MBS-AA BORELIGHT

Technical Manual

STEINER
Nothing Escapes You

MBS-AA BORELIGHT

VISIBLE RED LASER FOR BORE SIGHTING

TABLE OF CONTENTS

SAFETY SUMMARY

Warning: Laser Light

The MBS-AA borelight emits a laser light when activated that has been determined to pose a risk of eye injury. In order to avoid the possibility of injury, please adhere to the following warnings:

• Avoid looking directly into the laser beam.

• Do not look directly at the laser light using scopes or binoculars.

* Avoid shining the laser onto reflective surfaces.

* Do not direct the laser into the eyes or face of persons or animals.

* Observe all safety precautions with the laser that you would observe with a loaded firearm.

RULES FOR SAFE USE OF THE MBS-AA

ALWAYS use the factory supplied inserts and insert retaining screw.

ALWAYS when trueing the MBS-AA in the bore of the weapon turn the device in a clockwise direction.

ALWAYS when finished boresighting the weapon make sure that the insert and the retainer screw did not become detached in the barrel of the weapon.

ALWAYS remove the borelight from the weapon as soon as you have finished aligning the sight.

ALWAYS take your weapon to the range and test fire it to confirm proper sight alignment after using the borelight.

ALWAYS assume that the sight alignment calculated using the borelight is only an approximation of the actual impact point where a bullet will strike the target.

NEVER boresight a loaded gun.

RULES OF FIREARMS SAFETY

ALWAYS keep the gun pointed in a safe direction.

ALWAYS keep your finger off the trigger until ready to shoot.

ALWAYS keep the gun unloaded until ready to use.

ALWAYS be sure the gun is safe to operate and the barrel is clear of any obstruction.

ALWAYS use the proper factory made ammunition for your particular gun.

ALWAYS know your target and what is beyond it.

ALWAYS wear eye and ear protection when shooting.

ALWAYS store guns and ammunition in separate locked containers so they are secure and not accessible to children or unauthorized persons.

ALWAYS treat every gun as if it were loaded.

NEVER use alcohol or drugs before or during handling a gun.

NEVER bring a loaded firearm into a building.

NEVER transport a loaded firearm.

CHAPTER I – INTRODUCTION

USAGE

Please read this instruction manual before you attempt to use the MBS-AA borelight. While reading the manual pay special attention to items in bold text addressing WARNINGS and possible DANGERS associated with the improper use of the borelight product.

PRODUCT DESCRIPTION

The MBS-AA Borelight is a precision laser instrument used to align optical scopes, open sights and laser aiming devices. This manual contains sections relating to the operation, maintenance and troubleshooting of the MBS-AA borelight.

1-1 GENERAL INFORMATION

A. Equipment Name

MBS-AA Borelight

SECTION 1-2 GLOSSARY

Aiming Point	The exact point on the target that you wish to hit.
Axis of the Barrel	A straight line from the center of the weapon barrel to the target.
Bore	The inside of the weapon barrel.
Bore Rod	A part of the borelight that fits into the bore of the weapon.
Danger	Conditions or procedures that must be observed to avoid the risk of serious injury or death.
Elevation	Vertical (up/down) movement of a sight.
Insert	The plastic part used to configure the borelight for aligning different calibers of weapons.
Insert Retainer Screw	The screw part used to attach the insert to the bore rod.
Windage	Horizontal (left/right) movement adjustment of a sight.
Warning	Conditions or procedures that must be observed to avoid damage to equipment or risk of injury to persons.
Zero Point	The point on the target where the bullet will hit if the sight has been properly adjusted.

SECTION 1-3 EQUIPMENT CHARACTERISTICS AND FEATURES

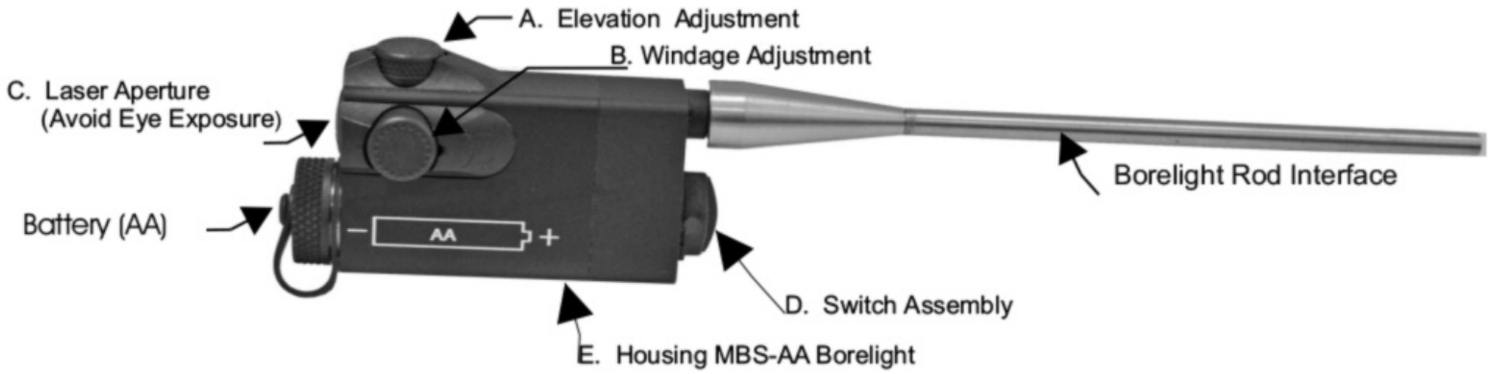
A. Characteristics of the Laser Borelight

