DBAL-A3

Technical Manual

STEINER
Nothing Escapes You

DUAL BEAM AIMING LASER

VISIBLE GREEN LASER WITH IR LASER / IR ILLUMINATOR

TABLE OF CONTENTS

SAFETY SUMMARY

WARNING

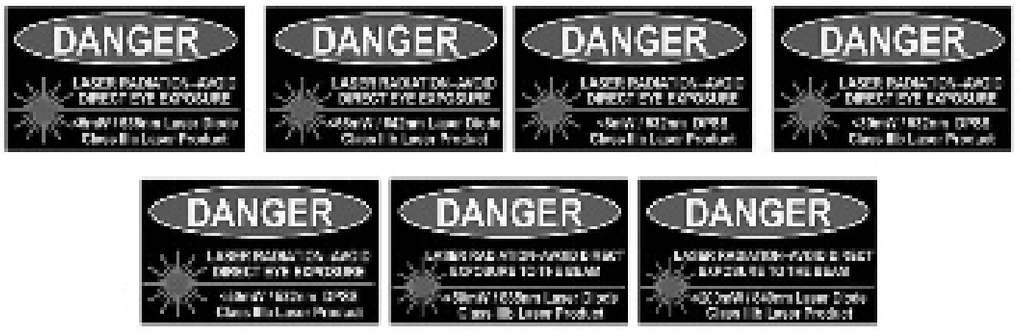
VISIBLE AND INVISIBLE LASER RADIATION
AVOID DIRECT EXPOSURE TO THE BEAM

VISIBLE LASER POINTER
OUTPUT: <5 MW, CLASS IIIA
WAVELENGTH: 532 NM

INFRARED LASER POINTER
OUTPUT: .7 MW, CLASS IIIA
WAVELENGTH: 835 NM

INFRARED ILLUMINATOR
OUTPUT: <4 MW, CLASS IIIA
WAVELENGTH: 835 NM

- DO NOT stare into the laser beam.
- DO NOT look into the laser beam through binoculars or telescopes.
- DO NOT point the laser beam at mirror-like surfaces.
- DO NOT shine the laser beam into other individual's eyes.



Safety Data

US FDA
Code of Federal Regulations (CFR) Title 21

LASER	Power Output	SAFETY CLASS	NOHD (m)
5 mW Visible GREEN Pointer			
High Power	<5 mW	Class IIIa	154
IR Pointer			
High Power	.7 mW	Class IIIa	114
IR ILLUMINATOR			
High Power	4 mW	Class IIIa	114

EXPLANATION OF SAFETY ALERTS

WARNING
Identifies a clear danger to the person doing that procedure.

CAUTION
Identifies risk of damage to the equipment.

NOTE
Used to highlight essential procedures, conditions, statements, or convey important instructional data to the user.

WARNING
Be sure the weapon is CLEAR and on SAFE before proceeding.

WARNING
RISK OF DETECTION BY ENEMY
To reduce the risk of detection by an enemy using a Night Vision Device (NVD), avoid prolonged activation of the DBAL-A^3.

WARNING
The infrared beam is more detectable to an enemy using a NVD when used in smoke, fog and rain. Avoid prolonged activation of the DBAL-A^3 in these conditions.

WARNING
All directions, such as CW and CCW, are given from the shooter's point of view, as though the DBAL-A^3 were weapon-mounted.

WARNING
DO NOT store the DBAL-A^3 with the battery installed.

WARNING
The High Power Modes of operation are not eye safe and are blocked with a safety screw. To operate the DBAL-A^3 in the High Power modes the blue safety screw must be removed from the back of the unit.

WARNING

Make sure the Activation Mode Selector Switch is in the OFF position before inspecting the Exit Port Lenses of the DBAL-A^3.

WARNING

If the Activation Selector Switch is not in the OFF position, depressing the fire button on the top of the housing or the remote cable pressure pad switch can inadvertently activate the laser

WARNING

If the Laser Borelight System (LBS) is used to boresight the DBAL-A^3, be sure to remove the LBS from the weapon prior to firing.

WARNING

NEVER boresight in the High Power mode of operation.

CAUTION

DO NOT over-adjust the laser adjusters by forcing them beyond their end of travel.

CAUTION

DO NOT defocus the infrared illuminator by forcing it beyond its normal end of travel.

CAUTION
DO NOT over tighten the Safety Screw when installing it into the DBAL-A^3 housing as you may strip the housing threads.

CAUTION
Prior to submerging the DBAL-A^3 make sure the infrared illuminator focusing knob has been adjusted in a CW direction to the focus point.

CAUTION
Use ONLY authorized cleaning supplies on the DBAL-A^3 or permanent damage may occur.

CAUTION
DO NOT remove the Remote Cable Switch by pulling on the cable.

CAUTION
To prevent damage to the IR POINT/ILLUM Exit Port Cover, open the Exit Port Cover before turning the knob to adjust the focus.

HOW TO USE THIS MANUAL

Usage

You must familiarize yourself with the entire manual before operating the equipment. Read the complete maintenance task before performing maintenance and follow all **WARNINGS, CAUTIONS** and **NOTES**.

Manual Overview

The manual contains sections for Operating and Maintaining the DBAL-A^3 and laser safety.

Appendix A Repair Parts

CHAPTER 1–GENERAL INFORMATION

1.1 GENERAL INFORMATION

1.1.a Type of Manual:

Operator and Field Maintenance Manual.

1.1.b Equipment Name:

DBAL-A^3, Dual Beam Aiming Laser-Advanced.

1.1.c Purpose of Equipment:

To covertly illuminate and direct fire using an infrared laser pointer (IR POINT) and infrared laser illuminator (IR POINT/ILLUM) for soldiers equipped with a Night Vision Device (NVD), or for aiming and pointing out a target using a visible laser (VIS POINT) during daylight and low light missions.

1.2 REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS

If you have a suggestion to improve the utility and performance of the DBAL-A^3, let us know. Mail your comments and suggestions to Steiner-Optik, 331 E. 8th St., Greeley, CO 80631 or email: laserlightsinfo@steiner-optics.com

1.3 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.

1.4 CROSS REFERENCES

Common Name	Official Name
Battery Cap	Battery Box Cover
Shipping Case	Shipping Box
Cotton Swab	Disposable Applicator
Lens Covers	Exit Port Covers
Paddle Switch	Remote Cable Switch
Battery	CR 123A
Technical Manual	Operator and Field Maintenance Manual
Tape Fastener Loop	Fastener, Loop Tape
Tape Fastener Hook	Fastener, Hook Tape

1.5 LIST OF ABBREVATIONS

C	Celsius (Centigrade)
CCW	Counter-clockwise
cm	Centimeters
CTA	Common Table of Allowance
CW	Clockwise
EA	Each
F	Fahrenheit
HI	High
ILLUM	Illuminator
in	Inches
IR	Infrared
LBS	Laser Borelight System
LED	Light Emitting Diode
LO	Low
m	Meter
Max	Maximum
Mfr	Manufacturer
Min	Minimum
MOM	Momentary
mm	Millimeter
mrad	Milliradians
mW	Milliwatts
nm	Nanometers
No	Number
NOHD	Nominal Ocular Hazard Distance
NSN	National Stock Number
NVD	Night Vision Device
O.D.	Optical Density
OIR	Optical Instrument Reticle
Para	Paragraph
PWR	Power
QTY	Quantity
RAS	Rail Adapter System
RMA	Return Material Authorization
SR	Service Representative
TM	Technical Manual
VIS	Visible

CHAPTER 2–EQUIPMENT DESCRIPTION

2.1 SYSTEM DESCRIPTION

The DBAL-A^3 is a Class IIIb laser device that features a VIS POINT for daylight and low light operations, as well as an IR POINT and IR POINT/ILLUM for use with a NVD. The IR beams can be operated individually or in combination, in both low power (LOW PWR) and high power (HIGH PWR) settings.

The DBAL-A^3 emits a highly collimated beam of infrared light for precise aiming of the weapon and a separate IR POINT/ILLUM for illumination of the target or target area. The IR POINT/ILLUM is equipped with an adjustable bezel to vary the size of the illumination beam based on the size and distance to the target. The VIS POINT and the IR POINT are co-aligned. The VIS POINT can be used to boresight the device without the requirement of a NVD and will simultaneously boresight the IR POINT.

The DBAL-A^3 can be used as either a handheld illuminator/pointer or can be weapon mounted using the Quick Release Mount. In the weapon-mounted mode, the DBAL-A^3 can be used to accurately direct fire as well as illuminate and identify targets.

When the Safety Screw is installed in the rear of the DBAL-A^3 housing, it prevents the operator from accessing the non-eye safe, HI PWR modes of operation.

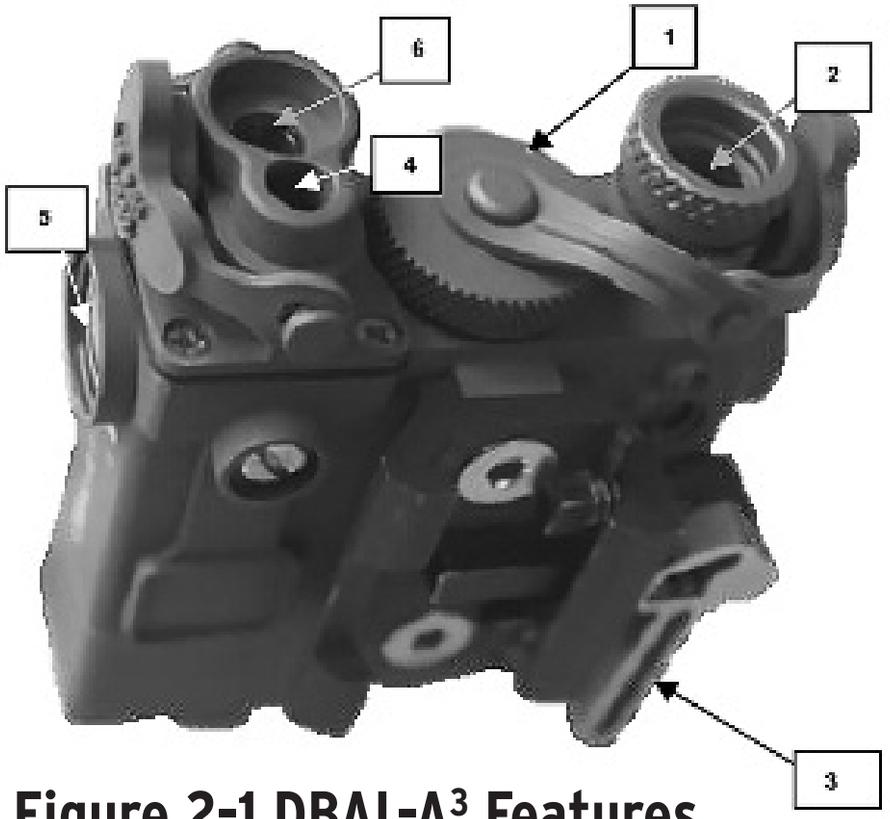


Figure 2-1 DBAL-A^3 Features

ITEM	DESCRIPTION
1	3V CR123A Battery Cap and Battery Compartment
2	IR ILLUMINATOR
3	Quick Release Mount
4	IR POINTER
5	Adjusters
6	VIS POINTER

2.2 GENERAL CHARACTERISTICS

Table 2.2 Weight, Dimensions, and Performance

WEIGHT	
(with one battery, 3-volt CR 123A)	5.4 oz / 153 grams
DIMENSIONS	
Length	3.5 in / 8.78 cm
Width	1.63 in / 4.14 cm
Height (including mounting bracket)	1.32 in / 3.35 cm
PERFORMANCE	
Wavelength	
Green Visible Pointer	532 nm
IR POINT / ILLUM	835 nm
Output Power	
Green Visible Pointer	<5 mW
IR POINT	<.7 mW
IR ILLUM	<4 mW
Beam Divergence	
Green Visible Pointer	<0.8 mrad
IR POINT	<0.8 mrad
IR POINT / ILLUM	95-250 mrad
Battery Life	3 - 7 Hours on Dual High (3V CR123A)
POINT & ILLUM RANGE (STARLIGHT CONDITIONS)	
VIS POINT / ILLUM	250 m

2.3.a DBAL-A^3 Assembly

The DBAL-A^3 device provides a VIS POINT, IR POINT and adjustable focus IR POINT/ILLUM. The device is used for aiming, signaling, command and control and to supply supplemental infrared illumination.

2.3.b IR POINT/ILLUM Exit Port Cover

When properly installed over the IR POINT/ILLUM laser exit port, the Exit Port Cover prevents laser energy emission and also protects the lens.

2.3.c CR123A Battery Cap or AA Battery Cap (Model Dependent)

The battery cap secures the battery inside the battery compartment. Must be used with associated battery type.

2.3.d Remote Cable Switch

The 7" Remote Cable Switch allows the user to activate the DBAL-A^3 in a momentary (MOM) mode by depressing the pressure pad once. Pressing the pressure pad twice in rapid succession will activate the DBAL-A^3 continuously for 5 minutes. Pressing the pressure pad again will return the unit to momentary activation. The pressure pad provides a tactile (silent) click that indicates when the switch has been activated.

2.3.e Tape Fastener Loop

The Tape Fastener Loop is provided to secure the Remote Cable Switch to the weapon in a position convenient to the soldier.

2.3.f Dual Remote Cable Switch

The Dual Remote Cable Switch plugs into a tactical light and the visible override port on the back of the laser housing. Pressing this pressure pad will simultaneously activate the tactical light and the visible laser.

2.3.g Battery (Model Dependent)

One CR 123A battery or one AA battery is used as a power supply for operating the DBAL-A^3. The use of a high-quality battery is recommended. Must be used with associated battery cap.

2.3.h Allen Wrench

A 3/32 inch Allen Wrench is supplied to remove and store the Safety Screw.

2.3.i Operator and Field Maintenance Manual

NOTE

You must read the entire Operator and Field Maintenance Manual before operating the DBAL-A^3 and follow all WARNINGS, CAUTIONS and NOTES.

