



# AVENGER 10X

## Night Vision Monocular



## OPERATION AND MAINTENANCE MANUAL

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## SAFETY SUMMARY

Before operating this product, carefully read and study this Operation and Maintenance Manual.

The Avenger 10X is a precision electron-optical instrument, and requires careful handling. To avoid damage to the equipment or physical harm to the user when operating the Avenger 10X, follow all WARNINGS, CAUTIONS and NOTES.

Below you will find definitions of the following alerts that appear throughout this Manual:

**WARNING** — Identifies a clear danger to the person operating the equipment.

**CAUTION** – Identifies risk of damage to the equipment.

**NOTE** – Serves to highlight essential procedures, conditions, and statements, or convey important instructional data to the user.



### WARNING:

**This product contains natural rubber latex which may cause allergic reactions!** The FDA has reported an increase in the number of deaths that are associated with an apparent sensitivity to natural latex proteins. If you are allergic to latex, it is a good idea to learn which products contain it and strictly avoid exposure to those products.



### WARNINGS:

- The light from the unit infrared (IR) illuminator is invisible to the unaided eye when used in total darkness. **However, the light can be detected by other Night Vision Devices (NVD).**
- To reduce the risk of detection by another NVD, avoid prolonged activation of the IR illuminator.
- The IR light is more detectable by an NVD when used in smoke, fog and rain. Avoid prolonged activation of the unit IR illuminator in these conditions.
- This product contains natural rubber latex, which may cause allergic reactions.
- The intensifier's phosphor screen contains toxic materials. Please note the following:
  - If the intensifier tube breaks, be **extremely careful** to avoid inhaling the phosphor screen material. DO NOT allow the material to come in contact with your mouth, eyes, or any open wounds on the skin.
  - If the phosphor screen material comes in contact with your skin, wash it off immediately with soap and water.
  - If you inhale or swallow any phosphor screen material, drink a lot of water, induce vomiting, and **seek medical attention as soon as possible.**

The information provided in this manual is for familiarization purposes only. The contents may undergo further changes with no commitment by Armasight® to notify customers of any updates.

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### CAUTION:

- The Avenger 10X is a precision electron-optical instrument, and must be handled carefully at all times to prevent damage to the device and danger to the user.
- To protect the intensifier tube, **do not remove** the lens cap of the Avenger 10X when the monocular is being operated in daylight conditions, or when the device is not in use.
- Use of the Avenger 10X in brightly lit conditions may damage the unit's intensifier tube.
- Bright light sources such as firelight, headlights, searchlights, etc. can damage the Avenger 10X. Avoid exposing the unit to these types of light sources.
- Before removing the lens cap, verify that the photoreceiver is open.
- DO NOT forget to open the photoreceiver after completing your mission.
- DO NOT attempt to force the controls past their stopping points, as this may cause damage to the mechanisms.
- The unit may be badly damaged if the tripod on which it is mounted collapses or overturns. Remove the unit from the tripod if it is not within your reach.
- Before replacing the intensifier tube, confirm that it is no longer covered by warranty.
- Thoroughly dry each component of the Avenger 10X before placing them in the storage case.

### NOTES:

- The equipment requires some ambient light (moonlight, starlight, etc.) to operate.
- Performance of the device in nighttime conditions depends on the level of ambient light in the environment. Please remember the following:
  - The level of ambient light is reduced by the presence of clouds, shade, or objects that block natural light (trees, buildings, etc.).
  - The equipment is less effective when operated in shadows and other darkened areas.
  - The equipment is less effective when operated in rain, fog, sleet, snow, dust or smoke.
  - The equipment will not "see" through dense smoke.
- At operating temperatures below -20°C (-4°F), the use of an alkaline battery is not recommended, as the battery life will be severely reduced. Under said conditions, lithium-iron disulfide 1.5V AA batteries or their equivalent should be used.
- The IR illuminator is intended for increased illumination, as needed, when viewing at a close distance of up to 20m.
- For the purpose of returning defective components, retain all packaging materials.

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## HOW TO USE THIS MANUAL

### USAGE

You must familiarize yourself with the entire manual before operating the equipment. Before performing any kind of maintenance on your device, read the section on maintenance in its entirety. Follow all WARNINGS, CAUTIONS, and NOTES.

### MANUAL OVERVIEW

This manual contains sections on Operating and Maintaining the Avenger 10X Night Vision Monocular.

The Product Warranty Registration Card can be found in Appendix A.

The list of Spare Parts can be found in Appendix B.

# INTRODUCTION

## 1.1 GENERAL INFORMATION

### 1.1.1 TYPE OF MANUAL

Operation and Maintenance (including a List of Spare Parts and an Intensifier Tube Replacement Manual).

### 1.1.2 MODEL NUMBER AND EQUIPMENT NAME

Avenger 10X Night Vision Monocular.

