.

9 years in the making (starting back in 2011) and after 3 years of use, the Generation 1 unit proved the principles correct. Thanks to some constructive suggestions that has been received by some of the best shooters in the world, the Generation 2 is now available.

Before using this mount, there are some VERY IMPORTANT realisations one must FIRST consider. Such realisations are highlighted in this manual, so please read and study carefully.

Sure, anybody can fit this mount and start using it. But, paying due attention to the details of the mount and the geometries it creates, you'll have a much greater chance of earlier success.

STEP 1 – KNOW THE MOUNT.

This mount looks simple enough, but there are some subtle points that must be first realised. Operating this mount without understanding may give unexpected results that create the perception that something is wrong with the mount.

The ELR mount basic function is simple…undo the rear screw, move the mount up or down by the incremental steps on the rail positioning bar, then simply tighten the rear screw. The rear screw locks the saw tooth on the block into the saw tooth at the rear of the pic rail positioning bar.

Base is all made from 7075 alum to ensure the mount is as strong and tough as it possibly can be.

Tuning is needed, which we'll get to. Sure, one can ignore it, but if cold bore shots count and the score is king, then tuning should be done.

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STEP 2 – MAKE SURE THE MOUNT IS COMPLETE AND MAINTAINED

This precision instrument needs to operate within certain conditions, otherwise the tolerances may change.

a) Keep the mount clean and free of foreign matter. The mount is easy to disassemble and clean. Use any typical cleaning product from a light hydrocarbon, brake or carby cleaner to soap and water (dry thoroughly). Use common sense.
b) Be sure the hinge at the front is lubricated. Do NOT leave it dry under use. Use any fine oil you wish. Potential of hydraulic lock will be removed once tightening the locking screw.
c) Ensure the front left venting hole to the hinge is clear. This hole is to allow the addition of oil, and the run-out of excess oil.
d) Remove any foreign material from the saw teeth of both the locating block and pic rail positioner (hint: used toothbrushes seem to work well).
e) Ensure all Stainless Steel screws are kept tight while unit is in use. Be sure they retain a fraction of anti-seize on the threads to prevent natural binding between the stainless and aluminium.

STEP 3 – MOUNTING THE BASE AND SCOPE

Mounting the ELR base is just like mounting any pic rail accessory. One must give consideration to the distance along the rifle pic rail to lock the mount on to. A starting point would be to locate the ELR base roughly in the same position as the existing rifle pic rail, then later move farther forward or backwards as desired (some base overhanging the rifle pic rail is fine).

The scope should be mounted for the desired eye relief to suit your firing position (sitting, prone, supported, off a bench, etc). Trial and test this before locking things in place.

This mount can adjust up to considerable height (240MOA and 80MIL (possibly more but not recommended)). At maximum setting, the muzzle of an average length barrel pointing at a considerable angle into the air.

One must pay attention to muzzle angle and that any front portion of the barrel (and any muzzle accessories) may enter the visual axis of the rifle sighting system (causing distraction, reduction in visual clarity, axial error, possible distortion, etc). This is exacerbated when using an extremely long and/or large diameter barrel. One must consider the finish height of the scope by considering ring heights, riser bars, mounting pic rails, etc.

The mount assembly is approx. 1.25" (32mm) high, which is usually high enough on a factory action/receiver with a typically 10-11mm high receiver pic rail and average 12mm boss height rings when on a rifle with a 30" barrel.

CUSTOM CHANGE, FOR BEST MOUNTING

The pic rail is left long for modern day long scopes. However, if the long rail is excessive, the front extra length can be cut off with a regular metal saw (polish and finish as desired).

STEP 4 – ADJUSTING THE ELEVATION

This is where the WR ELR Pro Base comes into its own…the ease and speed to adjust **precisely** to shoot from very close distances to extra-ultra-long distances…repeatable precision.

a) Undo the rear socket cap screw using a Hex/Allen key. Wind out the socket cap screw until the saw tooth block comes free from the pic rail positioner bar.
b) Hold the scope carefully between the scope rings (do not lever using the front or rear of scope) and tilt the scope up or down to the desired elevation level by aligning the rail positioner desired laser engraved elevation incremental graduation lines laser.
c) Tighten the screw on the rear TIGHT. Note, the elevation incremental lines will move up as the mount is locked up – this is normal (and consistent).

NOTE, when the mount is at zero (all way down at bottom) then the locking screw is tightened, the pic rail riser bar actually lifts slightly off the bottom of the base. This is intentional, for reasons of resonance and consistency from bottom position to all elevated positions.

STEP 5 – ZERO'ING WINDAGE ON YOUR SCOPE

After the mount is fitted to the rifle, one must perform some zero checks and adjustments.

The ideal windage situation for most any setup is the scope being at centre of windage travel and the bullet strikes at windage centre of the aiming mark. But, this is very rare, so adjustments should be made.

TEST WINDAGE ON THE RIFLE WITH THE BASE…

a) Setup a large target 100 or so yards away, with lots of splash area around it. Have a nice profound aiming mark that can easily be seen with the naked eye from the 100 yards.
b) Have the scope setup on the gun with the WR ELR base, ensuring no issues with the assembly – eg. The pic rail is correctly interconnected, cross bolts are in pic grooves, etc.
c) Set scope windage to middle of adjustment range (count clicks, look at reference lines, etc).
d) Make appropriate adjustments to elevation based on your rifle setup (eg. You may have a tapered pic rail, etc to consider). Elevation is not really a big concern just at the moment…but we don't want the barrel pointing a long way off the target at the 100 yards.
e) Using the scope, sight align to centre of the aiming mark. Then, bore sight the target from the rear of the barrel/receiver. At 100 yards, the aiming mark may appear high or low but elevation is not a concern at the moment. Where is the aiming mark in terms of windage? Can you see the aiming mark through your bore? If you can see the aiming mark, you are close, which is good. If not, you need to take some corrective action (see section below on "Windage Corrective Action").
f) Fire 2 or 3 shots at the target and check how far left or right the shots impact from the point of aim. If impacts were within a reasonable number of clicks on the scope then it's job done, and your windage is set.