The Operator and Field Maintenance Manual provides safety information, equipment information, operating instructions, mounting procedures, zeroing procedures, and operator and unit maintenance procedures.

2.3.j Shipping Case

The DBAL-A^3 is provided with a Shipping Pouch.

2.3.k Optical Instrument Reticle (OIR) (Pattern Generators)

NOTE

Pattern Generators are not designed for accurate aiming of the weapon.
The Optical Instrument Reticles (OIR) are used for command and control. When placed in front of the IR POINT or IR POINT/ILLUM that has been focused to a point, they project the shape of a circle ○, square □, triangle Δ, plus sign +, or T-shape. The OIR is inserted into the laser Exit Port.

2.3.l VIS POINT / IR POINT Exit Port Cover

When properly installed over the VIS POINT / IR POINT laser exit port, the Exit Port Cover prevents laser energy emission and also protects the lens.

2.3.m Safety Screw

When the Safety Screw is installed in the back of the laser housing it prevents the user from accessing the High Power modes of laser operation.

CHAPTER III – SECTION I OPERATING INSTRUCTIONS

3.1 DBAL-A^3 CONTROLS AND INDICATORS

This section contains a description of the controls and adjustments for the DBAL-A^3.

3.1.a Battery Installation

WARNING

DO NOT store the DBAL-A^3 with the battery installed.

NOTE

Loss or removal of the O-ring from the battery cap may allow water to enter the DBAL-A^3.

Unscrew the battery cap in a CCW direction. Remove and properly discard the spent battery. Inspect the battery compartment for dirt, moisture and corrosion. Clean the battery compartment as needed (refer to Paragraph 4.3.c). Inspect the O-ring seal on the battery cap to make sure it is free of sand and dirt particles and that it has not been damaged (see Paragraph 4.3.d). Install the battery (both CR123A and AA batteries are installed the same way) as indicated by the marking on the DBAL-A^3 housing. Reinstall the battery cap and hand tighten in a CW direction.

Figure 3-1 Battery Installation

3.1.b Activation Mode Selector Switch

WARNING
DO NOT store the DBAL-A^3 with the battery installed.

NOTE
The DBAL-A^3 will not operate if the rotary switch is not precisely aligned with the marked switch position.

In extreme cold temperatures the switch may offer more resistance.

The Activation Mode Selector Switch is located on the left rear of the DBAL-A^3 Housing. It is used to select between the various modes of operation when the Remote Cable Switch or the Integrated Momentary Activation Switch is depressed. The Activation Mode Selector Switch has seven (7) positions.

Figure 3-2 Activation and Mode Selector Switch

Table 3-1 Activation and Mode Selector Switch Functions

Switch Position	Marking	Use	Remarks
1	AH	HIGH VIS POINT is activated the Remote Cable or Fire Button is pressed.	Used for pointing or aiming at close range in daylight or at longer range in low light conditions. DO NOT use for zeroing the weapon.
2	AL	LOW VIS POINT is activated when the Remote Cable or Fire button is pressed.	Used for zeroing the laser to the weapon in low light conditions.
3	OFF	OFF	The DBAL-A^3 WILL NOT OPERATE.
4	AL	LOW IR POINT is activated together when the Remote Cable or Fire button is pressed.	Used for pointing, zeroing and training in low or no light conditions.
5	DL	Low IR POINT and Low IR POINT/ILLUM are activated together when the Remote Cable or Fire Button is pressed.	Used for pointing and aiming indoors and outdoors at close range and for supplemental illumination of shadowed areas.
6	AH	HIGH IR POINT is activated when the Remote Cable or Fire button is pressed.	Used for pointing at long distances in low or no light conditions.
7	IH	HIGH IR POINT/ILLUM is activated when the Remote Cable or Fire button is pressed.	Used for supplemental illumination of shadowed areas.
8	DH	HIGH IR POINT and HIGH POINT/ILLUM are activated together when the Remote Cable or Fire button is pressed.	Used for pointing at long distances in low or no light conditions and for supplemental illumination of shadowed areas.

3.1.c Safety Screw

WARNING

To operate the DBAL-A^3 in the High Power modes, the blue safety screw must be removed from the back of the unit. The Armorer will remove and store the safety screw.

CAUTION

DO NOT over tighten the Safety Screw when installing it into the DBAL-A^3 housing as you may strip the housing threads.

The Safety Screw is a blue colored hex head that, when installed, prevents the operator from accessing the non-eye safe HI PWR modes of operation. Unit standing operating procedures will provide direction on removal of the Safety Screw to enable the HI PWR modes of operation. A 3/32 inch. Hex Key from the Armorer's tool kit is used to remove the Safety Screw. The Armorer will remove and store the safety screw.

Figure 3-3 Safety Screw Installed (shown in Training Mode)

3.1.d Integrated Momentary Activation Switch

NOTE

Click sound is minimized by depressing the center of the switch.

The Integrated Momentary Activation Switch is located on the top of the DBAL-A^3 housing to the left of the word FIRE. Firmly pressing and holding the switch activates the DBAL-A^3 laser function selected by the Laser Mode Selector Switch. When the switch is released, the DBAL-A^3 turns off.
Pressing the Integrated Momentary Activation Switch twice in rapid succession will activate the DBAL-A^3 in a continuous ON mode for 5 minutes. Pressing the Integrated Momentary Activation Switch once again will return the unit to the momentary mode.

Figure 3-4 Integrated Momentary Activation Switch

3.1.e Activation Indicator/Low Battery Indicator.

A green LED is located on the rear housing between the Activation and Mode Selector Switch and the Visible Override Port. When lit, it indicates that the DBAL-A^3 is actively emitting laser energy. It also acts as a Low Battery Indicator. If the LED starts to blink, the battery is low and should be replaced. The battery should be replaced as soon as the Low Battery indicator starts to blink.

When the Activation and Mode Selector Switch is turned to an operating position, the LED will light up if either the Remote Cable Switch or Integrated Momentary Activation Switch is depressed, indicating that the laser is ON. The LED will remain lit until the Integrated Momentary Activation Switch or Remote Cable Switch is released.

When the Remote Cable Switch or Integrated Momentary Activation Switch has been depressed twice in rapid succession, the LED will light up indicating that the laser is functioning in a constant ON mode. The LED will remain lit for 5 minutes or until Integrated Momentary Activation Switch or Remote Cable Switch is pressed once again to return the unit to momentary activation..

Figure 3-5 Laser Activation LED / Low Battery Indicator

3.1.f Visible Override Port

CAUTION

DO NOT remove the Remote Cable Switch by pulling on the cable.

NOTE

Use the right hand remote cable port for all standard laser operation. The left hand cable port is the Visible Override port that ONLY operates the visible laser function when the cable switch is depressed.

The DBAL-A^3 Activation Mode Selector Switch must be turned to a laser setting to use the Cable Switch.

The DBAL-A^3 is equipped with two Remote Cable Ports. The left hand port is marked "Visible Override" (see Figure 3-7). The Visible Override Port is used to override the Activation Mode Selector Switch setting and activate the visible laser pointer. If the Activation Mode Selector Switch is set to operate any of the infrared functions at a High power setting, then the visible laser will be activated at its High setting. If the Activation Mode Selector Switch is set to operate any of the Infrared lasers at a Low power setting, then the visible laser will be activated at its Low setting. When a Remote Cable Switch plugged into the Visible Override Port has been depressed twice in rapid succession, the visible laser will be activated in a constant ON mode for 5 minutes or until the Remote Cable Switch is pressed once again to return the unit to momentary activation.

The Visible Override Port has been configured to incorporate our OV-2 and FML Tactical Lights using the Y-cable supplied with the DBAL-A^3. Plug the Y-cable into both the tactical light and the visible override port on the back of the laser housing. When the Y-cable pressure pad is pressed it will simultaneously activate the tactical light and the visible laser.

Figure 3-6 Location of Visible Override Port

3.1.g Standard Remote Cable Port

CAUTION

DO NOT remove the Remote Cable Switch by pulling on the cable.

NOTE

Use the right hand remote cable port for all standard laser operation. The left hand cable port is the Visible Override port that ONLY operates the visible laser function when the cable switch is depressed. The DBAL-A^3 Activation Mode Selector Switch must be turned to a laser setting to use the Remote Cable Switch.

The Remote Cable Port located on the right side of the unit (see Figure 3-8), is used for standard remote cable switch activation. The remote cable switch plugged into this port always activates the DBAL-A^3 in the operational mode selected by the Activation Mode Selector Switch. When the remote cable switch is released, the DBAL-A^3 turns off. When the Remote Cable Switch has been depressed twice in rapid succession, the DBAL-A^3 will be activate in a constant ON mode for 5 minutes or until the Remote Cable Switch is pressed once again to return the unit to momentary activation.

Figure 3-7 Location of Standard Remote Cable Port

3.2.h Remote Cable Switch

CAUTION

DO NOT remove the Remote Cable Switch by pulling on the cable.

NOTE

When installing the Remote Cable Switch, gently twist the plug into the remote cable port.

The DBAL-A^3 Activation Mode Selector Switch must be turned to a laser setting to use the Remote Cable Switch.

The DBAL-A^3 will not operate if the rotary switches are not precisely aligned with the marked switch position.

The Remote Cable Switch plugs into the back of the DBAL-A^3 for weapon mounted use as shown in Figure 3-7. Depressing the Remote Cable Switch activates the DBAL-A^3 in the operational mode selected by the Laser Mode Selector Switch at the power level selected by the Activation Mode Selector Switch (e.g. H/V, L/V, L/L, etc). When the remote cable switch is released, the DBAL-A^3 turns off.

In the Momentary Mode when the Remote Cable Switch has been pressed twice in rapid succession, the DBAL-A^3 will be activating in a constant ON mode for 5 minutes or until the Remote Cable Switch is pressed once again to return the unit to momentary activation.

When the Remote Cable Switch is installed into the DBAL-A^3, it automatically locks in place. To remove it, pull back on the plug's sleeve.

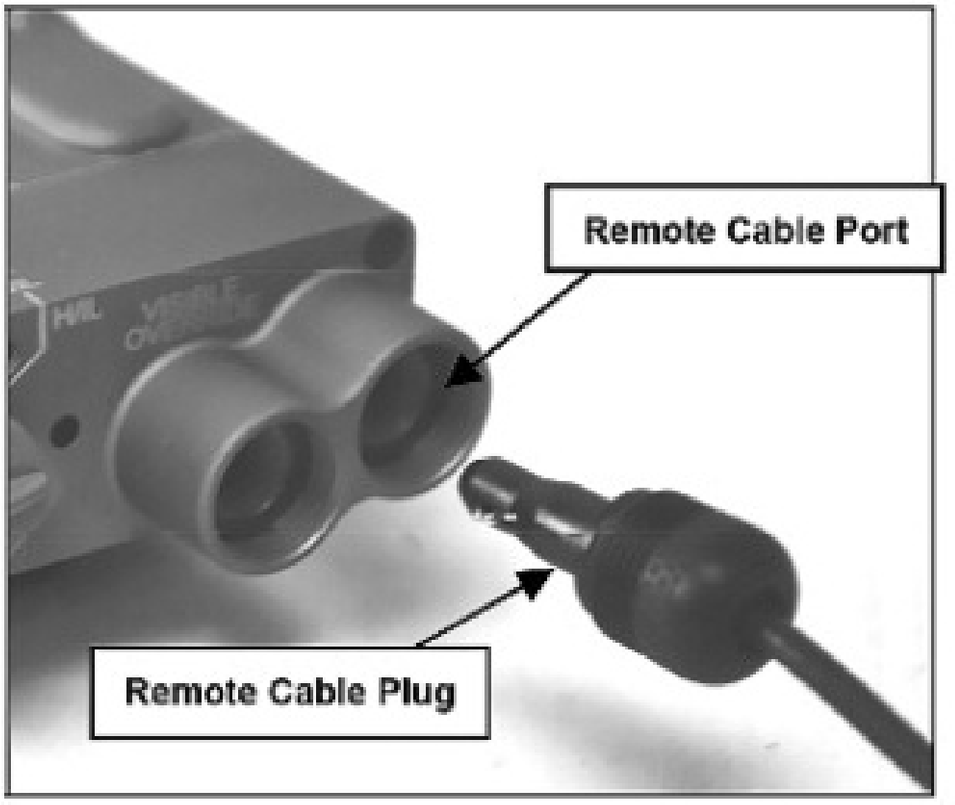


Figure 3-8 Installation of the Remote Cable Switch

3.1.i Exit Port Covers

NOTE

Exit port covers are not intended for use over the Optical Instrument Reticles.

The DBAL-A^3 is supplied with a VIS POINT and IR POINT Exit Port Cover, and an IR POINT/ILLUM Exit Port Cover. The Exit Port Covers prevent laser energy emission when properly installed over the laser exit ports. The exit port covers are held in place by the retention studs located above and below each exit window. Install the Exit Port Cover over the laser exit port by gently pulling it forward until it can be moved into place. Align the step on the inside surface of the Exit Port cover with the exit port and press the cover firmly into place. When the DBAL-A^3 is not in use, it should be stored with the Exit Port Covers in place to prevent the emission of laser energy and protect the lenses.