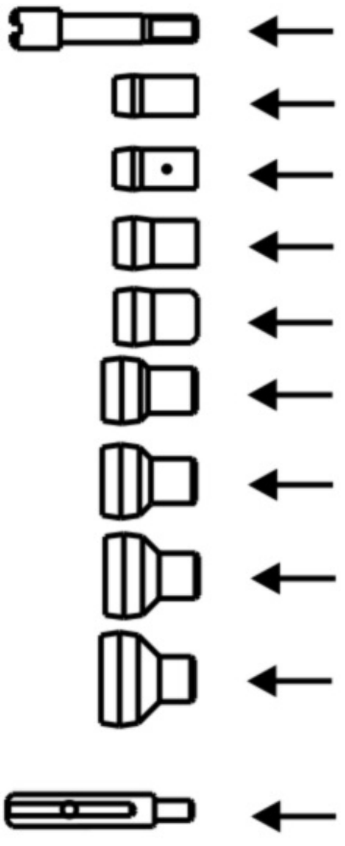
The borelight operates by projecting a laser light from the bore of the weapon to a target located at a known distance from the barrel of the weapon (usually 10 to 50 yards).

B. Features

- Battery powered using a 1.5-volt AA battery.
- Output Power: <5 mW
- Can be used in cold weather to -10° or 0°F.
- Withstands high temperatures to +50° or 123°F.
- May be stored without batteries at temperatures between 40° and 80°C.
- Can be used at high altitudes to 10,000 feet.
- Offers an estimated 7,500 alignment activations before mean failure (not including batteries and inserts).
- External adjustments for zeroing the borelight before use.
- Momentary Switch
- Optional On/Off Rocker Switch (kill Switch or Position On Switch)

SECTION 1-4 LOCATION AND DESCRIPTION OF MAJOR COMPONENTS





G. Insert Retainer Screw Only

H. Insert .30 CAL/.30-06/.308 CAL/7.62mm

H. Insert .270 CAL/7mm

H. Insert .22 CAL/.223/5.56mm

H. Insert .223 CAL/5.56mm OVERSIZE

H. Insert .38 CAL/.357 CAL/9mm

H. Insert .40 CAL/10mm

H. Insert .44 CAL/.45 CAL

H. Insert .50 CAL

(OPTIONAL)
Metal Spring Insert .22/.223/5.56mm

A. Elevation Adjustment

The elevation adjustment knob is used to adjust the laser on a horizontal plane. Each click moves the beam one-half of the diameter of the laser point on the target.

B. Windage Adjustment

The windage adjustment knob adjusts the laser for elevation. Each click moves the beam one-half of the diameter of the laser point on the target.

C. Laser Aperture

The point where the laser light is emitted. Avoid direct eye exposure to the laser light projected from this aperture.

D. Switch Assembly

The borelight is activated using the rotary switch located on the rear of the housing.

E. Housing

The body of the borelight that contains the battery, windage and elevation adjustments and the laser.

F. Mandrel

The stainless steel rod used with the appropriate barrel insert to center the borelight in the barrel.

G. Insert Retainer Screw

This is the metal screw assembly that is used to attach an insert to the bore rod.

DANGER: Never use the borelight without the Insert Retainer Screw.

H. Inserts

The plastic parts affixed to the bore rod with the Insert Retainer Screw. Each insert is sized to fit a specific caliber of barrel. Diagram below shows location of each insert within box package.

Insert Retainer Screw	.22/.223/5.56 mm	Oversize .223/5.56 mm	7 mm	.30/.308/ 30-06/7.62 mm
.38/.357/9 mm	.40/10 mm	.45	.50	Optional Metal Spring Insert .22/.223/.5.56

1-5 PRODUCT SPECIFICATIONS

A. Mechanical Specifications

Weight w/battery	5.4 oz. (153.1 grams)
Length (with bore rod)	9.25 inches (23.5)
Housing Material	Aircraft aluminum 6061T-6
Bore Rod Material	Tempered stainless spring steel 420
Insert Material	Specially engineered plastic
Windage & Elevation	Repeatable in .4 milliradian increments

B. Electrical and Optical Specifications

Switch	Rotary (3 position: On, Off, TRN)
Battery Type	1.5-volt AA
Battery Life	Up to 8 hours
Laser Type	Laser diode
Wavelength	Red: 635 nm
Optical Power Output	<5 mW
Laser Classification	Class IIIa
Beam Color	Red
Spot Size at 24 Meters	8 mm in diamater

C. Performance Specifications

Waterproofing	Waterproof to 10 feet (3 meters)
Maximum Altitude	>10,000 feet
Maximum Storage	40° to +85°C without batteries
Temperature	-40° to +60°C with batteries
Operating Temperature	-10° to +50°C
Reliability	Estimated to offer a minimum of 7,500 alignments, or 2,500 hours of continuous operation (excluding batteries & inserts)

CHAPTER II – OPERATING INSTRUCTIONS

Section 2-1 General

This chapter provides directions for the assembly of the borelight; insertion of the borelight into the weapon; checking the borelight for alignment; trueing the borelight and using the borelight to align weapon sights.

Section 2-2 Assembly and Preparation for Use

A. Installation of the Battery

1. Unscrew the battery cap from the Laser Housing.
2. Install a single 1.5-volt AA battery in the direction shown on the housing. See Figure 2-1 below.
3. Reattach the Battery Cap.

Figure 2-1

B. Attaching the Bore Rod

1. Select the appropriate bore rod for the weapon to be aligned -- long is used for aligning rifles and the short is used to align pistols and some sub-machine guns.
2. Attach the proper bore rod assembly by carefully threading it into the rear of the Switch Assembly. Tighten securely. See, Figure 2-2.