### 1.1.3 PURPOSE OF EQUIPMENT

**To provide the operator with the ability to observe at night under moonlight and starlight conditions.**

The Avenger 10x can be used as a handheld night vision device to allow long-range surveillance. The Avenger can be mounted in front of a camcorder or camera for night photography.

### 1.1.4 REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS

Recommendations from the user for improvements to the device are encouraged.

Mail your comments to Armasight Inc., 815 Dubuque Avenue, South San Francisco, CA 94080, USA. Or, send an email to [info@armasight.com](mailto:info@armasight.com).

## 1.2 WARRANTY INFORMATION AND REGISTRATION

### 1.2.1 WARRANTY INFORMATION

This product is guaranteed to be free from manufacturing defects in material and workmanship under normal use for a period of two (2) years from the date of purchase. In the event that a defect covered by the below warranty occurs during the applicable period stated above, Armasight, at its discretion, will either repair or replace the product; such action on the part of Armasight shall be the full extent of Armasight's liability, and the Customer's sole and exclusive reparation. This warranty does not cover a product if it has (a) been used in ways other than its normal and customary manner; (b) subjected to misuse; (c) subjected to alterations, modifications or repairs by the Customer or by any party other than Armasight without prior written consent of Armasight; (d) special order or "close-out" merchandise or merchandise sold "as-is" by either Armasight or the Armasight dealer; or (e) merchandise that has been discontinued by the manufacturer and either parts or replacement units are not available due to reasons beyond the control of Armasight. Armasight shall not be responsible for any defects or damage that in Armasight's view are a result from the mishandling, abuse, misuse, improper storage or improper operation of the device, including use in conjunction with equipment that is electrically or mechanically incompatible with, or of inferior quality to, the product, as well as failure to maintain the environmental conditions specified by the manufacturer. CUSTOMER IS HEREBY NOTIFIED THAT OPERATION OF THE EQUIPMENT DURING DAYLIGHT HOURS OR UNDER ANY EXCESSIVE LIGHT CONDITIONS MAY PERMANENTLY DAMAGE THE INTERNAL COMPONENTS OF THE UNIT AND SAID DAMAGE WILL NOT BE COVERED UNDER THIS WARRANTY. This warranty is extended only to the original purchaser. Any breach of this warranty shall be enforced unless the customer notifies Armasight at the address noted below within the applicable warranty period.

The customer understands and agrees that except for the foregoing warranty, no other warranties written or oral, statutory, expressed or implied, including any implied warranty of merchantability or fitness for a particular purpose, shall apply to the product. All such implied warranties are hereby and expressly disclaimed.

### 1.2.2 LIMITATION OF LIABILITY

Armasight will not be liable for any claims, actions, suits, proceedings, costs, expenses, damages or liabilities arising out of the use of this product. Operation and use of the product are the sole responsibility of the Customer. Armasight's sole undertaking is limited to providing the products and services outlined herein in accordance with the terms and conditions of this Agreement. The provision of products sold and services performed by Armasight to the Customer shall not be interpreted, construed, or regarded, either expressly or implied, as being for the benefit of or creating any obligation toward any third party of legal entity outside Armasight and the Customer; Armasight's obligations under this Agreement extend solely to the Customer. Armasight's liability hereunder for damages, regardless of the form or action, shall not exceed the fees or other charges paid to Armasight by the customer or customer's dealer. Armasight shall not, in any event, be liable for special, indirect, incidental, or consequential damages, including, but not limited to, lost income, lost revenue, or lost profit, whether such damages were foreseeable or not at the time of purchase, and whether or not such damages arise out of a breach of warranty, a breach of agreement, negligence, strict liability or any other theory of liability.

### 1.2.3 PRODUCT WARRANTY REGISTRATION

In order to validate the warranty on your product, Armasight must receive a completed Product Warranty Registration Card for each unit, or the Customer can complete a warranty registration on our website, at [www.armsight.com](http://www.armsight.com). Please complete the included form (Appendix A) and immediately mail it to our Service Center:

Armasight Inc.  
815 Dubuque Avenue  
South San Francisco  
CA 94080  
United States of America.



#### **1.2.4 OBTAINING WARRANTY SERVICE**

To obtain warranty service on your unit, the End-user (Customer) must notify the Armasight service department via email. Send any requests to [service@armasight.com](mailto:service@armasight.com) to receive a Return Merchandise Authorization number (RMA). When returning any device, please take in the product to your retailer, or send the product, postage paid and with a copy of your sales receipt, to Armasight Corporation's service center at the address listed above. All merchandise must be fully insured with the correct postage; Armasight will not be responsible for improper postage or merchandise that becomes lost or damaged during shipment. When sending product back, please clearly write the RMA# on the outside of the shipping box. Please include a letter that indicates your RMA#, the Customer's Name, a Return Address, reason for the return, Contact information (valid telephone numbers and/or an e-mail address), and proof of purchase that will help us to establish the valid start date of the warranty. Product merchandise returns that do not have an RMA# listed may be refused, or a significant delay in processing may occur. Estimated Warranty service time is 10-20 business days. The End-user/ Customer is responsible for postage to Armasight for warranty service. Armasight will cover return postage/ shipping after warranty repair to the End-user/ Customer only if the product is covered by the aforementioned warranty. Armasight will return the product after warranty service by domestic UPS Ground service and/ or domestic mail. Should any other requested, required or international shipping methods be necessary, the postage/ shipping fee will be the responsibility of the End-user/ Customer.