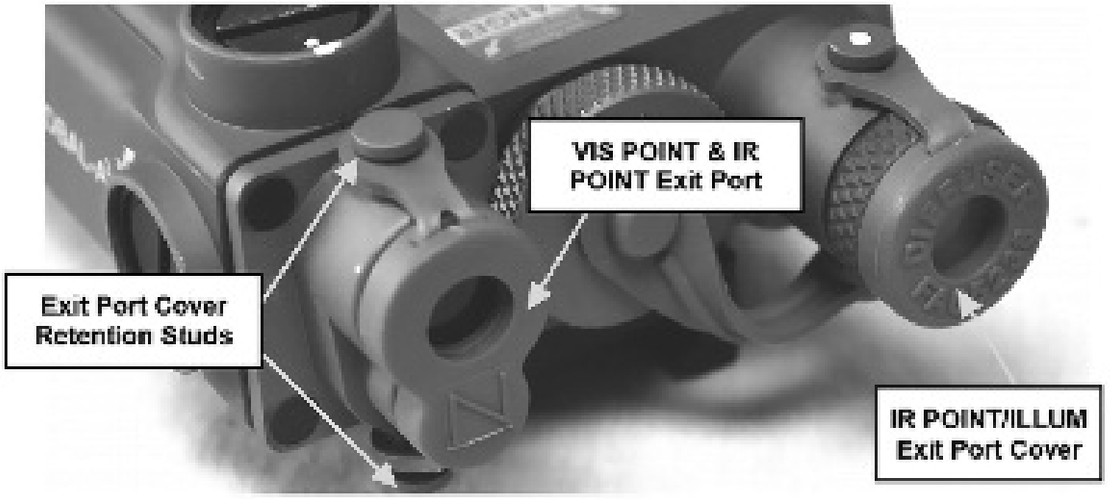


Figure 3-9 Exit Port Cover Installation

3.1.j IR POINT/ILLUM Focusing Knob

CAUTION

Prior to submerging the DBAL-A^3 make sure the infrared illuminator focusing knob has been adjusted in a CCW direction to its stop. To prevent damage to the IR POINT/ILLUM Exit Port Cover, open the Exit Port Cover before turning the knob to adjust the focus.

NOTE

Prior to exposing the DBAL-A^3 to extreme cold temperatures make sure that the IR POINT/ILLUM focusing knob has been adjusted to the focus point. In extreme cold temperatures the IR POINT/ILLUM focusing knob may offer more resistance.

The IR POINT/ILLUM focus knob is marked with a white dot to use as a reference point. Direction of rotation and the corresponding beam size (spot to flood) is indicated on the DBAL-A^3 housing.

Turn the IR POINT/ILLUM CCW from the shooters perspective fully toward spot to mechanical stop, then CW to line up the white dots on the IR POINT/ILLUM focus knob and the chassis on the laser assembly. This is optimal for a point or smallest diameter beam. Rotating the IR POINT/ILLUM CW adjusts the focus size from spot to flood based on the range and size of the area to be illuminated.

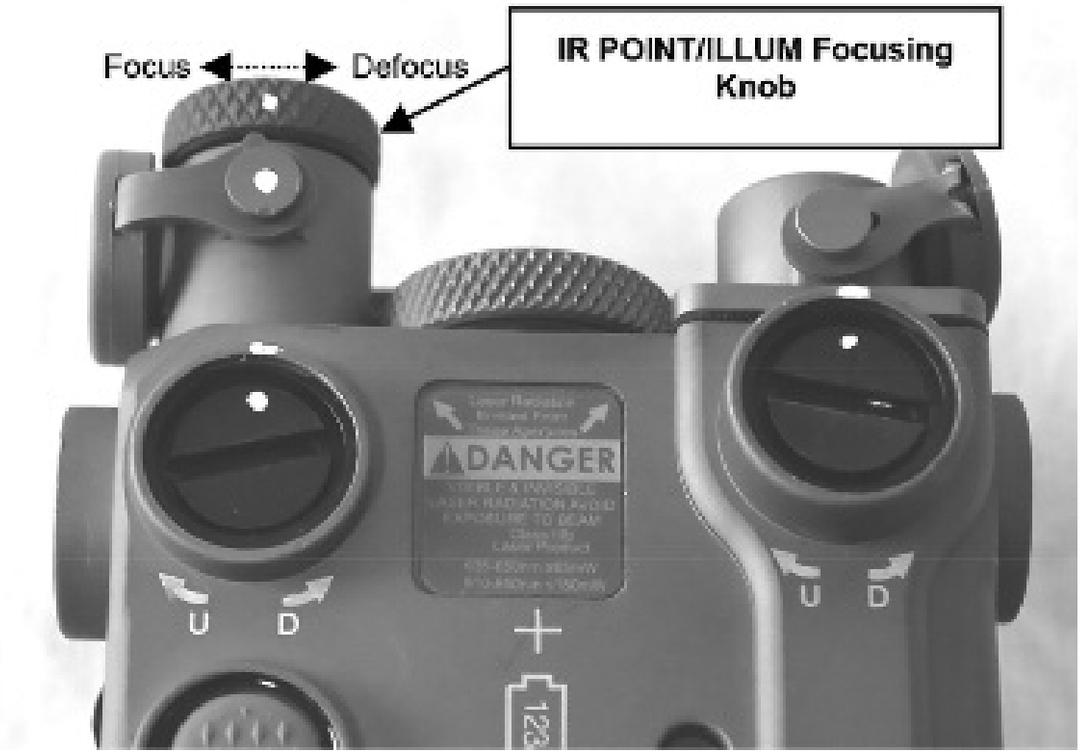


Figure 3-10 The IR POINT/ILLUM Focusing Knob

3.1.k Optical Instrument Reticles (OIR) OPTIONAL

NOTE

Pattern Generators are not designed for accurate aiming of the weapon.

If the OIR is installed in front of the IR POINT/ILLUM and the pattern appears to be blurry or is unrecognizable, focus the IR POINT/ILLUM. Prior to installing the OIR in front of the IR POINT/ILLUM, from the shooters perspective turn the IR POINT/ILLUM focus knob CCW fully toward spot to its mechanical stop, then CW to line up the white dots on the IR POINT/ILLUM focus knob and on the chassis of the laser assembly.

Exit port covers are not intended for use over the Optical Instrument Reticles.

The Optical Instrument Reticles (OIR), also known as Pattern Generators, are used for command and control. When an OIR is installed in front of the IR POINT or the IR POINT/ILLUM that has been focused to a spot, it will project the shape of a circle, triangle, plus sign, square, or T-shape as shown below.

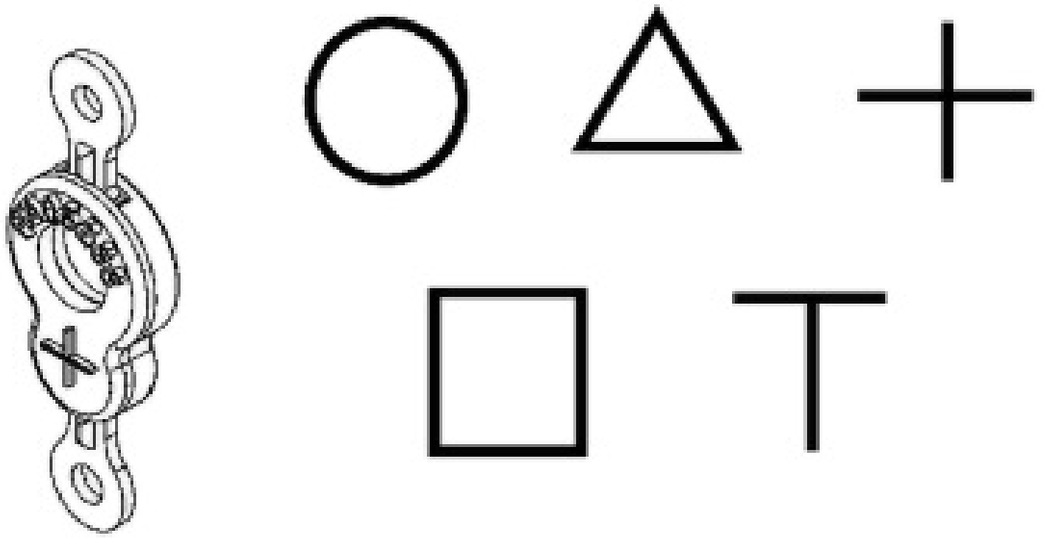
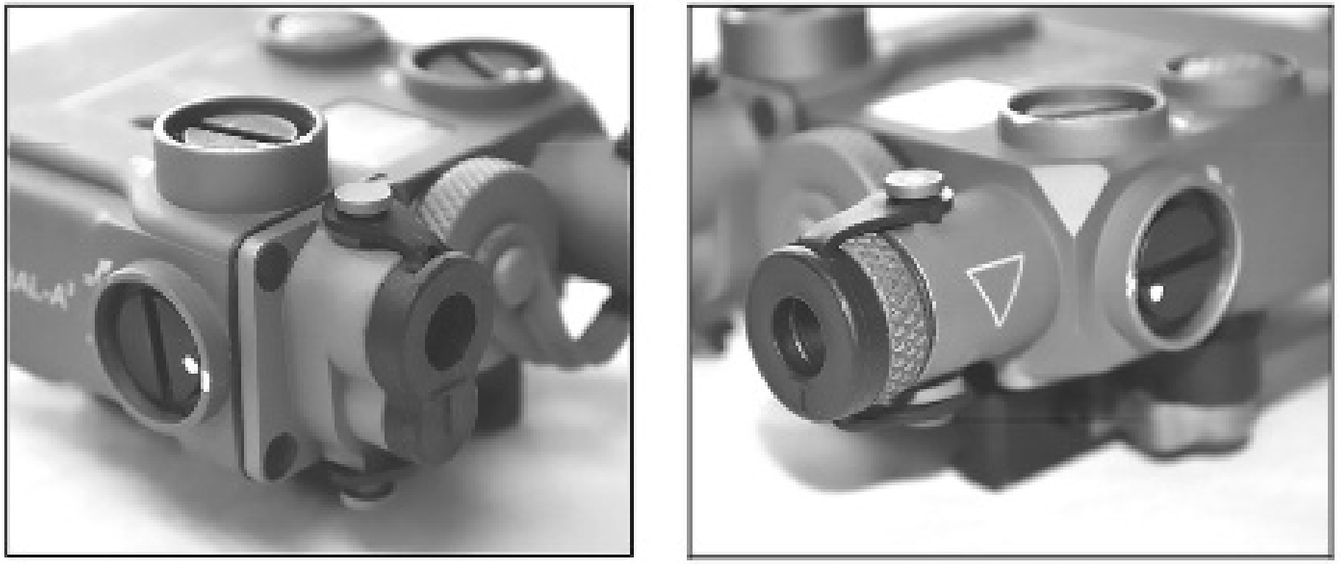


Figure 3-11 Optical Instrument Reticle (OIR)

To use the OIR, select the appropriate pattern as marked on the front of the OIR. Remove the Exit Port cover, and replace it with the OIR.

To remove the top Exit Port Cover, pull on the loose end of the Exit Port Cover retaining strap and stretch it over the top stud. Repeat the procedure to remove the bottom Exit Port Cover retaining strap from the DBAL-A^3.



Installation of OIR on IR POINT

Installation of OIR on IR POINT/ILLUM

Figure 3-12 Installation of Pattern Generators

To install the OIR, stretch the end of the retaining strap over the retaining stud located on the bottom of the housing. Repeat the procedure by stretching the loose end of the retaining strap over the stud located on the top of the housing.

3.1.l Adjusters

CAUTION

DO NOT over adjust the adjusters by forcing them beyond their end of travel.

NOTE

The mission will dictate which aiming laser (VIS POINT / IR POINT) will be zeroed to achieve maximum accuracy.

Always move the adjusters slowly, one click at a time, to prevent the adjuster from jumping detents.

In extreme cold temperatures the adjusters may offer more resistance.

The adjuster may offer some resistance as you turn it in a CW direction from the factory neutral position. When the adjuster is harder to turn it has reached the maximum CW travel.

When the adjuster is at its maximum CW or CCW point of travel and turned in the opposite direction the laser point may trace a small loop on the target. This is normal and does not indicate a failure condition.

A positive load is required on the adjustment mechanism when zeroing the DBAL-A^3 for purposes of retaining the set alignment. See Section 3.4.

The adjuster knobs on the DBAL-A^3 may vary slightly in the force required to turn the adjusters. This is normal and does not indicate a failure condition.

At the maximum CW or CCW travel the DBAL-A^3 lasers may not move a full 1cm per click, or may jump squares on the target. If this happens the DBAL-A^3 should be returned to its factory neutral preset as described in Section 3.5.

DBAL-A^3 is for use on weapons where the MIL-STD-1913 rail is parallel with the bore of the weapon. In the factory neutral position the VIS POINT / IR POINT should project on the same side of the target as the laser is mounted and must fall within 10.2 cm of the bore at 25 meters. See Section 3.5.

The DBAL-A^3 is equipped with adjusters for adjusting the VIS POINT, IR POINT and IR POINT/ILLUM for elevation and windage. Each adjuster click will move the laser point by .75 cm at 25 meters.

The VIS POINT / IR POINT adjuster guards are marked with arrows and the letters U/D and R/L indicating the direction that the shot group will move if an adjuster is turned when the laser is mounted in the horizontal (top) position. The IR POINT/ILLUM adjuster guards are also marked with arrows and the letters U/D and L/R indicating the direction that the ILLUM beam will move on the target if an adjuster is turned when the laser is mounted in the horizontal (top) position. The adjusters will move the VIS POINT / IR POINT approximately 10 inches or 25cm in each direction from the factory neutral preset position at 25 meters. See Section 3.6.

The VIS POINT and the IR POINT are adjusted using the same adjusters. Zeroing the VIS POINT will align the IR POINT and vice versa. For improved accuracy, always align the primary laser expected to be used on the mission.

When zeroing the IR POINT/ILLUM always zero the IR POINT to the weapon first, then align the IR POINT/ILLUM so that it is centered on the IR POINT.