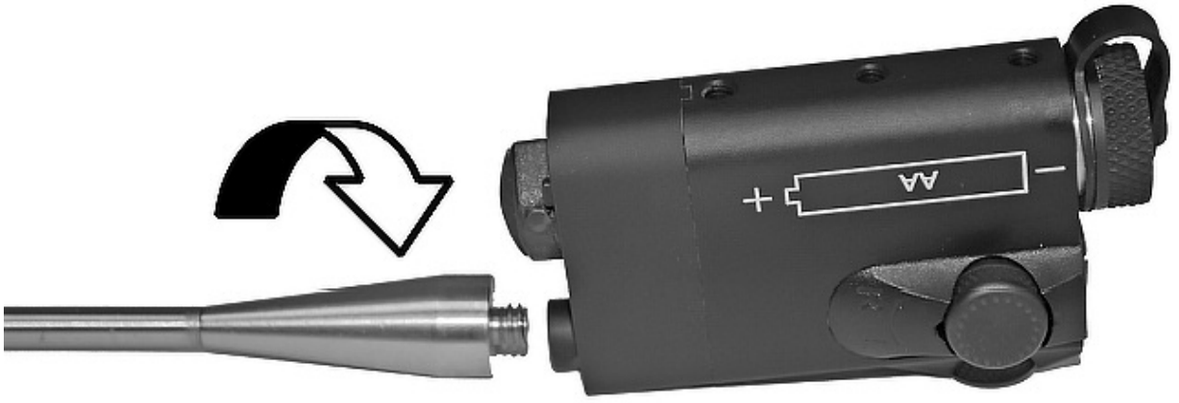


Figure 2-2

C. Installing the Insert

1. Select the appropriate insert for the weapon to be aligned.
2. Slip the appropriately sized insert onto the Insert Retainer Screw. The widest end of the insert is slipped onto the Insert Retainer Screw first. See Figure 2-3 below.
3. Install the Insert Retainer Screw by threading it into the hole bored in the shaft of the bore rod. Warning: Make sure not to cross-thread the Insert Retainer Screw.

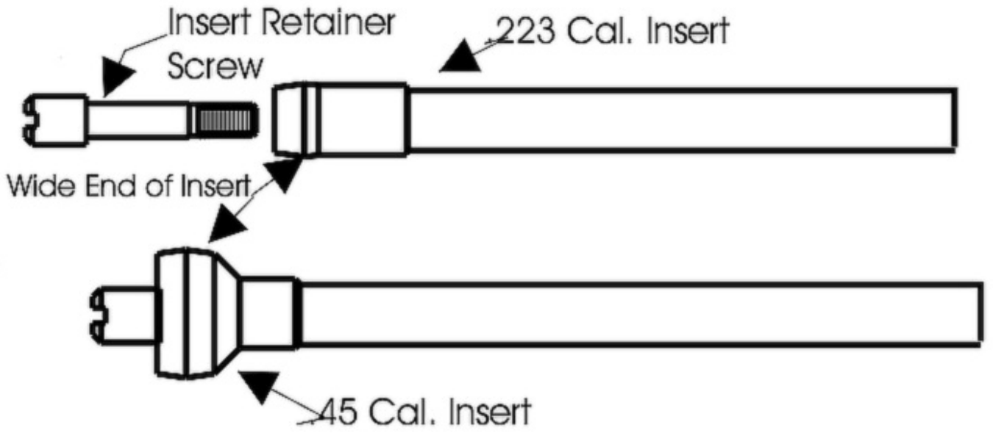


Figure 2-3

4. Once the Insert Retainer Screw is seated against the bore rod use a cartridge case, coin, screwdriver or knife blade to lightly tighten the Insert Retainer Screw. See Figure 2-4 below. **DANGER: Failure to properly install the Insert Retainer Screw on the bore rod may result in the insert coming loose and lodging inside the barrel of the weapon.**

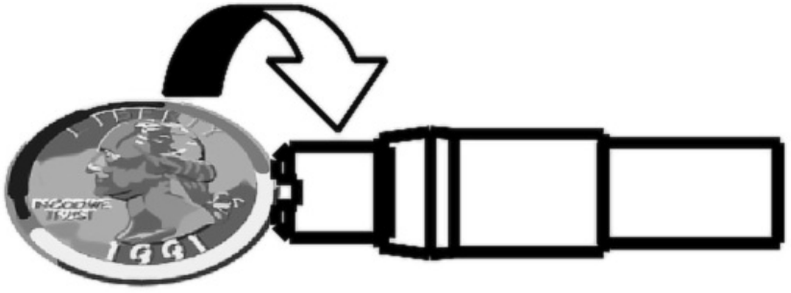


Figure 2-4

D. Mounting the Borelight into the Weapon Barrel

1. Confirm that the appropriately sized insert is securely attached to the interface rod using the Insert Retainer Screw.
2. Grasp the borelight and insert the bore rod into the bore. Note: A properly sized insert should offer a firm fit. If the insert cannot be inserted into the barrel of the weapon with firm pressure, then confirm that the appropriately sized insert was installed on the bore rod. Likewise, if the bore rod slips into the bore without any pressure being applied, then the insert may be too small.
3. Firmly press the bore rod into the barrel of the weapon until the tapered or cone shaped area of the bore rod contacts the bore.

WARNING

Apply force in a straight line with axis of the barrel to avoid the possibility of bending the bore rod or the Insert Retainer Screw.

Section 2-3 Checking the Alignment of the Borelight

1. Measure the range you intend to boresight your weapon.
2. Mount the weapon to be aligned on a bench or use sandbags to steady the weapon. The weapon must be mounted level or parallel to the floor.
3. Activate the borelight by rotating the switch to the ON position.