If you are NOT happy with the windage, read on to STEP 5 (part B), otherwise skip to 6.

STEP 5 (part B) - WINDAGE CORRECTIVE ACTION (skip this step if not needed after previous step)

This section is only relevant if there are issues with the windage so far off when scope is at centre of its windage. Some testing is needed…

Remove the WR ELR base and let's check the native rifle and scope. Have the scope fitted directly to the rifle using the same scope rings and receiver pic rail that were used with WR ELR base.

First establish a baseline windage for your rifle with a conventional scope setup. Work out how far off windage centre your rifle is printing. Do some bore sighting and some close range live fire to verify alignment?

When scope mechanical windage is set to zero, how far left or right is the scope from windage zero?

If more than a few minutes, take typical corrective action to pic rail, rings, etc. The rifle rail or rings may be the cause of the windage being so far off. Even if they are not, they are probably the cheapest and easiest items to get close to a natural windage zero. Take steps necessary before trying to incorporate a WR ELR base (but note, the WR base may also help, so don't make permanent changes if they are not reversible.

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If your WR ELR base is fitted and you only need 5 to 10 MOA of windage to get to an “acceptable” windage alignment that is correctable with the scope, then the ELR base does have a few windage minutes available. It may be a suitable way to get the scope to a reasonable centre windage zero.

The ELR base pic rail and rail positioner are 2 separate pieces, held together by 5x assembly screws. The pic rail uses the rear tang of the rail positioner as the recoil lug for the rail. With clearances around the 5x assembly screws, each screw can be backed off, allowing angling of the rail to a desired angle.

a) Loosen the rear lockup screw.
b) Remove the front cross bolt that goes through the front of the rail positioner bar.
c) Remove the rail positioner and pic rail sub-assembly.
d) Turn the rail positioner upside down to get access to the 5x pic rail joining screws.
e) Simply slacken these 5x screws.
f) With a small amount of force, swing/offset the alignment of pic rail to one side of the rail positioner. The actual direction and amount of angle depends on your needs.
g) Hold the new offset pic rail and rail positioner and tighten the screws firmly. YOU MUST ENSURE THE PIC RAIL IS HARD BACK ON THE RAIL POSITIONER RECOIL LUG.
h) Assemble and tighten (do not over-tighten) all screws for a firm assembly.
i) Live fire test for zero with new adjustments. Repeat process if or as necessary.

At this point, this should offer enough windage.If more windage is needed, it is possible to achieve this by modification to the increase the size of the thru holes in the rail positioner. Such as modification is at own risk. OR, more precisely, elongating the holes in the desired direction to gain more MOA offset and keep possible movement to a minimum. This should be done with a lot of consideration and care. Perhaps take to a reputable and seasoned gunsmith?

STEP 6 - TEST ELEVATION ON THE RIFLE WITH THE BASE…

Similar steps as the windage Step 6 process…

a) Setup a large target with lots of splash area around it 100 yards or so away. Have a nice profound aiming mark that can easily be seen with the naked eye from the 100 yards.
b) Have the scope setup on the gun with the ELR base AND your new ELR base setup windage zero.
c) Set scope elevation to middle of adjustment range (count clicks, look at reference lines, etc).
d) Look through the scope and sight align to centre of the aiming mark. Then, bore sight the target from rear of barrel. If you can see the aiming mark height in the bore, then that is well within a decent range and should be fine to start getting a solid zero with live fire.

e) Due to the height of the base, we need to ensure there is no false positive with elevation. Move back to 300 yards, or a little farther is fine. Shoot at the target and take steps to adjust elevation accordingly – adjust the ELR base, adjust the scope, adjust the pic rail or use a pic rail with taper (or no taper) built in, etc.

Once you have your elevation zero for a base distance, be sure to record the details in a way you understand and can repeat.

STEP 7 – GETTING TRUE CALIBRATIONS

The mount is either indexed in 30MOA or 10MIL-RAD increments. However this can vary from true value increments based on many things, such as bullet yaw, barrel bends, actual to relative target face angles to the bore axis and bullet arc at target entry, etc. One should check the indexing of the base against a tall target at varying and accurately known distances with allowance for target face incline angles, then take measurements to calculate zeros accuracy.

There are lots of tests that can be done at short distances on tall targets to check the base elevation, however they are actually very complex and require a lot of math. For example, one may wish to use a tall target at 25 yards, however, testing the whole 240MOA or 80MIL-RAD at 25 yards will see a deterioration of actual zeros due to bullet tangent and ark, true target to bore alignment angles, etc. If one wishes to do a short range increment test at short distance to a degree of accuracy, one should layout the scenario with accurate distances and target face angles for the given elevation for reliable results.

The winding of the scope elevations will not actually equal the base elevations when nearing the middle of the ELR base range. The main reason is the ELR base is actually changing the mechanical alignment of the rifle to the optical axis – where a scope is changing the path of light coming through it that can cause illusion. Don’t rely on 90MOA on a scope being equal to 90MOA on the base.

There is no substitute for putting the base on the gun, getting a good windage and elevation zero baseline, then actually shooting out to extreme distances, say incrementing in 200-300 yards and noting the settings. If the conditions are favourable, this is as true as you can get (excluding some environmental issues such as Coriolis, mirage, etc).

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