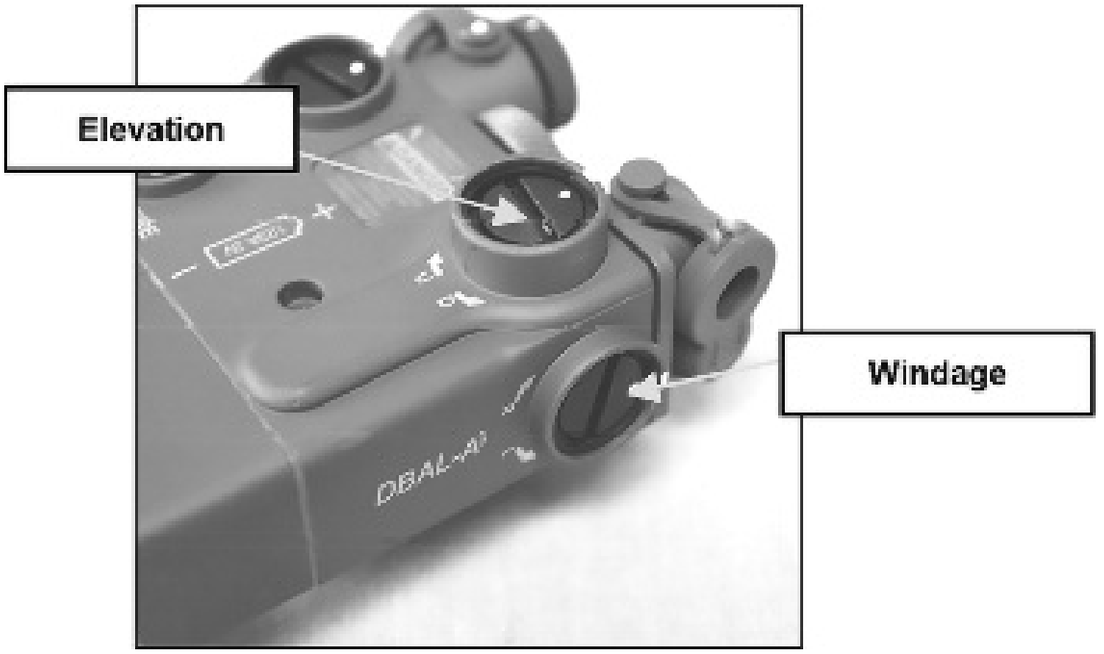


Figure 3-13 Adjusters for Aiming and Illumination Beams

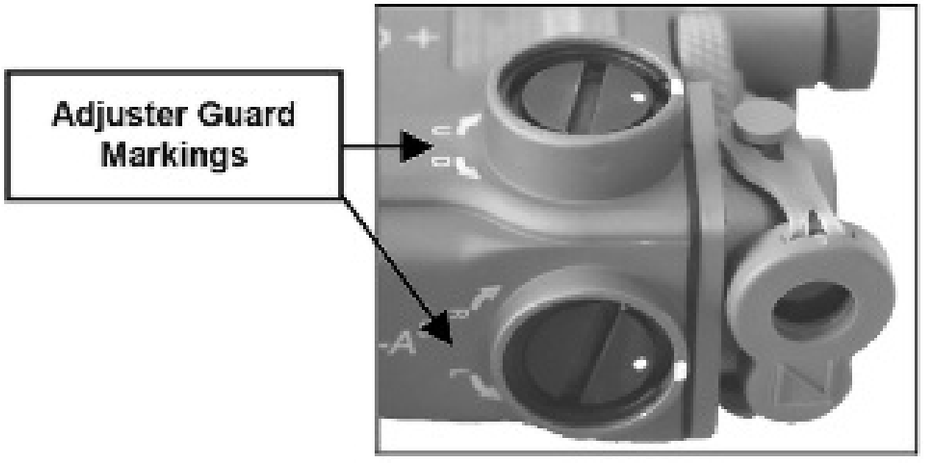


Figure 3-14 Adjuster Guard Markings

VIS POINT and IR POINT Adjustment

Table 3-3 indicates the direction of adjuster rotation and resultant shot group movement for zeroing the VIS POINT or IR POINT to the weapon when the DBAL-A^3 is TOP Mounted.

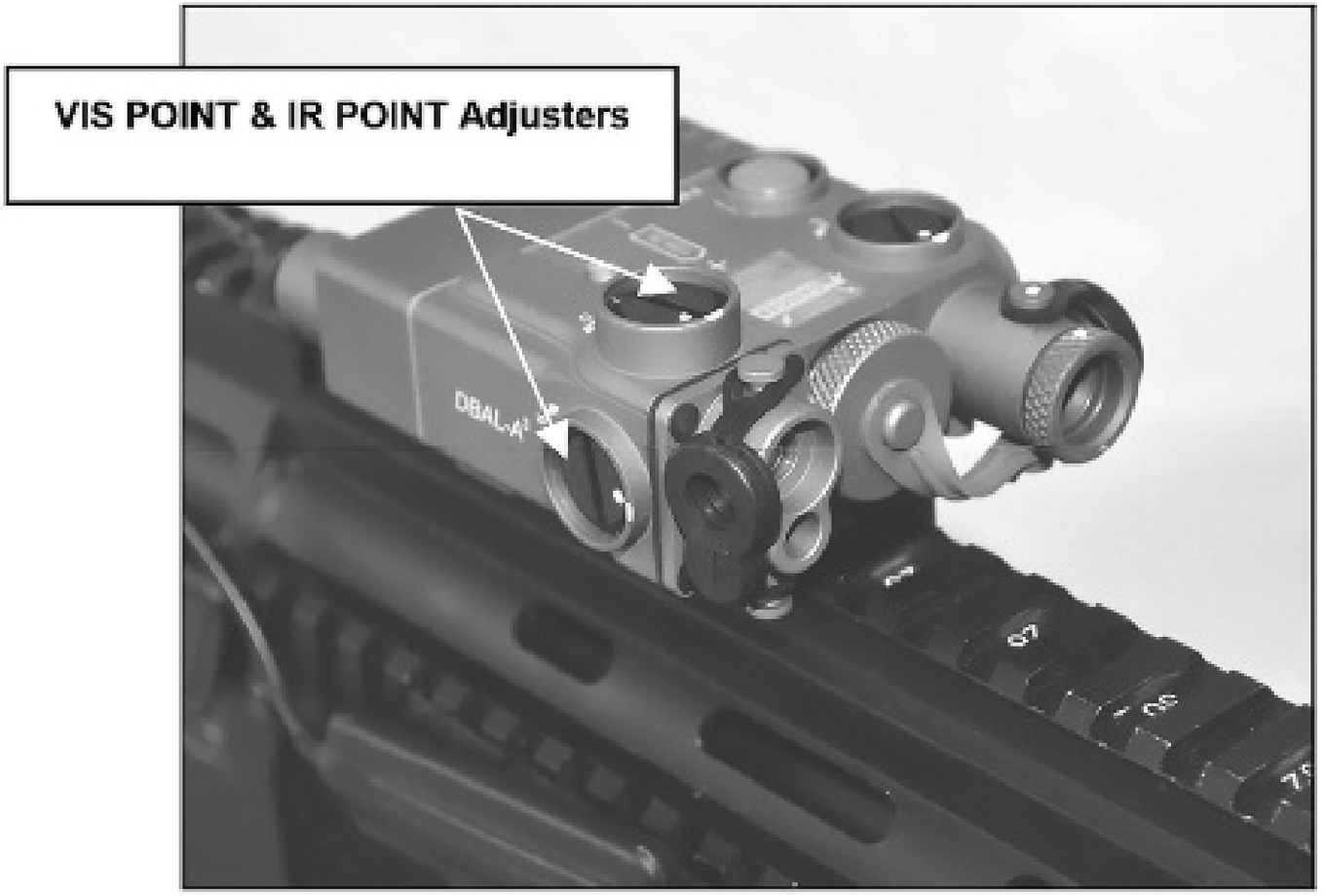


Figure 3-15 VIS POINT and IR POINT Adjusters (Top Mounted)

Table 3-2 Adjuster Rotation and Shot Group Movement for the VIS POINT and IR POINT (Top Mounted)

ZEROING THE AIMING LASER	Adjuster Movement	Shot Group Movement
Top Adjuster Elevation	CW	Up
(guard marked U/D)	CCW	Down
Side Adjuster Windage	CW	Right
(guard marked R/L)	CCW	Left

When adjusting in a CCW direction, apply a positive load to the adjuster by turning an additional 1/4 turn (8 clicks) CCW, then make the final boresighting/zeroing adjustments by turning the adjusters in a CW direction. No positive load is required when adjustments are made in the CW direction.

IR POINT/ILLUM Adjustment

Table 3-4 indicates the direction of adjuster rotation and resultant illumination beam movement for centering the illumination area on the aiming beam when the DBAL-A^3 is TOP Mounted.

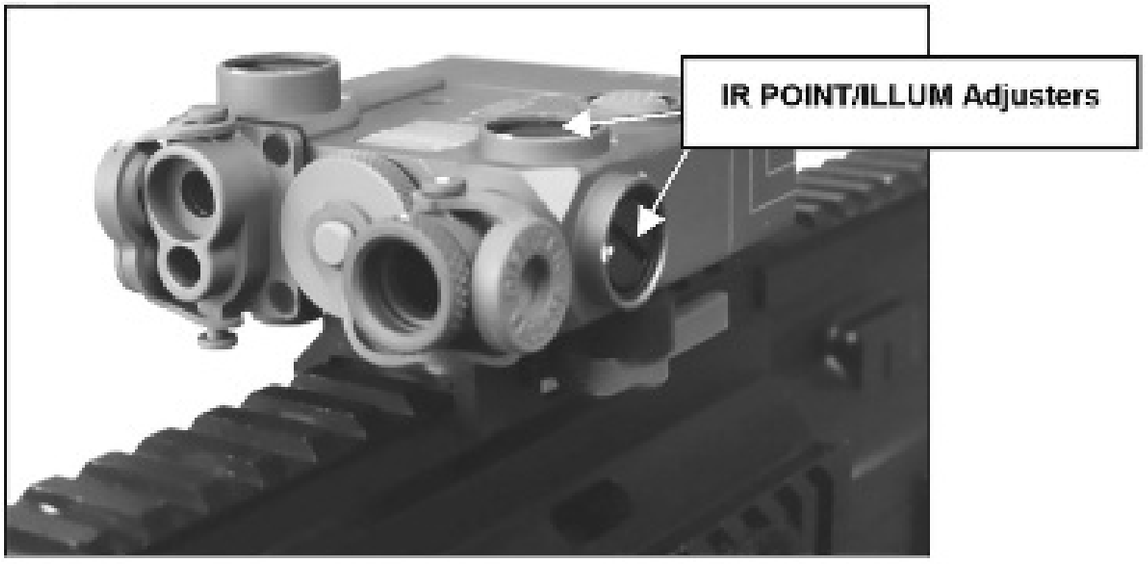


Figure 3-16 IR POINT/ILLUM Adjusters (Top Mounted)

Table 3-3 Adjuster Rotation and Illumination Area Movement for the IR POINT/ILLUM (Top Mounted)

ZEROING THE IR POINT/ILLUM	Adjuster Movement	Illumination Area Movement
Top Adjuster Elevation	CW	Up
(guard marked U/D)	CCW	Down
Side Adjuster Windage	CW	Right
(guard marked L/R)	CCW	Left

When adjusting in a CCW direction, apply a positive load to the adjuster by turning an additional 1/4 turn (8 clicks) CCW, then make the final boresighting/zeroing adjustments by turning the adjusters in a CW direction. No positive load is required when adjustments are made in the CW direction.

CHAPTER III – SECTION II MOUNTING PROCEDURES

3.2 MOUNTING PROCEDURES

WARNING

Be sure the weapon is CLEAR and on SAFE before proceeding.

NOTE

The DBAL-A^3 may be placed at any position (forward and aft) on the rail that is convenient for the operator. If the DBAL-A^3 is removed from the rail, the operator must take note of the position at which it was zeroed, and return it to the same position in order to ensure that zero is retained.

Failure to fully tighten the Quick Release Mount will cause zero retention problems. Insure that the base of the Quick Release Mount is fully seated on the MIL-STD-1913 rail with NO front or rear overhang.

The DBAL-A^3 is for use on weapons where the MIL-STD- 1913 rail is parallel with the bore of the weapon. In the factory neutral position the VIS POINT / IR POINT should project on the same side of the target as the laser is mounted and must fall within 10.2 cm of the bore at 25 meters. See Section 3.5.

An integrated Quick Release Mount is used to attach the DBAL-A^3 to weapons equipped with a MIL-STD-1913 rail. Place the device far enough back on the rail to allow for battery replacement without removal from the weapon. If removed, the DBAL-A^3 must be returned to the same position on the rail to retain zero.

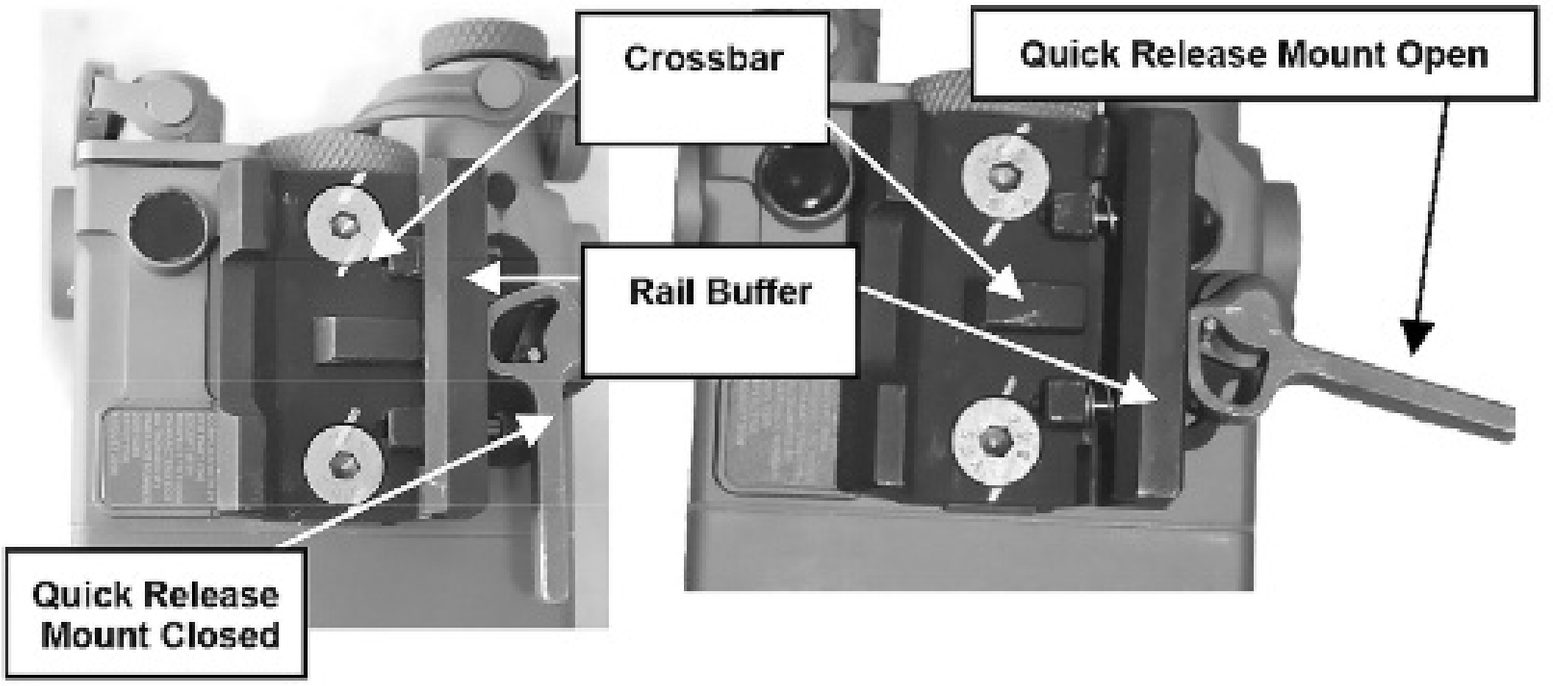


Figure 3-17 Quick Release Mount Configuration

3.3.a M4/M16A4 Mounting Procedure

The DBAL-A^3 may be mounted on the TOP, LEFT, or RIGHT rail using the Quick Release Mount.