## 1.3 LIST OF ABBREVIATIONS

C	Celsius (Centigrade)
CCW	counterclockwise
Cont'd	Continued
CW	clockwise
Dia	diameter
F	Fahrenheit
FOV	Field of View
g	gram
Gen	Generation
H	Height
hr	hour
IR	infrared
IT	Intensifier Tube
L	Length
LED	Light Emitting Diode
lx	lux
m	meter
mA	milliampere
min	minute
mm	millimeter
mW	milliwatt
nm	nanometer
No	Number
NV	Night Vision
NVD	Night Vision Device
Para	Paragraph
PMCS	Preventive Maintenance Checks and Services
QRM	Quick Release Mount
QTY	Quantity
RMA#	Return Merchandise Authorization number
s	second
seq	sequence
SR	Service Representative
VDC	Volts Direct Current
V	Volt
W	Width

# DESCRIPTION AND DATA

## 2.1 SYSTEM DESCRIPTION

The Avenger 10X is a hand-held night vision system.

The Avenger 10X utilizes the principle of intensification of the residual light that is reflected from the surrounding objects. The optical system of the unit consists of an objective lens, an intensifier tube (IT), and an eyepiece.

The Avenger 10X manual variable gain control allows the operator to adjust the brightness of the image to compensate for overly bright or extremely dark conditions.

The Avenger 10X automatic protective system controls illumination through a photoreceiver. If the illumination level surpasses 100-300 lx for more than 10 s, the unit will shut off automatically.

Automatic shut-off system automatically turns off the device when it is unused (controls are not touched) for 60 minutes. The automatic shut-off function preserves battery life should the device be inadvertently activated.

A built-in IR illuminator makes it possible to use the unit in low light or total darkness.

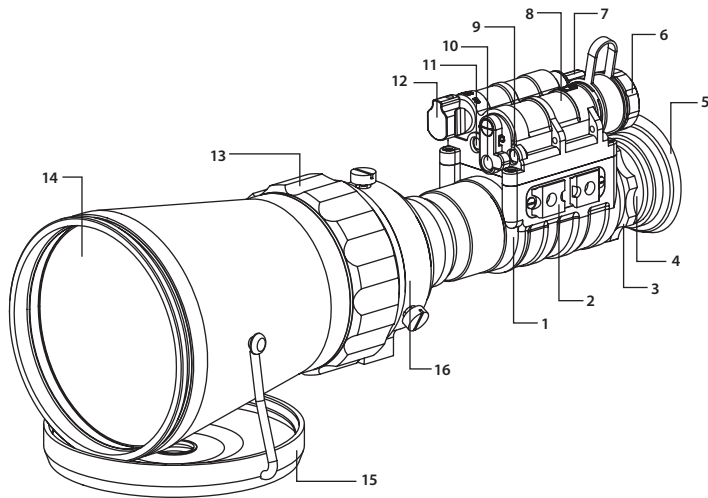
The Avenger 10X uses LED lights to indicate illumination level, low battery, and to show the user that the IR illuminator is on.

The Armasight Avenger 10x can be equipped with high-performance Gen 2+ and Gen 3 IITs including Green phosphor or Armasight's "Quick Silver" and "Ghost" IITs, which provide users with natural B&W night vision displays.

### NOTE:

The equipment requires some light (moonlight, starlight, etc.) to operate. Performance of the device depends upon the level of ambient light in the environment. Please remember the following:

- The level of ambient light in the environment is reduced by the presence of clouds, shade, or objects that block natural light (trees, buildings, etc).
- The equipment is less effective when operated in shadows and other darkened areas.
- The equipment is less effective when operated in rain, fog, sleet, snow, or smoke.
- Under starlight conditions, particularly in low-contrast environments such as snow-covered territory, sandy deserts, large bodies of water or grassy hills, the visibility may degrade, thereby disguising or masking changes in terrain.
- The equipment will not "see" through dense smoke.