Warning: Make sure the borelight and weapon are pointed in a safe direction.

4. Place the boresight target down range at the distance you intend to boresight your weapon (usually 10 meters).
5. Adjust the target position until the laser point is directed to the Center Point of the target. The Center Point of the target should be at the same height as the borelight.
6. Rotate the borelight 90 degrees in a clockwise direction.
   See Figure 2-5.

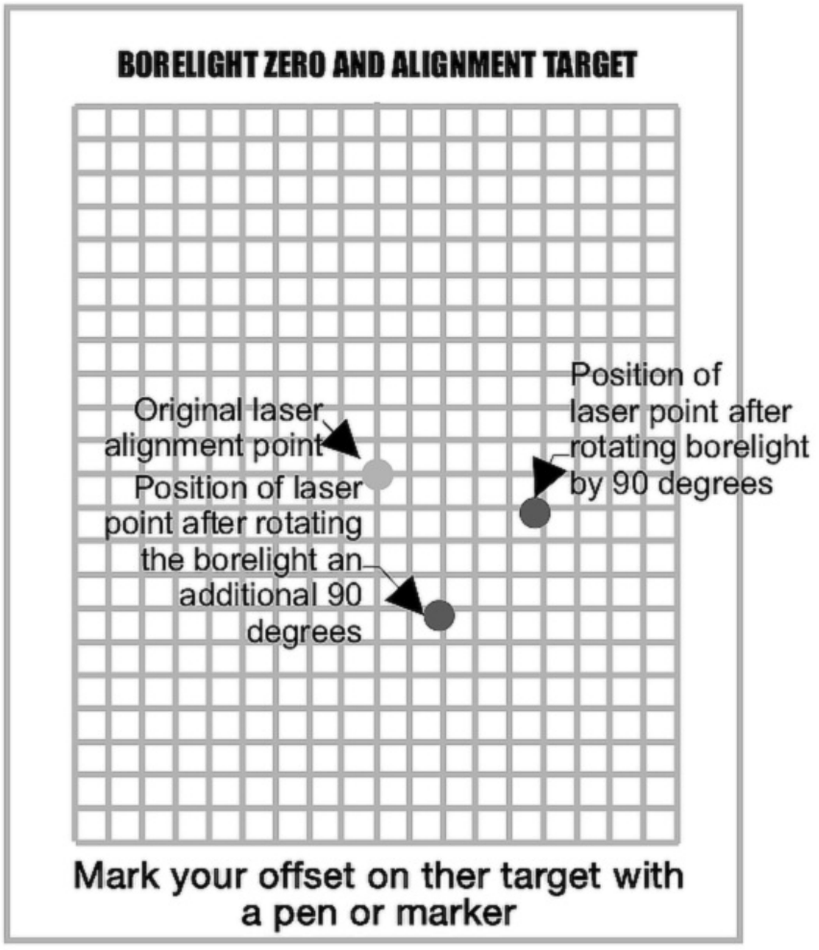


Figure 2-5

7. If the laser point moves off of the center point marked on the target, mark the new position of the laser point. See Figure 2-5. If the laser point does not move from the Center Point, then you may proceed to Section 2-2, Boresighting Procedures. If the laser point traces a circle on the target, then the borelight has not been properly adjusted. See 8. to 11. Below
8. Rotate the borelight again by an additional 90 degrees. At this point the Elevation Adjustment Knob should be facing down. This is 180 degrees from the starting point. See Figure 2-5. Mark the new position of the laser point on the target.
9. Next, mark the point that is exactly one-half the distance between the two points marked in Steps 7 and 8 above, the "Center Point". See Figure 2-6 below.
10. Without moving the borelight, adjust the windage and elevation knobs until the laser point rests on the Center Point.
11. Adjust the boresight target so that the laser point is realigned on the Center Point of the target. Next, repeat Steps 6, 7, 8 and 9 as necessary. **NOTE: The borelight should remain on or very close to the center of the target when the unit is rotated in the barrel of the weapon.**