Open the Quick Release Mount so that it is perpendicular to the DBAL-A^3 housing. See Figure 3-17.

Place the rail buffer against the left side of the MIL-STD-1913 rail and align the crossbar on the bottom of the mount with a slot on the rail. Push forward on the DBAL-A^3 so that the crossbar contacts the front of the slot on the MIL-STD-1913 rail. Move the quick release lever so that it is parallel with the body of the laser housing. See Figure 3-17.

Install the Remote Cable Switch in a convenient location.

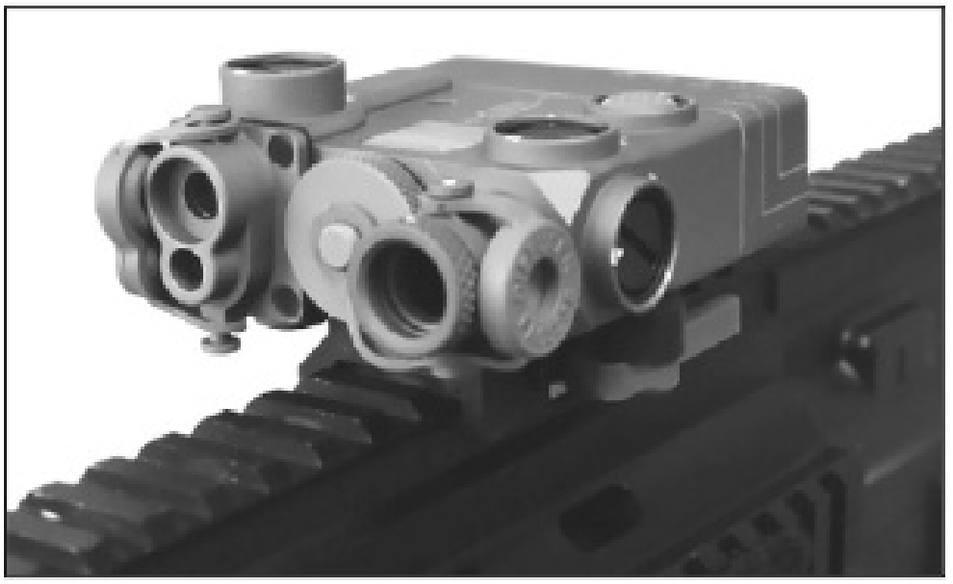


Figure 3-18 DBAL-A^3 Top Mounted on M4/M16A

CHAPTER III – SECTION III ZEROING PROCEDURES

This section provides zeroing instructions for the DBAL-A^3 using the MBS-1WE Laser Borelight System (LBS), LDI Part No. 3160635 on a 25-meter range.

3.4 PLACING A POSITIVE LOAD ON THE ADJUSTERS

CAUTION

DO NOT over-adjust the adjusters by forcing them beyond their end of travel.

NOTE

ALWAYS Zero the DBAL-A^3 starting with the Adjuster marked D/U.

When moving the adjusters, make sure that the adjustment mechanism has engaged a detent and has not stopped between detents. Failure to properly engage a detent may impact accuracy as the laser may move when the weapon is fired.

Positive Load is required anytime an adjustment to VIS POINT / IR POINT or IR POINT/ILLUM is made in a CCW direction. A Positive Load is not required when making a CW adjustment.

Positive Load is the controlled compression of the spring within the adjuster mechanism to insure the highest level of accuracy is maintained after the weapon is zeroed.

When adjusting in a CCW direction, apply a positive load to the adjuster by turning an additional 1/4 turn (8 clicks) CCW, then make the final adjustment by turning the adjuster CW. For example, to move the adjuster one (1) click CCW, turn the adjuster CCW 8 clicks and then turn it CW 7 clicks to the new position.

3.4 FACTORY NEUTRAL PRESET

CAUTION

DO NOT over-adjust the adjusters by forcing them beyond their end of travel.

NOTE

ALWAYS zero the DBAL-A^3 starting with the Adjuster marked D/U.

When moving the adjusters, make sure that the adjustment mechanism had engaged a detent and has not stopped between detents. Failure to properly engage a detent may adversely impact accuracy as the laser may move to the next detent when the weapon is fired.

The adjuster may offer some resistance as you turn it in a CW direction from the factory neutral position. When the adjuster is harder to turn it has reached the maximum CW travel.

The DBAL-A^3 is preset at the factory to a neutral position. In the neutral position the laser beam is parallel to the bore of the weapon. The VIS POINT / IR POINT can be returned to the factory alignment (neutral position) using the following procedure:

1. Turn the adjuster marked U/D CW to the natural stop.
2. Turn it CCW one and one-quarter (1 1/4) turn.
3. Turn it CW until the white dot on the adjuster aligns with the white dot on the adjuster guard.
4. Turn the adjuster marked R/L CW to the natural stop.
5. Turn it CCW one and one-quarter (1 1/4) turn.
6. Turn it CW until the white dot on the adjuster aligns with the white dot on the adjuster guard.

Figure 3-19 Neutral Preset

Table 3-4 Factory Neutral Preset

Adjuster	Instruction
Adjuster Guard marked U/D for the visible pointer and IR pointer	First, turn CW to end of travel. DO NOT force past mechanical stop. Next, turn CCW 1 1/4 turns. Finally, turn CW to align the dot on the adjuster with the dot on the adjuster guard.
Adjuster Guard marked R/L for the visible pointer and IR pointer	

3.6 DBAL-A^3 Mounting Configurations and Weapon Offsets

Table 3-5 Mounting Configuration and Weapon Offsets includes weapon type, mounting configurations and offsets used in conjunction with DBAL-A^3. The table includes the 10 Meter Laser Borelight Offsets as well as standard M16A2/M16A4 25-Meter Zeroing Target offsets.

Table 3-5 DBAL-A^3 Mounting Configurations and Weapon Offsets

Weapon	Mount	Range Zeroed To	10m Boresight Target Offset cm	25m M16A2/M16A4 Target Zero Offset Squares to Strike Point
M4/M16A4	DBAL-A^3 top rail	300m	VIS POINT 2.1R / 2.9U IR POINT 2.1R / 3.2U	VIS POINT 2.1L / 0 IR POINT 2.1L / 0
M4/M16A4	DBAL-A^3 left rail	300m	VIS POINT 5L / 1.2U IR POINT 5.5L / 1.2U	VIS POINT 5R / 2U IR POINT 5R / 2U
M4/M16A4	DBAL-A^3 right rail	300m	VIS POINT 4.4R / 3.6D IR POINT 4.9R / 3.6D	VIS POINT 5L / 7U IR POINT 5L / 7U
M4/M16 w/M203	DBAL-A^3 top rail	300m	VIS POINT 2.2R / 3.7U IR POINT 2.2R / 4.2U	VIS POINT 2.1L / 0 IR POINT 2.1L / 0
M4/M16 w/M203	DBAL-A^3 left rail	300m	VIS POINT 4.3L / 0.8U IR POINT 4.8L / 0.8U	VIS POINT 4.8R / 3U IR POINT 4.8R / 3U
M4/M16 w/M203	DBAL-A^3 right rail	300m	VIS POINT 4.7R / 2.8D IR POINT 5.2R / 2.8D	VIS POINT 5R / 7U IR POINT 5R / 7U
M249 Short Barrel	DBAL-A^3 top rail	400m	VIS POINT 1.2L / 6U IR POINT 1.2L / 6.5U	VIS POINT 9R / 13U IR POINT 9R / 13U
M249 Short Barrel	DBAL-A^3 left rail	400m	VIS POINT 8.4L / 2.4D IR POINT 9.2L / 2.4D	VIS POINT 2.1R / 4.4U IR POINT 2.1R / 5.4U
M249 Short Barrel	DBAL-A^3 right rail	400m	VIS POINT 4.3R / 7.5D IR POINT 4.7R / 7.5D	VIS POINT 2.1R / 4.4U IR POINT 2.1R / 5.4U

Weapon	Mount	Range Zeroed To	10m Boresight Target Offset cm	25m M16A2/M16A4 Target Zero Offset Squares to Strike Point
M249 Standard Barrel	DBAL-A3 top rail	400m	VIS POINT 4.8R / 5.5U IR POINT 4.8R / 6.2U	VIS POINT 2.1L / 2.1U IR POINT 2.1L / 1.1U
M249 Standard Barrel	DBAL-A3 left rail	400m	VIS POINT 4.4L / 1.8D IR POINT 5.3L / 1.8D	VIS POINT 6.7R / 9.7U IR POINT 6.7R / 9.7U
M249 Standard Barrel	DBAL-A3 right rail	400m	VIS POINT 5.7R / 7.4D IR POINT 6.7R / 7.4D	VIS POINT 6.7L / 13.9U IR POINT 6.7L / 13.9U
M240B	DBAL-A3 top rail	500m	VIS POINT 2R / 3.8U IR POINT 2R / 4.5U	VIS POINT 2.1L / 5.1U IR POINT 2.1L/ 5.1U
M240B	DBAL-A3 left rail	500m	VIS POINT 6L / 3.5D IR POINT 6.5L / 3.5D	VIS POINT 6.3R / 14.6U IR POINT 6.8R / 14.6U
M240B	DBAL-A3 right rail	500m	VIS POINT 6R / 7.8D IR POINT 6.9R / 7.8D	VIS POINT 6.8L / 16.8U IR POINT 6.8L / 16.8U

3.6.a Zeroing Using the Laser Borelight System (LBS)

WARNING

NEVER boresight in the High Power mode of operation.

CAUTION

DO NOT over-adjust the adjusters by forcing them beyond their end of travel.

NOTE

The mission will dictate which aim laser (VIS POINT / IR POINT) will be boresighted to achieve maximum accuracy.

Always move the adjusters slowly, one click at a time, to prevent the adjuster from jumping detents. In extreme cold temperatures the adjusters may offer more resistance.

The adjuster may offer some resistance as you turn it in a CW direction from the factory neutral position. When the adjuster is harder to turn it has reach the maximum CW travel.

When the adjuster is at its maximum CW or CCW point of travel and is turned in the opposite direction the laser point may trace a small loop on the target. This is normal and does not indicate a failure condition.

A positive load is required on the adjustment mechanism when zeroing the DBAL-A^3 for purposes of retaining the set alignment See Section 3.4.

NOTE

The adjuster knobs on the DBAL-A^3 may vary slightly in the force required to turn the adjusters. This is normal and does not indicate a failure condition. At the maximum CW or CCW travel the DBAL-A^3 lasers may not move a full .75 cm per click, or may jump squares on the target. If this happens the DBAL-A^3 should be returned to its factory neutral preset as described in Section 3.5.

DBAL-A^3 is for use on weapons where the MIL-STD- 1913 rail is parallel with the bore of the weapon. In the factory neutral position the VIS POINT / IR POINT should project on the same side of the target as the laser is mounted and must fall within 10.2 cm of the bore at 25 meters. See Section 3.5.

This procedure is used to boresight the DBAL-A^3 on its weapon for a distance of 300, 400 or 500 meters using the MBS-1WE Laser Borelight System (LBS), LDI Part No. 3160635. Boresight Targets may be locally manufactured using the offsets found in Table 3-5.

See Figure 3-20 for a sample 25 Meter Offset Target. Refer to the LBS Operator's Manual for instructions on creating boresight targets. Each adjuster click moves the strike point 4mm on the offset target.

1. Create the 25 Meter Boresight Target for the DBAL-A^3 weapon combination for which boresighting is required using the 10m Boresight Target Offsets in Table 3-5.
2. Position the target at 25 Meters oriented in a level, vertical position. Proper positioning of the target is critical for accurate boresighting results.
3. Stabilize the weapon so it does not move and insert the LBS Mandrel Interface assembly into the muzzle of the weapon.
4. Rotate the LBS Mode Selector Switch to the LO position and verify that the LBS is properly aligned. Refer to LBS Operator's Manual for zeroing procedures.
5. Adjust the target as required to place the laser dot on the target location marked "Laser Borelight."
6. Activate the aiming laser to be zeroed by rotating the Laser Mode Selector Switch. Next, rotate the Activation Mode Selector Switch to the ON LO PWR position. Adjust the Aiming Laser windage and elevation adjusters until the point is centered on the corresponding offset location.
7. A positive load is required on the adjustment mechanism when zeroing the DBAL-A^3 for purposes of retaining the set alignment. See Section 3.4.
8. The DBAL-A^3 weapon combination is now zeroed. Rotate the DBAL-A^3 Activation Mode Selector Switch to OFF and remove the Borelight Mandrel Interface assembly from the weapon.