**FIGURE 2-1. AVENGER 10X NIGHT VISION MONOCULAR**

**TABLE 2-1. AVENGER 10X SYSTEM DESCRIPTION**

ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	Body	9	Photo Receiver
2	Rail	10	Pivotal Focusing Lens
3	Eyepiece Ring	11	IR Illuminator
4	Eyepiece	12	Turn-pull Function Switch
5	Eye-cup	13	Focus Ring
6	Battery Cap	14	Lens
7	Gain Control Knob	15	Lens Cap
8	Battery Compartment	16	Tripod Mounting Ring

## 2.2 SPECIFICATIONS

**TABLE 2-2. OPTICAL DATA**

ITEM	DATA
Magnification	10 X
Lens:	
— Focal Length	192 mm
— Lens F/number	1:2.13
Focus Range:	50 m to infinity
FOV:	5.2°
Exit Pupil Diameter	5 mm
Eyepiece Focal Length	20 mm
Eye Relief	16 mm
Eyepiece Diopter Adjustment	-5 to +5 diopters
Built-in IR Illuminator	
— Power	50 mW
— Illumination Range	up to 20 m
— Illumination Wavelength	850 nm

**TABLE 2-3. ELECTRICAL DATA**

ITEM	DATA
Battery	One AA (1.5 V) or one CR123A (3 V) *
Continuous Operation** at 20 °C (68°F):	
- AA Alkaline Battery	20
- CR123A Lithium Battery	24

\* Any AA or CR123 type rechargeable batteries with voltage from 1.2V to 3.7V can be used

\*\* With IR illuminator off.

**TABLE 2-4. MECHANICAL DATA**

ITEM	DATA
Overall Dimensions	288 x 100 x 100 mm / 11.3 x 3.9 x 3.9 in
Weight (w/o battery)	1.33 kg / 2.9 lbs

**TABLE 2-5. ENVIRONMENTAL DATA**

ITEM	DATA
Operating Temperature	-40 to +50 °C
Storage Temperature	-50 to +70 °C
Humidity	95%, 25°C to 40°C for 48 hr
Illumination Required	Natural night illumination (overcast starlight to moonlight)
Environmental Rating	Water and fog-resistant

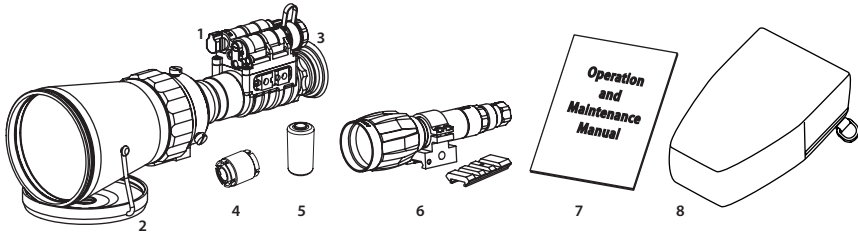
**TABLE 2-6. XLR-IR850 ILLUMINATORS DATA**

ITEM	DATA
IR Emitter Type	LED
Power	1000 mW
Peak Wavelength	850 nm
Illumination Range	up to 1000 m
Divergence	4 to 35°
Battery	Single 18650 Rechargeable Battery (3.7V) *
Battery Life at 20 °C (68 °F)	up to 10 (1/4 Power); 8 (1/2 Power); 6 (3/4 Power); 2.5 (Full Power)
Overall Dimensions (with Mount)	150×48×57 mm (5.9"×1.9"×2.2")
Weight (with Mount, w/o Battery)	264 g (9.3 oz)
Operating Temperature	-20 to +50°C (-4 to 122°F)
Storage Temperature	-50 to +70°C (-58 to 158°F)
Environmental Rating	Water Resistant

\* 18650 rechargeable battery and charger are included

## 2.3 STANDARD COMPONENTS

The standard components of the Avenger 10X are shown in Figure 2-2 and listed in Table 2-7. The ITEM NO. column indicates the number used to identify items in Figure 2-2.



**FIGURE 2-2. AVENGER 10X STANDARD COMPONENTS**

**TABLE 2-7. AVENGER 10X STANDARD COMPONENTS**

ITEM NO.	DESCRIPTION	QUANTITY
1	Night Vision Monocular	1
2	Lens Cap	1
3	Eye-cup	1
4	Battery Adapter	1
5	Battery 123A Lithium	1
6	XLR-IR850 Detachable Long Range Infrared Illuminator Kit	1
7	Operation and Maintenance Manual	1
8	Carrying Case	1

### 1) Armasight Avenger 10X Night Vision Monocular

Monocular night vision device.

### 2) Lens Cap

A cap used to protect the lens and to be used when testing the unit in daylight.

### 3) Eye-cup

A rubber cup used to protect the eyepiece as well as provide comfort for the operator.

### 4) Battery Adapter

Allows of use of a single 3V CR123 or 1.5V AA batteries.

### 5) Battery 123A Lithium

A single, 123A lithium battery used to power the unit.

### 6) XLR-IR850 Detachable X-Long Range Infrared Illuminator w/Dovetail to Weaver Transfer Piece #21, Rechargeable Battery, and Charger

A detachable LED extra long-range infrared illuminator with a wide, adjustable beam angle (4 to 35 degrees). Should be used when there is little to no ambient light. Comes fully assembled with a dedicated mount in order to be installed on a Picatinny/Weaver rail. Dovetail to Weaver Transfer Piece #21 is included. The XLR-IR850 comes standard equipped with a 18650 rechargeable battery and charger unit.