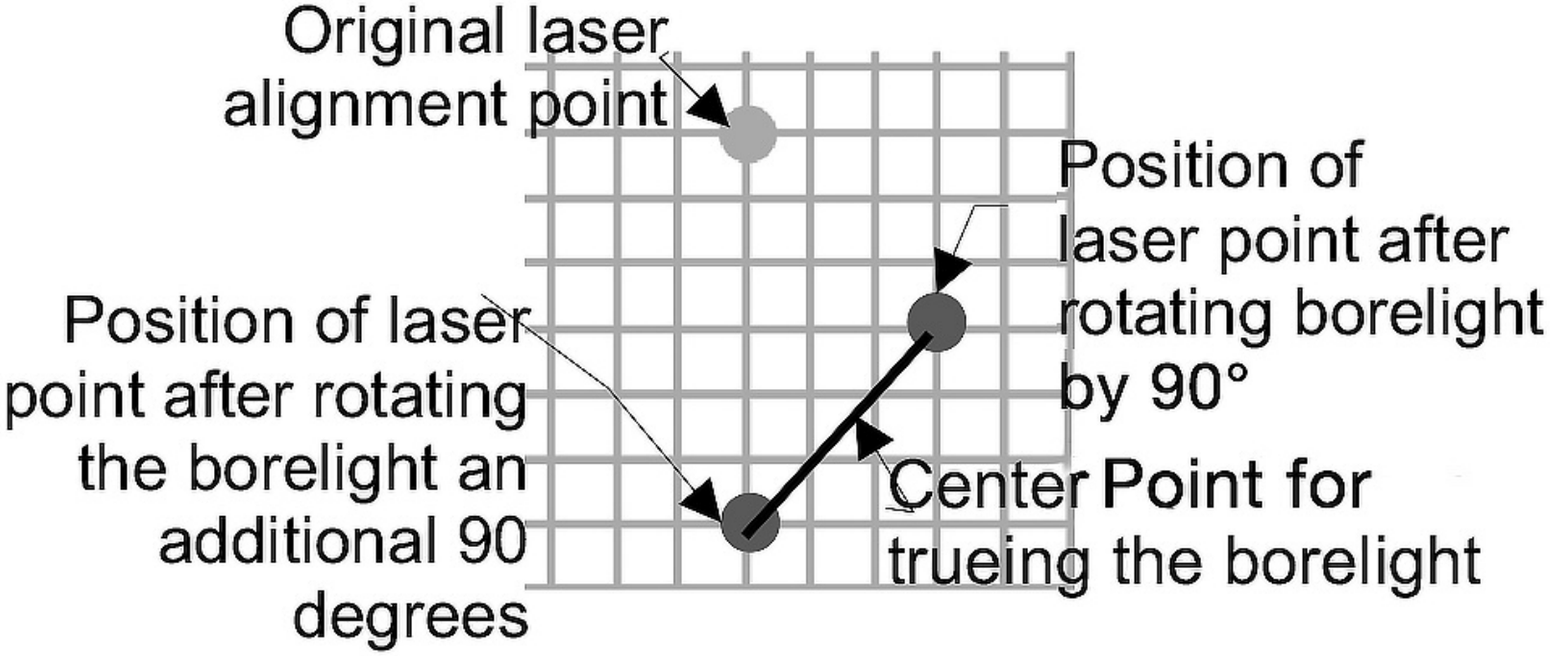

Original laser alignment point
Position of laser point after rotating borelight by 90°
Position of laser point after rotating the borelight an additional 90 degrees
Center Point for trueing the borelight

Figure 2-6

CHAPTER III – CALCULATING OFFSET FOR SIGHT ALIGNMENT

Section 3.1. General Principles

1. The borelight, when properly aligned in the weapon barrel, projects a laser point on the target that is in line with the axis of the barrel (e.g. the laser light travels in a straight line from the weapon barrel to the target). See Figure 3-1.

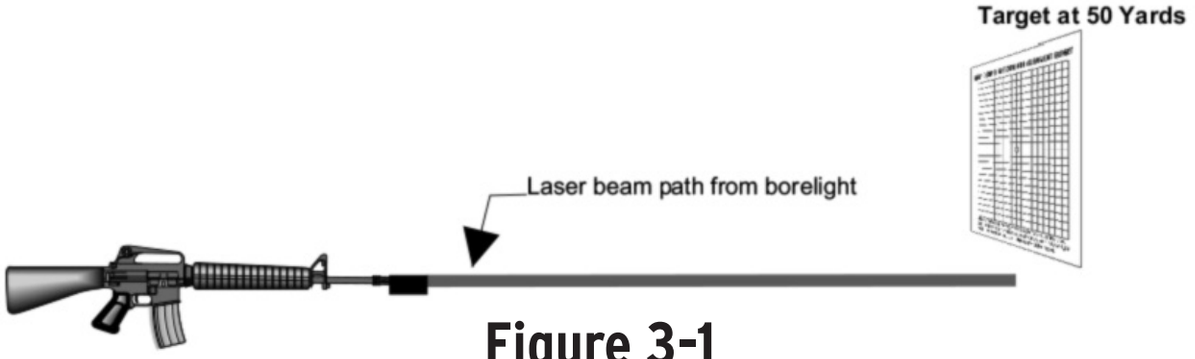


Figure 3-1

2. A bullet fired from a weapon held parallel with the ground immediately starts to drop as soon as it leaves the barrel. The actual rate of drop is determined in part by the velocity of the bullet. The path of the bullet will always be below the straight line of laser light projected from the borelight. See Figure 3-2.

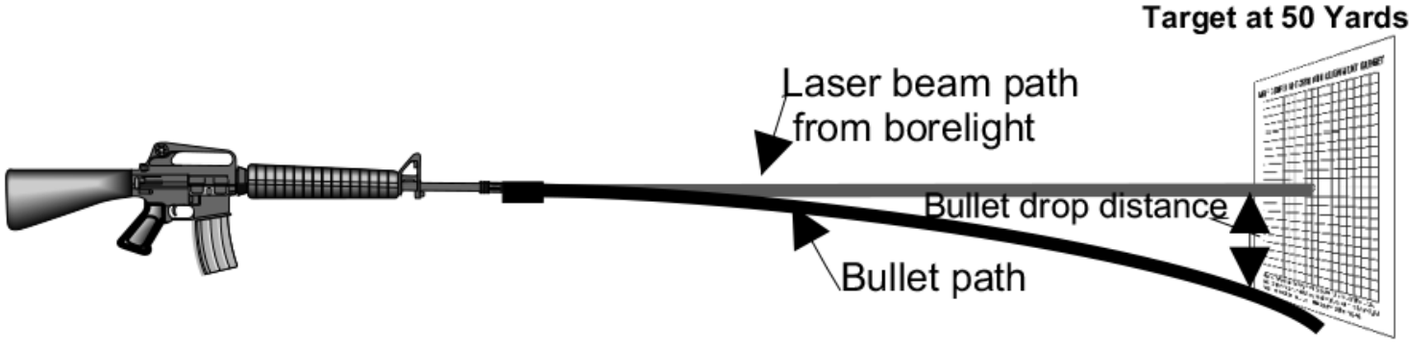


Figure 3-2

3. The optical scope is used to cant the barrel in an upward direction so that when a bullet is fired it will trace an arc to the target. An imaginary straight line drawn through a properly aligned weapon sight will trace a descending line that crosses the straight line from the bore of the weapon to the target. See Figure 3-3.