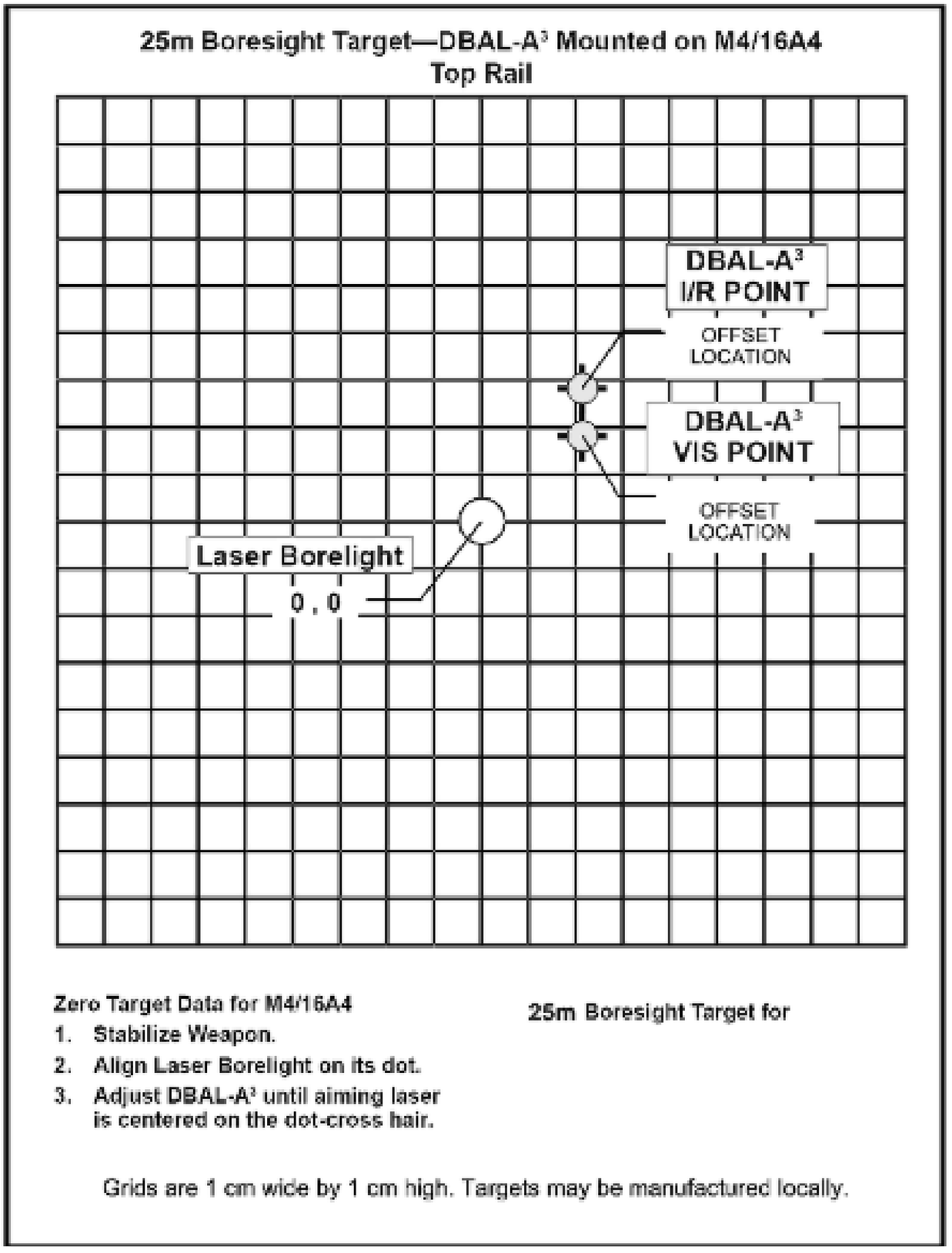


Figure 3-20 Sample 25-meter Boresight Target

3.6.b Zeroing on a 25-Meter Range

CAUTION

DO NOT over-adjust the adjusters by forcing them beyond their end of travel.

NOTE

The mission will dictate which aim laser (VIS POINT / IR POINT) will be boresighted to achieve maximum accuracy.

Always move the adjusters slowly, one click at a time, to prevent the adjuster from jumping detents. In extreme cold temperatures the adjusters may offer more resistance.

The adjuster may offer some resistance as you turn it in a CW direction from the factory neutral position. When the adjuster is harder to turn it has reach the maximum CW travel.

When the adjuster is at its maximum CW or CCW point of travel and is turned in the opposite direction the laser point may trace a small loop on the target. This is normal and does not indicate a failure condition.

A positive load is required on the adjustment mechanism when zeroing the DBAL-A^3 for purposes of retaining the set alignment See Section 3.4.

The adjuster knobs on the DBAL-A^3 may vary slightly in the force required to turn the adjusters. This is normal and does not indicate a failure condition.

NOTE

At the maximum CW or CCW travel the DBAL-A^3 lasers may not move a full 1cm per click, or may jump squares on the target. If this happens the DBAL-A^3 should be returned to its factory neutral preset as described in Section 3.5.

DBAL-A^3 is for use on weapons where the MIL-STD-1913 rail is parallel with the bore of the weapon. In the factory neutral position the VIS POINT / IR POINT should project on the same side of the target as the laser is mounted and must fall within 10.2 cm of the bore at 25 meters. See Section 3.5.

This procedure is used to zero the DBAL-A^3 to the following weapons for the distances listed in Table 3-5. Refer to Table 3-2 and Table 3-4 for adjuster rotation and direction of shot group movement. Each adjuster click moves the strike point by 1 cm on the M16A2/M16A4 25 meter zeroing target.

1. On a 25 meter zeroing target M16A2/M16A4, mark the designated strike point and designated 4 cm/6 cm strike zone based on the weapon you are using. See Table 3-5 and Figure 3-21.
2. Mount the target on an "E" silhouette or other suitable surface at 25 meters.
3. Set the DBAL-A^3 adjusters to their factory neutral position as described in Paragraph 3.5.
4. Activate the aiming laser (VIS POINT or IR POINT) to be zeroed by rotating the Activation Mode Selector Switch to the desired position. Press the Integrated Momentary Activation Switch or the Remote Cable Switch twice in rapid succession to activate the laser continuously. When aligning the IR POINT, leave the IR/ILLUM Exit Port Cover in place. Aim center mass of the target until the aiming laser disappears through the 3 cm cut out.
5. Fire a 3-round shot group and note the center of the shot group relative to the designated strike zone.
6. Adjust the aiming beam adjusters to move the center of the shot group to the designated strike zone.
7. Repeat steps 5 and 6 until the shot group falls within the strike zone.
8. When firing the M16, M4 series or M240 series of weapons, when 5 out of 6 consecutive rounds are in the designated 4cm strike zone you are zeroed. When firing the M249 series of weapons, when 5 out of 12 non-consecutive rounds are within a 6cm square, the weapon is zeroed.

Once the IR POINT is zeroed, open the Exit Port Cover in front of the IR POINT/ILLUM while aiming the weapon down range. If necessary, adjust the focus of the IR POINT/ILLUM so that it can be seen down range. Use the IR POINT/ILLUM adjustors to center the IR POINT/ILLUM on the IR POINT.
Rotate the DBAL-A^3 Activation Mode Selector Switch to OFF.

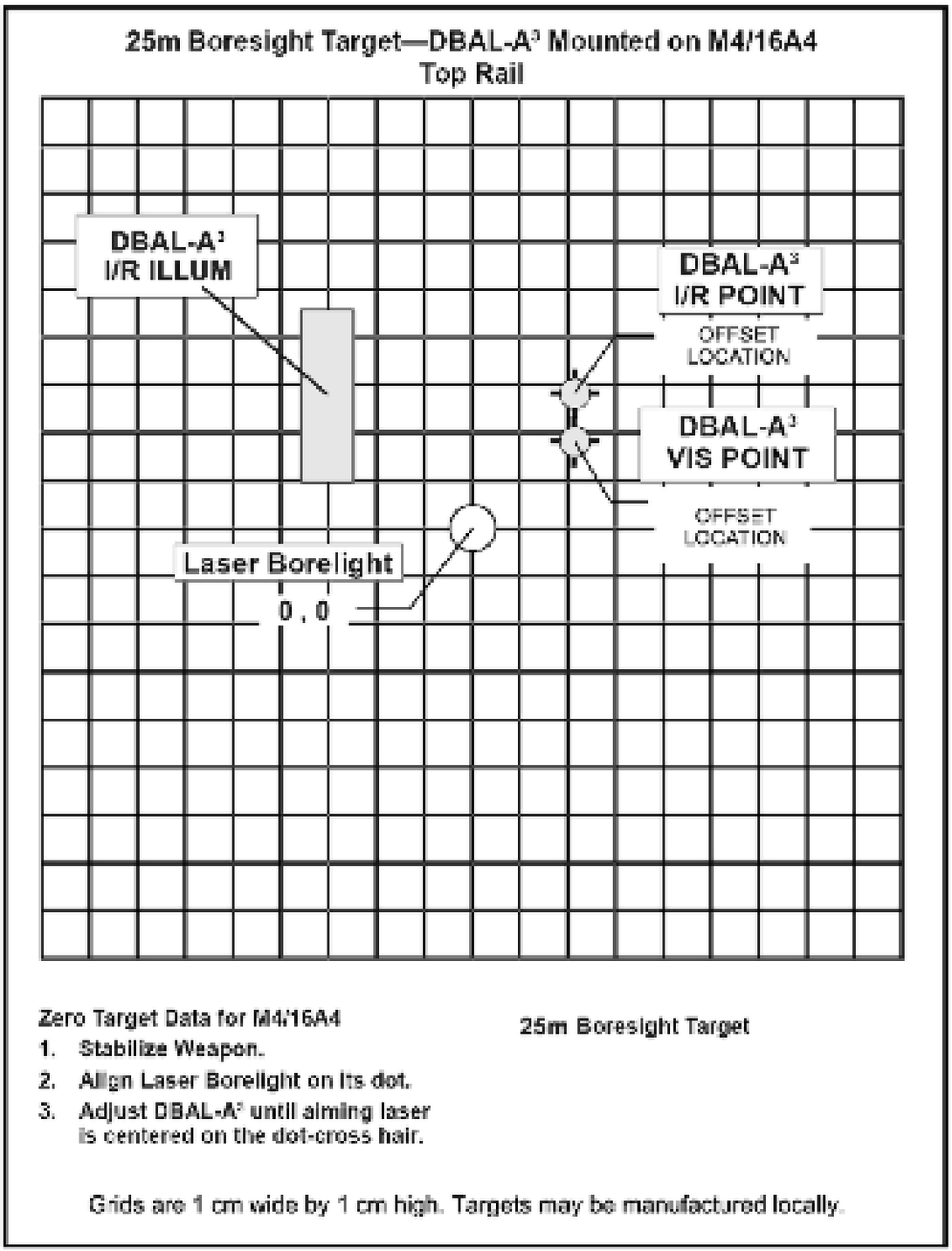


Figure 3-13 25-meter Zeroing Target

CHAPTER IV – SECTION I PREVENTIVE MAINTENANCE CHECKS

4.1 GENERAL

Table 4-1 Preventive Maintenance Checks, has been provided so that you can keep your equipment in good operating condition.

NOTE

Perform functional tests in the order listed in Table 4-1. Operating Procedures are detailed in Chapter III, Section I.

The Safety Screw must be installed in the Training Position. See Paragraph 3.2.c for Safety Screw operation.

Functional testing of the DBAL-A^3 to ensure proper operation should be performed in a dark room or area away from light. Viewing of IR beams must be performed with a NVD, (AN/PVS-7 or AN/PVS-14).

4.1.a Warnings and Cautions

Always observe the WARNINGS and CAUTIONS appearing in the table.

4.1.b Explanation of Table Entries

1. Item Number

Numbers in this column are for reference. Item numbers also appear in the order that you must perform the checks and services listed.

2. Interval

This column tells you when you must do the procedure in the procedure column. BEFORE (B) PROCEDURES must be done before you operate or use the equipment. DURING (D) PROCEDURES must be done during the time you are operating or using the equipment. AFTER (A) PROCEDURES must be done immediately after you have operated or used the equipment.

3. Item to Check/Service

This column provides the item to be checked or serviced.

4. Procedure

This column gives the procedure you must do to check the item.

5. Not Fully Mission Capable If

Information in this column tells you what faults will keep your equipment from being capable of performing its primary mission.

Be sure to observe all special information and notes that appear in your table.

Table 4-1 Preventive Maintenance Checks and Services

Item No.	Interval	Item to Check/Service	Procedure	Not Fully Mission Capable If:
1	B/D/A	DBAL-A^3 Exterior	-Check housing for separation between the front and the rear section of the housing, missing screws switch knobs, and windage and elevation adjuster covers.	A gap appears between the front and the rear section of the housing, missing switch knob, or adjuster covers.
WARNING: DO NOT STARE DIRECTLY INTO INFRARED LIGHT BEAM				
2	B/A	Exit Port Covers	-Check for broken or missing covers, exit port cover retention studs. -Move the Exit Port Covers to the open position.	
3	B/A	Exit Port Lens	-Check for cracked, dirty or broken lenses or missing ILLUM focusing adjustment.	-If cracked or missing lens or missing ILLUM focusing knob.
4	B/A	Adjusters	-Check for broken, missing or stripped Adjusters.	-Adjusters broken, missing or stripped or laser fails to move.