### 7) Operation and Maintenance Manual

Provides safety information, equipment description, operating instructions, and preventive maintenance checks and service (including a List of Spare Parts).

### 8) Carrying Case

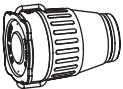



A protective case used for storing and carrying of the Avenger 10X and its accessories.

## 2.4 OPTIONAL EQUIPMENT

Optional items are shown and listed in Table 2-8.

The PART NO. column indicates the primary number used by the manufacturer to identify an item.

**TABLE 2-8. AVENGER 10X OPTIONAL EQUIPMENT**

IMAGE	DESCRIPTION	PART NO.
	<b>XLR-IR Afocal Doubler</b> Doubles the distance of XLR-IR850 IR Illuminator beam. Comes complete with an thread adapter #174.	ANAF18XXLR
	<b>Camera Adapter #47</b> An adapter with step down ring that allows the Avenger to be attached to any 35 mm SLR camera or 8mm camcorder.	ANAM000016
	<b>Tripod with a Grip</b> Lightweight and compact Camera Tripod	ANAMTM0003
	<b>Hard Shipping/Storage Case #102</b> A protective case used for the shipping/ storage of the Avenger 10X and its accessories.	ANHCC000004

## 2.5 KEY FEATURES

- Powerful 10x magnification
- Rugged design
- XLR-IR850 Detachable X-Long Range IR Illuminator included
- Manual variable gain control
- Ergonomic, simple, easy to operate controls
- Utilizes single CR123A lithium or AA battery
- Adaptable for use with cameras
- Standard tripod adaptable
- Limited two-year warranty



# OPERATING INSTRUCTIONS

## 3.1 INSTALLATION AND MOUNTING

### CAUTION:

To protect the intensifier tube when the sight is not in use or when it is being operated in daylight, keep the protective lens cap securely fitted over the lens.

### 3.1.1 BATTERY INSTALLATION

The Avenger 10X operates on a single CR123A or AA battery.

Depending on the size of the battery used, it may be necessary to reposition the battery adapter within the battery cap.

### NOTE:

If operating the device at temperatures below  $-20^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$ ), the use of an alkaline battery is not recommended, as the severe cold will adversely affect the life of the battery. In these conditions, it is recommended that you use a lithium-iron disulfide 1.5V AA battery, or its equivalent.

Install the CR123A battery as follows:

1. Unscrew the battery cap (A) and insert the CR123A battery (B), observing the polarity markings on the body of the device.
2. With the battery adapter (C) installed, screw the battery cap (A) back on securely.

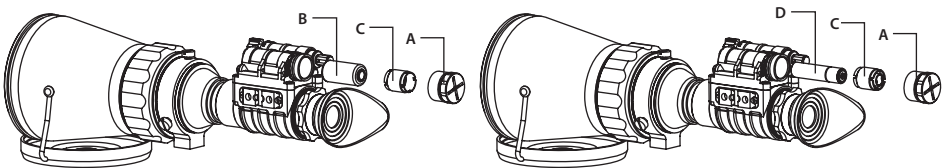


FIGURE 3-1. BATTERY INSTALLATION

Install the AA battery as follows:

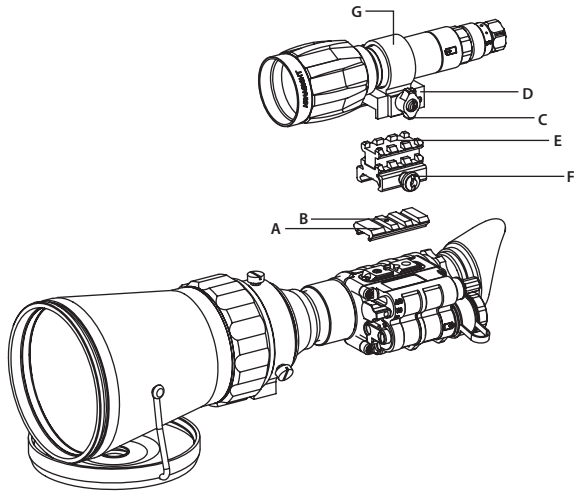
1. Unscrew the battery cap (A).
2. Unscrew the battery adapter (C) from the cap, turn it around, and screw in the other end.
3. Insert the AA battery (D), observing the polarity markings as indicated on the body of the device.
4. Screw the battery cap (A) back into place.

### 3.1.2 MOUNTING AN DETACHABLE IR ILLUMINATOR TO THE AVENGER 10X

Armasight long range IR illuminators are delivered with a dedicated mount, to be installed on the Picatinny/Weaver rail.

To mount an IR illuminator on the Avenger 10x, use the Dovetail to Weaver Transfer Piece and Riser. Perform the following steps (refer to Figure 3-2):

1. Install the transfer piece (A) onto one of the Avenger 10x rails.
2. Tighten the fixing screw (B) on the transfer piece.
3. With the nut (C) loosened, install the mount (D) on the rail of riser (E) so that the recoil stop slides into one of the transverse slots of the rail.
4. Tighten the nut (C).