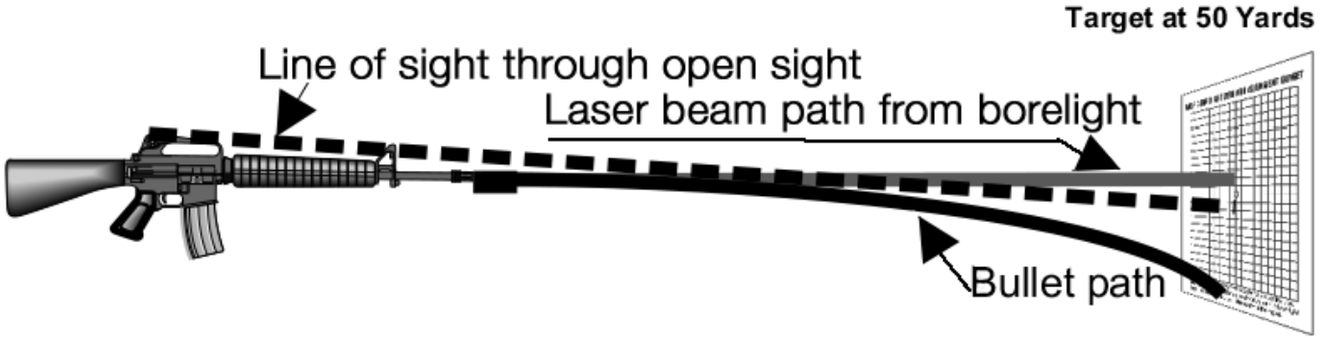


Figure 3-3

NOTE: Depending upon the distance from the end of the barrel to the target that is being used to align the weapon sight, the proper alignment point for the weapon sight (i.e. the offset point) may be above or below the imaginary straight line drawn through the sight to the target. See Figure 3-4.

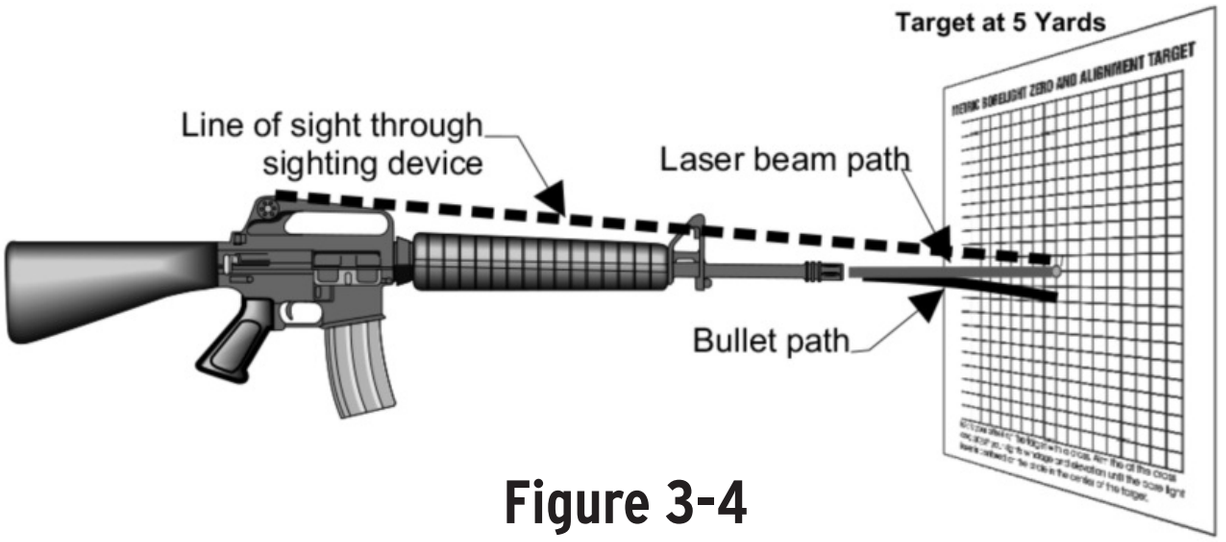


Figure 3-4

4. The distance between the point on the target where the laser point projected by the borelight strikes the target and the point on the target to where scope or sighting device needs to be aligned so that a bullet fired from the weapon will strike the aim point at a given range is the "Offset Distance". See Figure 3-5.