Table 4-1 Preventive Maintenance Checks and Services

Item No.	Interval	Item to Check/Service	Procedure	Not Fully Mission Capable If:
5	B/D/A	Quick Release Mount	-Check attachment to housing, broken, missing parts. -Inspect rail clamp, crossbar and mount base for dirt and corrosion. -If laser is loose on the rail: Move to a different position on the rail; Move to a different rail on weapon; Replace the rail on weapon.	-Quick release mount loose, missing parts or broken.
6	B/D/A	Safety Screw	-Broken or Missing.	-Broken or Missing.
7	B/D/A	Remote Cable Port	-Check for mud or dirt and clean as needed.	
8	B/A	Battery Compartment	-Check for corrosion, presence of O-ring, spring, battery cap lanyard. Inspect threads for dirt or damage.	-Corroded or broken contacts.
9	B/A	Battery Compartment O-Ring	-Check O-ring for cuts, cracks. -Lubricate as needed.	-Cracked or cut; may cause leakage into unit.
10	B/A	Install CR123A or AA Battery (depending on model)	-Install a known good battery	

Table 4-1 Preventive Maintenance Checks and Services

Item No.	Interval	Item to Check/Service	Procedure	Not Fully Mission Capable If:
11	B/A	Activation Mode Selector Switch and Integrated Momentary Activation Switch	-Select LV (LOW VIS POINT) using the Activation Mode Selector Switch. -Use the Integrated Momentary Activation Switch and observe the beam spot on wall. -Select H.V. (HIGH VIS POINT) and repeat the activation. -Select L.L (LOW IR POINT and LOW IR POINT/ILLUM and repeat the activation using a night vision goggle to view the IR laser POINT and ILLUM on the wall. -Repeat for each laser activation position.	-Activation Mode Selector Switch inoperative with the VIS POINT, IR POINT, or IR POINT/ ILLUM beam spot not visible.

Table 4-1 Preventive Maintenance Checks and Services

Item No.	Interval	Item to Check/Service	Procedure	Not Fully Mission Capable If:
12	B	Boresight	-Confirm that the IR POINT or VIS POINT to be used on the mission can be zeroed on the weapon it will be mounted on.. -Check to make sure that the VIS POINT / IR POINT projects on the same side of the target as the laser is mounted and falls within 10.2 cm of the bore at 25 meters. See Section 3.5.	
13	B/D/A	LED Status Indicator	-Observe green LED is lit and does not flash when lasing.	
14	B/A	Optical Instrument Reticle	-Check for presence of cracks in the lens. -Install and check pattern is visible using IR POINT or IR POINT/ILLUM. -Focus IR POINT/ILLUM as needed to view pattern. -Rotate OIR to improve intensity	
15	B/A	Remote Cable Switch	-Insert the remote cable switch and activate the laser.	

Table 4-1 Preventive Maintenance Checks and Services

Item No.	Interval	Item to Check/Service	Procedure	Not Fully Mission Capable If:
16	B/A	Flood Adjuster	-Check that IR POINT/ILLUM adjusts from spot to flood setting	
17	B	Exit Port Covers	-Close exit port covers and press into place. -Activate visible laser and visually check to make sure no light is being emitted from around the cover.	
18	A	Textile Bag	-Check for torn fabric.	
19	A	Battery	-Remove battery.	

CHAPTER IV – SECTION II TROUBLESHOOTING

4.2 GENERAL

The purpose of troubleshooting is to identify the most frequent equipment malfunctions, probable causes and corrective actions required. Table 4-2 lists the common malfunctions which may be found during the operation or maintenance of the DBAL-A^3 and accessory equipment. Perform the tests, inspections and corrective actions in the order listed. This manual cannot list all malfunctions that may occur, or all tests, inspections and corrective actions.

Table 4-1 Preventive Maintenance Checks and Services

Malfunction	Test / Inspection	Corrective Action	Ref. Para.
1. POINT/ILLUM beams fail to come on or stay on.	a. Ensure Activation switch is on and Mode Selector Switch is in proper position.	-Properly align switch.	3.2.b 3.2.c
	b. Verify Exit Port Cover is removed and that the Exit Port Lens is not obscured by mud/dirt.	-Remove Exit Port Covers. -Clean POINT & ILLUM Exit Port Lenses.	4.3.b
	c. Verify battery installation.	-Tighten battery cap. -Install new battery.	3.2.a
	d. Inspect battery cap for damage or corrosion.	-Notify Unit Maintenance.	
	e. Inspect battery contact spring and Mode Selector Switch is in in the battery compartment for damage or corrosion.	-Notify Unit Maintenance.	
	f. Possible internal failure.	-Notify Unit Maintenance.	
2. POINT/ILLUM beams have become weak (not as bright).	a. Verify Exit Port Cover is removed and that Exit Port Lens is not obscured by mud / dirt.	-Remove Exit Port Cover. -Clean POINTER & ILLUM Exit Port Lenses.	4.3.b
	b. Verify proper battery installation.	-Tighten battery cap. -Install new battery.	3.2.a
	c. Verify Exit Port Lens is not scratched or pitted.	-Notify Unit Maintenance.	

Table 4-1 Preventive Maintenance Checks and Services

Malfunction	Test / Inspection	Corrective Action	Ref. Para.
3. Low Battery Indicator Light remains on when new battery is installed.	a.Inspect battery compartment for corrosion.	-Clean battery compartment.	4.3.d
	b. Inspect Battery Cap contact for corrosion.	-Clean battery cap.	4.3.d
	c. Inspect battery cap and housing threads for contamination.	-Clean battery cap and housing threads.	4.3.a
4. POINTER/ILLUM beams DO NOT move.	a. Verify adjuster function.	-Clean as required -Notify Unit Maintenance.	4.3.a
5. Remote Cable Switch inoperable, but Integrated Momentary Activation Switch functions.	a. Verify Remote Cable Switch plug is fully seated.	-Reconnect plug.	3.2.g
	b. Verify Remote Cable Port is free of mud / dirt.	-Flush with water.	4.3.a
	c. Inspect Remote Cable Plug Contacts.	-Clean as needed.	4.3.a
	d. Verify function of Remote Cable Switch.	-Notify Unit Maintenance.	
6. POINTER beam cannot be zeroed to weapon.	a. Verify Quick Release Mount is properly positioned/secured to weapon.	-Properly position and secure.	3.3
	b. If laser is loose on rail:	-Move to different position on rail. -Move to different rail on weapon. -Replace rail on weapon.	3.3

Table 4-1 Preventive Maintenance Checks and Services

Malfunction	Test / Inspection	Corrective Action	Ref. Para.
6. POINTER beam cannot be zeroed to weapon.	c. Inspect mount base for corrosion or dirt. d. Verify DBAL-A^3 is properly secured to Quick Release Mount.	-Clean as required. -Notify Unit Maintenance. -Notify Unit Maintenance.	4.3.a
	e. Verify Quick Release Mount is not damaged.	-Notify Unit Maintenance.	
7. ILLUM knob turns, but beam does not change.	a. Verify knob is free of mud and dirt.	-Clean as required -Notify Unit Maintenance.	4.3.a
8. OIR is installed in front of IR POINT/ILLUM and pattern is blurry or unrecognizable.	a. Verify IR POINT/ILLUM has been focused to a spot	-Focus the IR POINT/ILLUM to a point. -Rotate OIR to improve intensity. -Install different OIR -Notify Unit Maintenance	3.2.i

CHAPTER IV – SECTION III OPERATOR MAINTENANCE

4.3 GENERAL

WARNING

DO NOT store the DBAL-A^3 with the battery installed.

CAUTION

The use of gun cleaning agents that contain perchloroethylene or methylene chloride may permanently damage the DBAL-A^3 system.

The DBAL-A^3 is a rugged, compact laser device that is designed to operate in severe environments. The exterior housing is made of aircraft grade aluminum and the outer components are made of chemically resistant materials that will not be harmed by chemicals normally encountered during military operations. Operator maintenance is limited to the inspection and cleaning of the DBAL-A^3 external surfaces, replacement of the battery before each mission and removal of the battery after each mission.

4.3.a External Cleaning

Clean the exterior of the DBAL-A^3 by flushing with water and wiping with a clean, soft cloth. Cleaning should be done whenever the DBAL-A^3 becomes dirty or after exposure to salt water.

4.3.b Exit Port Lens Cleaning

To clean the POINT and ILLUM Exit Port Lenses,, wipe clean using a soft cloth or disposable applicator dampened with water.

4.3.c Battery Compartment

Before each use, inspect the battery and battery compartment for dirt, dust, or corrosion. If dirty, clean using a soft cloth or disposable applicator.

4.3.d Battery Cap

Before each use, inspect the battery cap for dirt, dust or corrosion. If dirty, clean using a soft cloth or disposable applicator. Prior to water operations or emersion, inspect the O-ring seals in the battery cap to make sure they are free of sand or dirt particles. If the O-ring becomes cut, nicked or dried out, it should be replaced. If the battery cap is bent or scratched in the O-ring seating area, it should be replaced.

4.3.e IR POINT/ILLUM

Prior to water operations or immersion, make sure that the IR POINT/ILLUM Focusing Knob has been tightened in a CCW direction. This will fully compress the internal O-rings to prevent the possibility of water infiltrating the housing.

4.3.f Battery Removal and Replacement

Refer to Chapter III, Paragraph 3.2.a for Battery Installation procedures. No special tools or equipment are required to replace the battery.

4.3.g Remote Cable Port

Before each use, inspect the remote cable port for dirt, dust, or corrosion. Thoroughly clean the receptacle by flushing with water, then wipe with a soft cloth or disposable applicator.

4.3.h Battery Compartment O-ring

NOTE

Never use a sharp or metal object to remove O-rings as they damage the O-ring or the O-ring groove contact surface.

Before each use, inspect the battery compartment O-ring for nicks, cuts or damage. Lubricate the O-ring as needed using silicone grease as follows:

1. Gently Remove the O-ring. Be careful not to stretch the O-ring.

2. Check the O-ring for hair, sand, lint or other debris and wipe clean as necessary. Be careful not to stretch the O-ring. If the Oring is cut or cracked it must be removed and replaced with a new O-ring.

3. If possible, wash your hands prior to greasing the O-ring. Lubricate the O-ring using your fingertips and a small amount of grease until there is a thin film covering the complete surface. DO NOT stretch the O-ring.

4. Before replacing the O-ring, visually inspect the groove in the battery compartment cap for hair, sand, lint, or other debris and wipe clean as necessary.

5. Install the O-ring in the groove at the base of the battery compartment cap making sure that it is seated uniformly, with no twists or loose areas. Be careful not to stretch the O-ring.

CHAPTER V – SECTION I UNIT TROUBLESHOOTING

5.1 UNIT TROUBLESHOOTING

The purpose of troubleshooting is to identify the most frequent equipment malfunctions, probable causes and corrective actions required. Table 5-1 lists the most common malfunctions that may occur with the DBAL-A^3. Perform the tests, inspections and corrective actions in the order they are listed. This manual cannot list all malfunctions that may occur, or all tests, inspections and corrective actions.

Table 5-1 Unit Troubleshooting

Malfunction	Test / Inspection	Corrective Action	Ref. Para.
1. POINT/ILLUM beams fail to come on or stay on.	a. Inspect battery compartment for corrosion. proper position.	-Clean battery compartment	5.2.c
	b. Inspect battery cap contact for corrosion	-Clean battery cap contact.	5.2.d
	c. Inspect battery cap and housing threads for contamination.	-Clean battery cap and housing threads.	5.2.d
	d. Possible internal failure.	-Replace battery cap -Notify Unit Maintenance.	5.2.d
2. POINT/ILLUM beams have become weak (not as bright).	a. Verify Exit Port Cover is removed and that Exit Port Lens is not obscured by mud / dirt.	-Remove Exit Port Cover. -Clean POINT & ILLUM Exit Port Lenses.	5.2.b
	b. Verify proper battery installation.	-Tighten battery cap. -Install new battery.	3.2.a
	c. Verify Exit Port Lens is not scratched or pitted.	-Replace battery cap. -Notify Unit Maintenance.	5.2.d
3. Low Battery Indicator Light remains on when new battery is installed.	a.Inspect battery compartment for corrosion.	-Clean battery compartment contacts.	5.2.c
	b. Inspect Battery Cap contact for corrosion.	-Clean battery cap.	5.2.d
	c. Inspect battery cap and housing threads for contamination.	-Clean battery cap and housing threads. -Replace battery cap -Notify Unit Maintenance.	5.2.e

Table 5-1 Unit Troubleshooting

Malfunction	Test / Inspection	Corrective Action	Ref. Para.
4. POINTER/ILLUM beams DO NOT move.	a. Verify adjuster function.	-Clean as required -Notify Unit Maintenance.	5.2.a
5. Remote Cable Switch inoperable, but Integrated Momentary Activation Switch functions.	a. Inspect Remote Cable Port for dirt or debris. b. Inspect Remote Cable Plug for damaged contacts. c. Possible remote cable failure.	-Clean remote cable port. -Replace remote cable assembly. -Replace remote cable. -Notify Unit Maintenance.	5.2.f 5.2.g 5.2.g
6. Laser cannot be aligned, moves on the rail, or the laser when reset to the factory neutral position fails to project the VIS POINT/ IR POINT on the same side of the target as the laser is mounted and does not fall within 10.2cm of the bore at 25 meters.	a.Inspect weapon system rail.	-Refer to appropriate weapons TM.	

CHAPTER V – SECTION II UNIT MAINTENANCE

5.2 General

CAUTION

The use of gun cleaning agents that contain perchloroethylene or methylene chloride may permanently damage the DBAL-A^3 system.

Unit Maintenance Procedures consist of operational tests, inspections, troubleshooting and the replacement of a limited number of parts (paragraphs 5.2.a through 5.2.g). All authorized repair parts can be installed at the unit level. A DBAL-A^3 failing to meet the tests and inspections should be replaced.

5.2.a External Cleaning

Clean the exterior of the DBAL-A^3 by flushing with water and wiping with a clean, soft cloth. Cleaning should be done whenever the DBAL-A^3 becomes dirty or after exposure to salt water.

5.2.b Exit Port Lens Cleaning

Use a lens cleaning kit to clean the VIS POINT, IR POINT and IR POINT/ILLUM lenses.

5.2.c Battery Compartment

Before each use, inspect the battery and battery compartment for dirt, dust or corrosion. Clean the battery compartment by wiping with a soft, clean cloth. If a damp cloth is used to clean the battery compartment make sure to allow the compartment to air dry completely before reinstalling the battery cap.

5.2.d Battery Cap

Prior to water operations or immersion, inspect the O-ring and the battery cap to make sure they are free of dirt, moisture or corrosion. Thoroughly clean the O-rings, battery cap and back of the battery compartment that seals against the O-ring using Isopropyl Alcohol. After cleaning, or if the O-ring becomes dried out, lubricate the O-ring using silicone grease. If the O-ring becomes cut or nicked, it should be replaced.