**FIGURE 3-2. MOUNTING AN IR ILLUMINATOR TO THE AVENGER 10X**

5. With the nut of riser (F) loosened, install the illuminator on the Weaver rail so that the recoil stop of riser slides into one of the transverse slots of the rail.
6. Tighten the nut of riser (F).

#### **NOTE:**

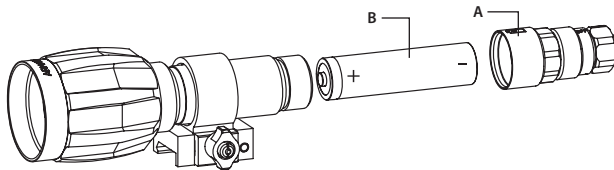
The mount clamp (G) has a spherical hinge that allows the IR illuminator to be aligned with the field of view of the Avenger 10x for maximum effectiveness.

Install the battery as follows (refer to Figure 3-3):

#### **CAUTION:**

Ensure that the IR Illuminator is off before installing the battery.

1. Unscrew the battery cap (A).
2. Install the fully charged 18650 rechargeable battery (B) into the battery compartment. Align the polarity symbols on the battery with those on the cap face.
3. Replace the battery cap (A).

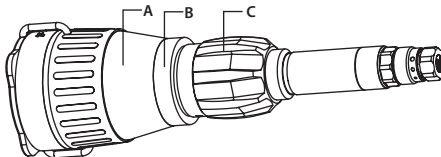


**FIGURE 3-3. XLR-IR850 ILLUMINATOR. BATTERY INSTALLATION**

The XLR-IR850 can be used as hand-held long-range IR illuminator with optional Afocal Doubler.

Attach the magnifying lens to the XLR-IR850 as follows (refer to Figure 3-4):

1. Screw the Afocal Doubler (A) into the threading adapter (B).
2. Screw the Afocal Doubler with adapter into the threading of the XLR-IR850 objective lens (C) housing. Be careful not to over-tighten the lens.



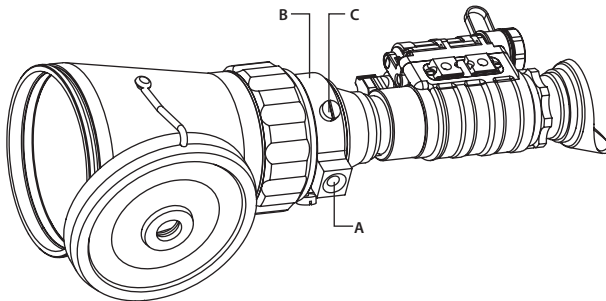
**FIGURE 3-4. XLR-IR850 ILLUMINATOR WITH AFOCAL DOUBLER**

**NOTE:**

The caution notice **DO NOT REMOVE IN DAYLIGHT** on the front lens cap of this universal magnifying lens is not applicable when using it on the XLR-IR850.

**3.1.3 TRIPOD MOUNTING**

The Avenger 10x can be installed to a tripod. Screw the tripod into the 1/4" threaded socket (A) located on the tripod mounting ring (B) of the Avenger's lens. The position of Avenger on tripod can be changed for comfortable use. Loosen the fixing screws (C) of the tripod mount ring and rotate the unit. Tighten the screws for fixation of new position.



**FIGURE 3-5. TRIPOD MOUNTING**

### CAUTION:

The unit may be badly damaged if the tripod collapses or falls over. Remove the unit from the tripod if it is not within your reach.

## 3.1.4 MOUNTING A CAMERA/ CAMCORDER TO THE AVENGER

To mount any 35mm SLR photographic camera or 8mm camcorder to the Avenger 10x, use the optional camera adapter and perform the following:

1. Using the (M37x0.75 threaded) adapter ring (B), screw the (M52x0.75 threaded) adapter (A) into the front lens of the photographic camera or video camera.
2. Remove the eyecup from the Avenger eyepiece.
3. Connect the adapter with the eyepiece and tighten the three fixing screws (C) located on the adapter.

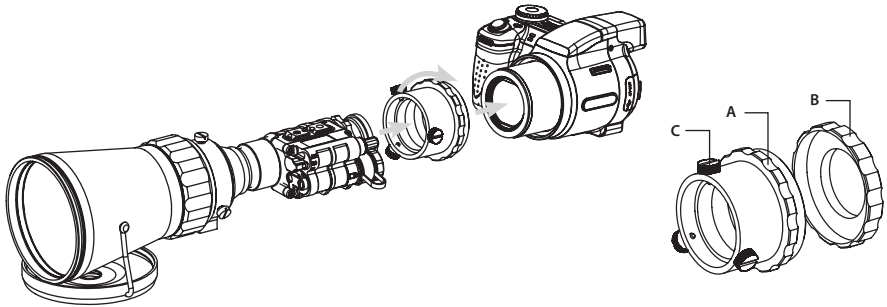


FIGURE 3-6. MOUNTING A CAMERA/ CAMCORDER TO THE AVENGER

## 3.2 CONTROLS AND INDICATORS

### 3.2.1 CONTROLS AND INDICATORS

The Avenger 10X controls and indicators are defined in Table 3-1.