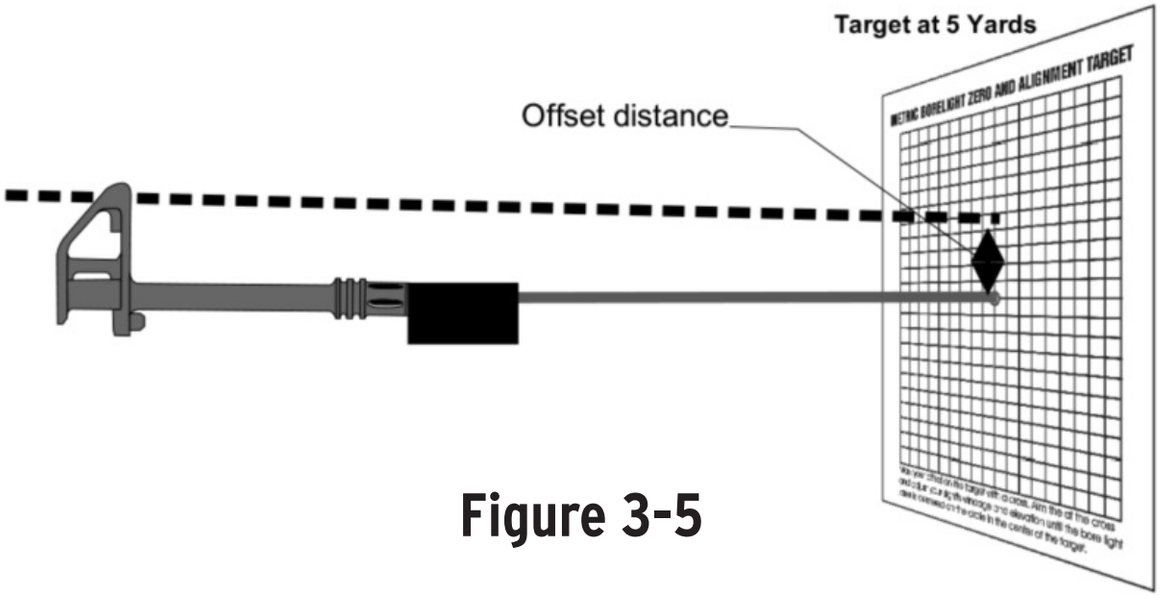


Figure 3-5

SECTION 3.2. CALCULATING THE OFFSET DISTANCE

NOTE: Calculating the offset requires access to a complete ballistics table or a ballistics calculator. In the alternative, you may want to use the online offset calculator available at http://wilson.simplenet.com/shareware/borescope/index.html.

Remember, any offset point derived using a ballistics table or a ballistics calculator is considered an approximation of the actual aim point.

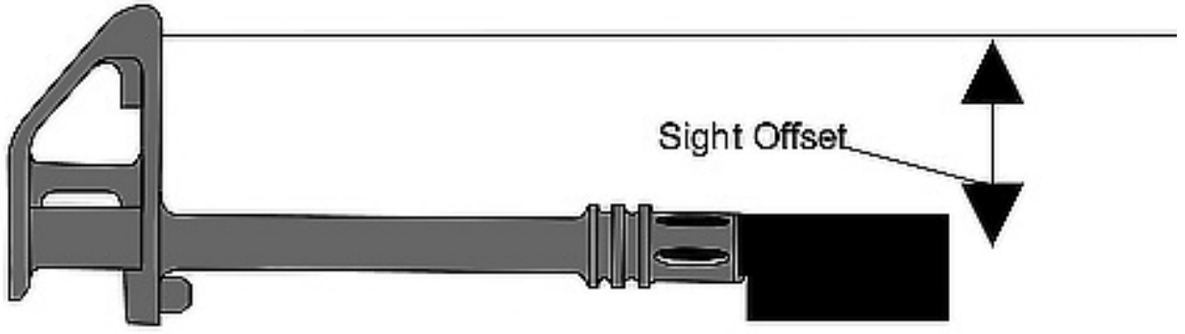


Figure 3-6

1. Measure or calculate the distance between the center of the bore and the center of the sight. If you are using an iron sight the distance will be from the center of the bore to the top of the front post. A common offset distance is 1.5 inches. See Figure 3-6.

2. Calculate the distance between the boresight target and end of the weapon barrel. The distance is usually not less than 10 yards but may be as great as 50-100 yards, depending on the scope and the visibility of the laser point.

3. Determine the distance that you want to align your weapon sight (e.g. 200 yards or 300 yards).

4. Use a ballistics table or a ballistics calculator for the cartridge used and determine the "actual bullet drop" over the distance that you want to align your weapon sight. See sample table below.

16 Range (Yards)	**Muzzle**	**50**	**100**	**200**	**300**
Velocity	3000	2906	2815	2637	2466
Drop Inches (true)	0.00	-.48	-1.99	-8.37	-19.75
Drop (Zero @ 100)	-1.5	-0.24	-0.00	-2.89	-10.78
Drop (Zero @ 200)	-1.5	0.49	1.44	0.0	-6.45
Drop (Zero @ 300)	-1.5	+1.56	+3.59	+4.30	0.0

5. Assuming that you will boresight a .308 Cal. rifle firing the bullet described above at 50 yards, the offset point to be marked on the bore-sight target is calculated as follows:
   a. add the True Bullet Drop of .49 inches; and
   b. the Expected Trajectory Height above the line of sight at 50 meters from the ballistics table for the range at which you want to align your weapon sight. This height according to the ballistics table is 1.56 inches. See Figure 3-7 & 3-8.

6. Mark the OFFSET DISTANCE below the center point marked on the target.

7. Adjust your weapon sight to the OFFSET POINT you have marked on the target.

8. Take your weapon to the range and test fire it to confirm the alignment of the sight.

Total Offset Distance 2.05"