5.2.e Battery Compartment and Housing Threads

Inspect threading on the battery cap and housing for contamination. If the threading appears to be oily or dirty, clean with Isopropyl Alcohol using a soft, clean cloth.

5.2.f Battery Removal and Replacement

Refer to Chapter III, Paragraph 3.2.a for Battery Installation procedures. No special tools or equipment are required to replace the battery.

5.2.g Replace Remote Cable

See Paragraph 3.2.h for replacement of the Remote Cable Switch.

5.3 TESTS AND INSPECTIONS

See Operator Preventive Maintenance Checks and Services Table4-1.

5.4 REMOVAL AND REPLACEMENT OF PARTS

Unit Maintenance is authorized for the removal and replacement of a limited number of assemblies. All repair parts can be installed at the unit level. Special tools or equipment are not required for maintaining the DBAL-A^3.

5.4.a Battery Removal and Installation

See Paragraph 3.2.a for procedures.

Figure 5-1 Battery Removal and Installation

5.4.b Remove and Replace Battery Cap

NOTE

To remove the Battery Cap Retaining Strap it is necessary to remove the Exit Port Cover Retaining Strap first.

Install the Battery Cap Retaining Strap below the Exit Port Cover Retaining Strap on the IR POINT/ILLUM. If necessary, remove the bottom Exit Port Cover strap from the IR POINT/ILLUM Exit Port Cover then install the Battery Cap Retaining Strap.

To remove, stretch the end of the Retaining Strap over the stud on the Battery Cap then stretch the other end over the stud located directly below the IR POINT/ILLUM.
To install, stretch the end of the retaining strap over the stud located on the battery cap.

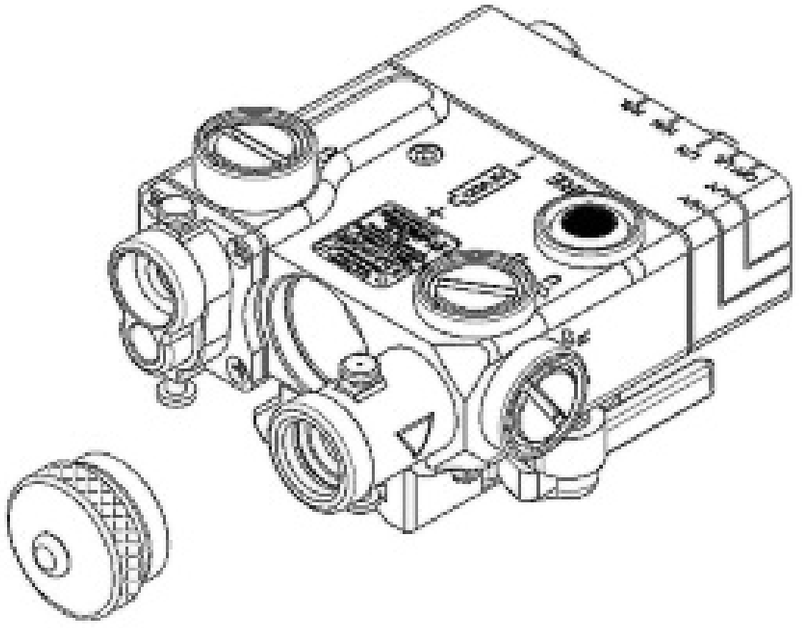


Figure 5-2 Remove and Replace Battery Cap

5.4.c Removal and Replacement of Battery Cap Retaining Strap

NOTE

Install the Battery Cap Retaining Strap below the Exit Port Cover Retaining Strap on the IR POINT/ILLUM. Remove the bottom Exit Port Cover strap from the IR POINT/ILLUM Exit Port Cover first then install the Battery Cap Retaining Strap.

To remove the Battery Cap Retaining Strap it is necessary to remove the Exit Port Cover Retaining Strap first.

To install stretch the end of the retaining strap over the stud located on the battery cap. Stretch the other end of the retaining strap over the stud located directly below the IR POINT/ILLUM focusing assembly.

To remove, stretch the end of the Retaining Strap over the stud on the Battery Cap then stretch the other end over the stud located directly below the IR POINT/ILLUM.

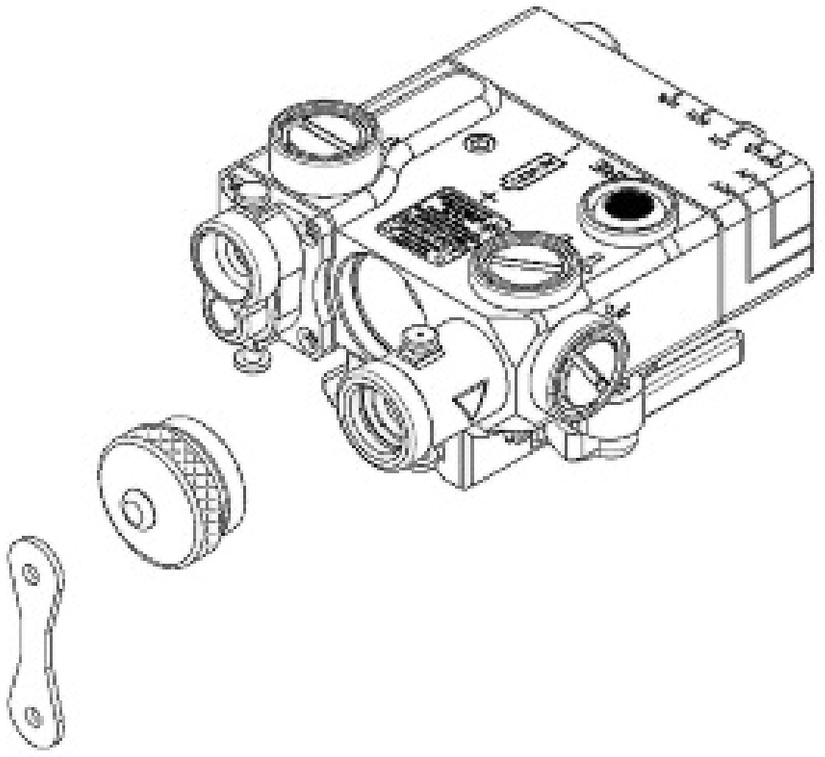


Figure 5-3 Remove and Replace Battery Cap Retaining Strap

5.4.d Remove and Replace Battery Cap O-ring

NOTE

NEVER use a sharp or metal object to remove O-rings as they may damage the O-ring or the O-ring groove contact surface. Inspect the O-ring for nicks, cracks, cuts or abrasion. Also check to make sure that it feels soft. If damaged, replace the O-ring.

To remove pull the O-ring out of the groove at the base of the threaded portion of the battery cap and remove. Install the new Oring by pulling it onto the battery cap so that it fits in the groove located at the base of the threaded portion of the battery cap.

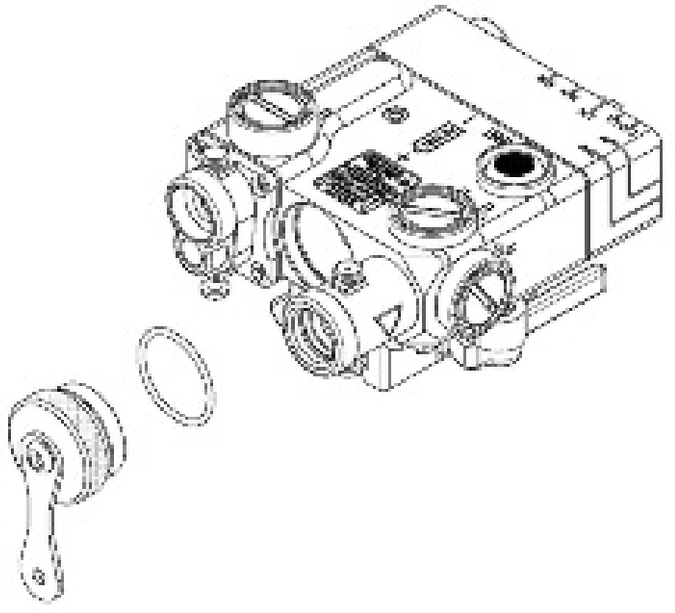


Figure 5-4 Remove and Replace Battery Cap O-Ring

5.4.e Remove and Replace Safety Screw

WARNING

In order to make the DBAL-A^3 operate in the High Power modes of operation the blue safety screw must be removed from the back of the unit. The Armorer will remove and store the safety screw.

CAUTION

DO NOT over tighten the Safety Screw as it may strip the threads in the housing. The Armorer will remove and store the safety screw using a 3/32" hex key. The Armorer will install the safety screw using a 3/32" hex key.

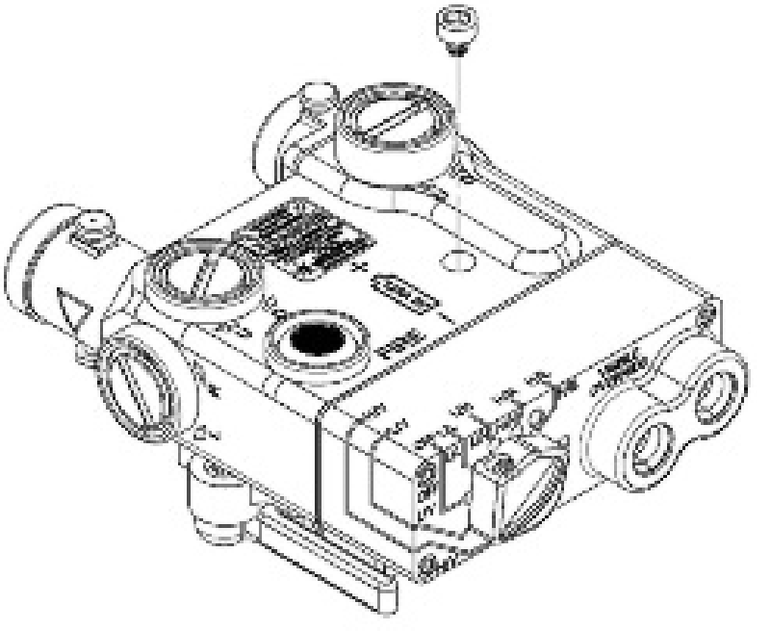


Figure 5-5 Remove and Replace Safety Screw

5.4.f Removal and Replacement of Exit Port Cover Retaining Straps

To remove the top Exit Port Cover, pull on the loose end of the Exit Port Cover retaining strap and stretch it over the top stud. Repeat the procedure to remove the bottom Exit Port Cover retaining strap from the DBAL-A^3.

To replace the Exit Port Cover Retaining Straps, stretch the end of the retaining strap over the retaining stud located on the bottom of the housing. Repeat the procedure by stretching the loose end of the retaining strap over the stud located on the top of the housing.

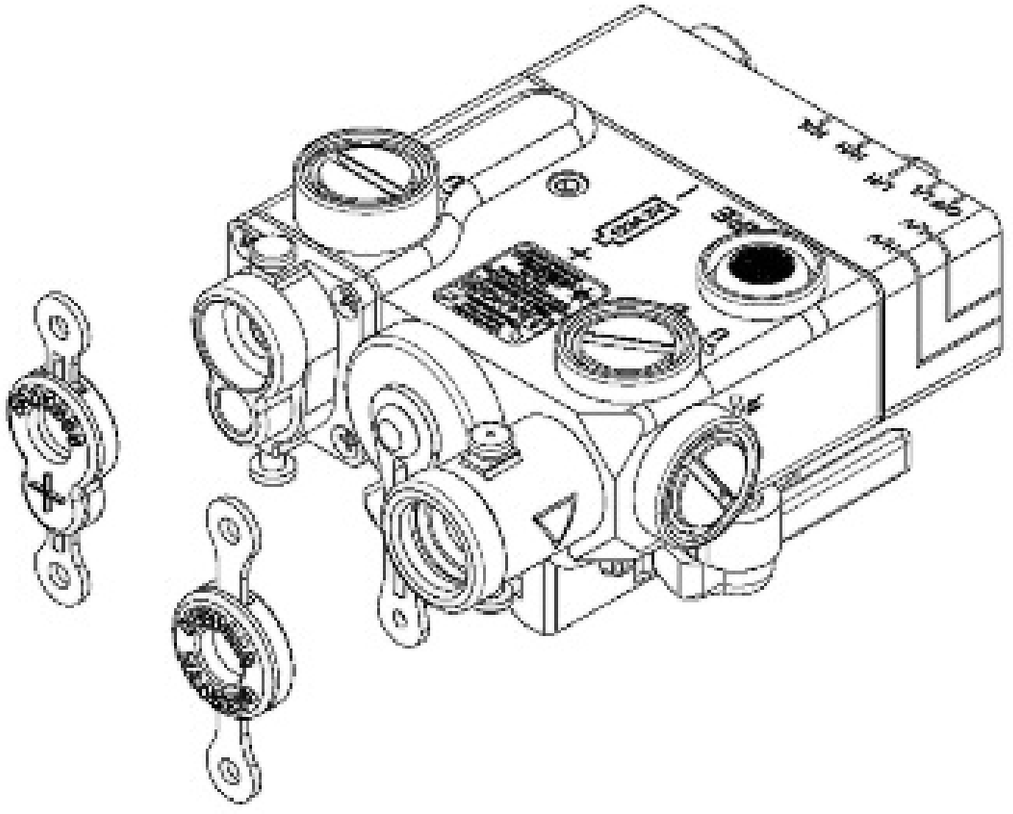


Figure 5-6 Remove and Replace Exit Port Cover Retaining Straps

CHAPTER V – SERVICE/PACKING AND UNPACKING

5.5 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.

5.6 Warranty or Repair Service

5.6.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.

5.6.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.

5.6.c When returning the DBAL-A^3 for service or repair, the following procedures should be followed to prevent any additional damage:

1. Be sure that the DBAL-A^3 is free of all contaminants such as dirt or any other foreign material.
2. Remove the battery.
3. Place the Exit Port Covers over each of the lenses.
4. Place the DBAL-A^3 in the Shipping Case or Carrying Case if available. If the Shipping Case is not available, individually package each DBAL-A^3 unit being returned in a suitable container.

5.6.d Place the DBAL-A^3 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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