The Avenger 10X controls are shown in Figure 3-7.

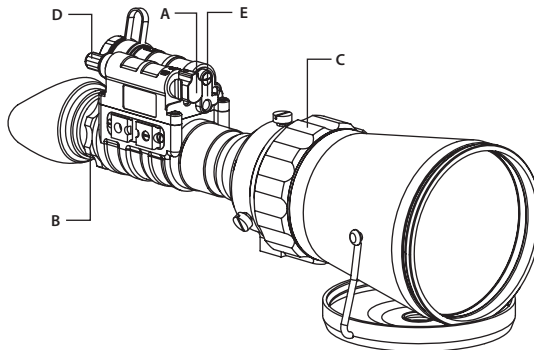


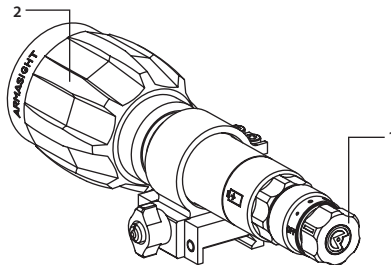
FIGURE 3-7. AVENGER 10X CONTROLS

**TABLE 3-1. AVENGER 10X CONTROLS AND INDICATORS**

CONTROL/INDICATOR	FUNCTION
Turn-pull Function Switch (Figure 3-7, A)	<p>OFF position — the unit is off.</p> <p>ON position — the unit is on (IT powered). Turn the unit on by turning the switch CCW from OFF to ON.</p> <p>IR position — the unit is on, and the IR illuminator is activated. Activate the IR illuminator by pulling it out and turning the switch CW from ON to the IR position.</p>
Eyepiece Ring (Figure 3-7, B)	Adjusts the unit diopter. The total dioptic range is covered in a 1/2 ring revolution.
Focusing Ring (Figure 3-7, C)	Focuses the lens. Adjusts for sharpest view of the scene. The total focus range is covered in a 1/3 ring revolution.
Gain Control Knob (Figure 3-7, D)	Adjusts for image contrast.
Pivotal Focusing Lens (Figure 3-7, E)	<p>Allows the user to choose between the following:</p> <ol style="list-style-type: none"> <li>1. The IR illuminator spot beam. When the pivotal focusing lens is placed in the leftmost position of the window of the IR illuminator, the photoreceiver is open.</li> <li>2. The IR illuminator flood beam. When the focusing lens is placed in the center position, the photoreceiver is opened.</li> <li>3. The photoreceiver will close when the focusing lens is placed in the rightmost position.</li> </ol>
Built-in LED Indicators	<p>A GREEN GLOW in the eyepiece viewing area indicates excessive light conditions. After 10 s of exposure to bright light, the intensifier will shut off automatically. The unit will turn back on again when moved away from the excessive light.</p> <p>A PERMANENT RED GLOW in the eyepiece viewing area indicates that the IR illuminator is operating.</p> <p>A FLASHING RED LIGHT in the eyepiece viewing area indicates that the battery is low.</p>

### 3.2.2 IR ILLUMINATOR CONTROLS

The controls of the optional IR illuminators are shown in Figure 3-8 and defined in Table 3-3. The ITEM NO. column indicates the number used to identify items in Figure 3-8.



**FIGURE 3-8. IR ILLUMINATOR CONTROLS**

**TABLE 3-2. IR ILLUMINATOR CONTROLS**

ITEM NO.	FUNCTION	DESCRIPTION
1	POWER SWITCH	Switches the IR illuminator on/off and adjusts for radiated power. Four ON positions are located between the two OFF positions, and are each marked with a different-sized spot. The larger the spot, the greater the radiated power.
2	LENS FOCUS	Adjusts for IR beam divergence. Adjustment range is covered within approximately one turn of the lens.

## 3.3 OPERATING PROCEDURES

### 3.3.1 OPERATING PROCEDURES

These procedures should be performed under nighttime conditions only.

**CAUTION:**

Use of the Avenger 10X brightly lit conditions may damage the unit's intensifier tube.

**CAUTION:**

DO NOT over-adjust the controls by forcing them past their stopping points.

1. Verify that the battery is installed as indicated on the monocular body.
2. Make a visual estimation of the illumination level in the viewing area. The required level of illumination is less than 1 lx (late twilight sky conditions).
3. Remove the lens cap and place it over the housing of the lens.

**CAUTION:**

Before removing the objective lens cap, verify that the photoreceiver is open.