Sight to be zeroed for accuracy at 300 yards

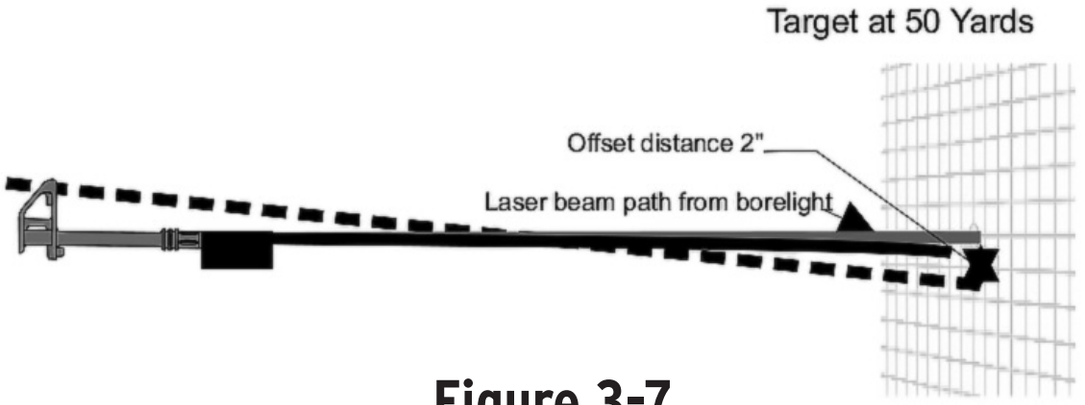


Figure 3-7

Close-up of target at 50 yards

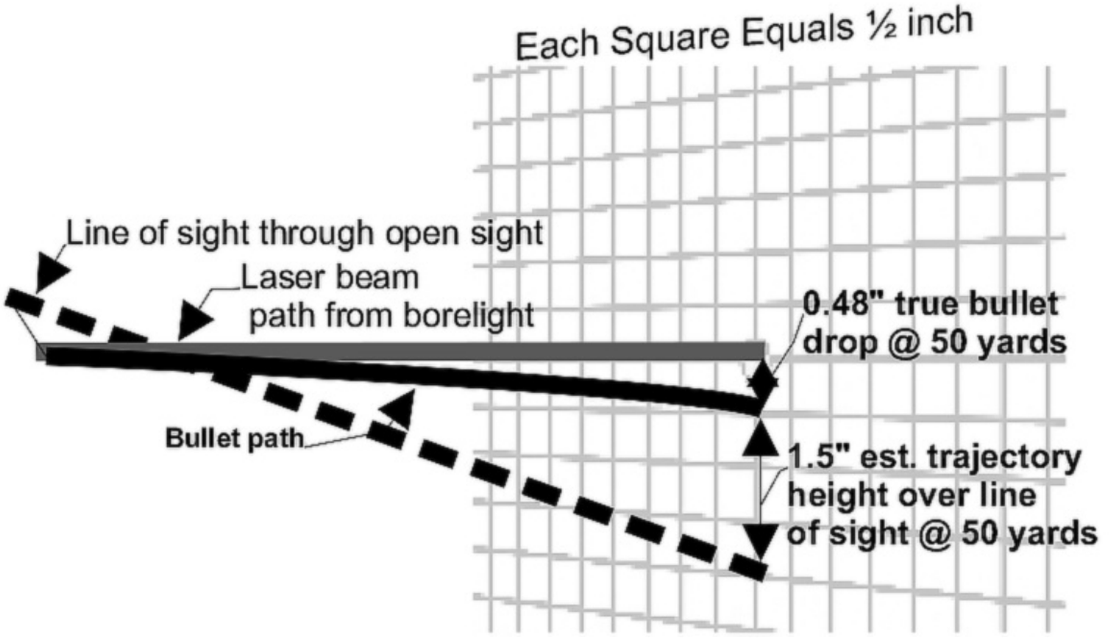


Figure 3-8

DANGER

Ballistics tables may be wrong! Errors may have crept into the published data. Please keep in mind that ballistics performance is dependent on the characteristics of each barrel, air temperature, humidity, elevation, and a variety of other factors. In addition, even a small misalignment of the borelight may move the actual impact point several inches. Therefore, the offset point derived herein should always be considered an approximation. The trajectories provided herein and the information presented by any other source should be considered an approximation.

CHAPTER IV – TROUBLESHOOTING

Section 4.1. Unit Fails to Operate

1. Fails to operate.

a. Replace the battery (see instructions).

b. Check the battery installation to make sure the batteries were installed with the positive (+) terminal facing out.

2. Laser light is weak or dim.

a. Replace the battery (see instructions).

b. Check the front cap and lens of the laser to make sure that it is not covered with dirt. If the front cap is dirty, clean gently with a cotton swab or soft clean cloth taking care not to scratch the lens.

3. If the borelight still fails to operate, please contact the Customer Service for assistance. See Service and Repair, Section 5.2

CHAPTER V – SERVICE/PACKING AND UNPACKING

5.1 Steiner 3-Year Laser Device Warranty

On all laser devices, Steiner offers a 3-Year Limited Warranty from the date of purchase that covers all laser, optical and electronic components, materials and workmanship. All warranties are void if the serial number or manufacturer's labels affixed to the product have been removed, or if products have been abused, misused, modified, neglected or have been disassembled prior to return to the manufacturer.

5.2 Warranty or Repair Service

5.2.a If you require warranty or repair service please contact Steiner Optik, and we will determine the best way to fix your device. For more information, email laserlightsinfo@steiner-optics.com or call 888-288-7747.

5.2.b To assist the Customer Service with determining if the item is repairable, please provide the following information:

1. Serial Number of the defective item
2. Thorough description of the malfunction, defect or damage
3. An explanation as to how the malfunction, defect or damage occurred, if known.

If Steiner determines that the item is under warranty or should be returned for repair, a Return Material Authorization (RMA) number will be provided.

5.2.c When returning the MBS-AA Borelight for service or repair, the following procedures should be followed to prevent any additional damage:

1. Be sure that the MBS-AA Borelight is free of all contaminants such as dirt or any other foreign material.
2. Remove the battery.
3. Place the MBS-AA Borelight in the Shipping Case or Carrying Case if available. If the Shipping Case is not available, individually package each MBS-AA Borelight unit being returned in a suitable container.

5.2.d Place the MBS-AA Borelight and a copy of the test report or detailed description of the failure in a suitable packing/shipping container. Mark the package with the RMA number. Ship by the fastest, traceable, prepaid means to the address provided by Steiner Customer Service.

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