4. Turn the function switch ON. After a slight delay, a green glow will appear in the eyepiece of the monocular.
5. Adjust the unit diopter by rotating the ring of the eyepiece.
6. Observe the scene. Rotate the focus ring until the image is clear and sharp.
7. Adjust the brightness and contrast of the image using the gain control knob.

**CAUTION:**

Bright sources such as firelight, headlights, searchlights, etc. can damage the Avenger 10X. Avoid exposing the unit to these types of light sources.

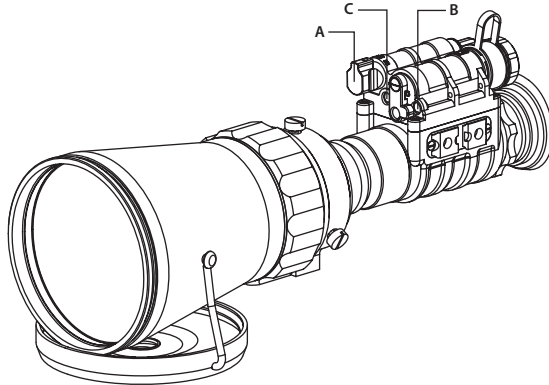
**NOTE:**

If the automatic shut-off system automatically turns off the device when it is used you need turn the operation switch to OFF position and then back to ON position for continuing the operation.

### 3.3.2 BUILT-IN IR ILLUMINATOR OPERATIONS

**CAUTION:**

When operating the device in extremely dark conditions, the light from the unit's IR illuminator will be invisible to the unaided eye. However, the light can be detected by other NVDs.



**FIGURE 3-9. BUILT-IN IR ILLUMINATOR OPERATIONS**

**NOTE:**

The IR illuminator is designed to provide additional illumination (when needed) while viewing scenes or targets from a short distance (up to 3m).

1. To activate the IR illuminator, turn the monocular on. Pull the IR illuminator out and flip the turn-pull function switch (A) CW from ON to the IR position. A red light will appear in the eyepiece to indicate that the IR illuminator is operating.
2. Focus the IR light, if necessary, by placing the pivotal focusing lens onto the IR illuminator output window (C).

### 3.3.3 OPERATING THE XLR-IR850 IR ILLUMINATOR

Use the XLR-IR850 illuminator for long-distance observation when there is little to no ambient light.

**CAUTION:**

The IR illuminator infrared light will be invisible to the naked eye. The light can, however, be detected by other night vision devices.

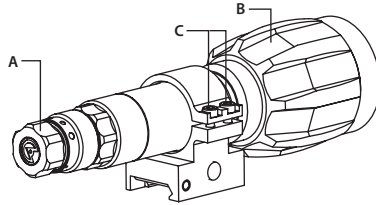
**CAUTION:**

DO NOT leave the IR illuminator activated in the ON position if it is not being used.

Operate the IR illuminator as follows:

1. Turn on the IR illuminator by rotating the power switch (A) from OFF position.
2. To change the power level, turn the power switch to one of the spots between the two OFF positions.
3. To adjust IR beam divergence, turn the objective lens of IR illuminator (B).

4. To adjust the IR spot position in the field of view, loosen the two clamp screws (C) and tilt the IR illuminator as required in the spherical clamp hinge. Tighten the screws using a 2.5 mm hex key.



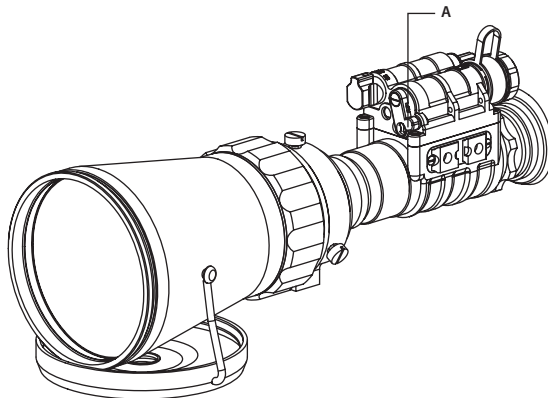
**FIGURE 3-10. XLR-IR850 ILLUMINATOR ADJUSTMENT**

### 3.3.4 OPERATING UNDER CHANGING LIGHT CONDITIONS

If the ambient light level exceeds the limit of 100-300 lx for more than 10 s, the Avenger 10X automatic protective system will shut off the intensifier tube. If a mission must be carried out in changing light conditions, the user can shut down the protective system manually by closing the photoreceiver.

**CAUTION:**

DO NOT forget to open the photoreceiver after completing your mission.



**FIGURE 3-11. PHOTORECEIVER IS CLOSED WITH CAP ON THE PIVOT PLATE**

### 3.3.5 AVENGER 10X SHUT-DOWN

1. Turn the function switch to OFF. The green glow of the viewing area will fade to black.
2. Secure the lens cap over the objective lens.
3. If necessary, remove the unit from the rail (from the scope lens). Remove the unit by following the mounting instructions in reverse..
4. Unscrew the battery cap and take out the battery. Replace the battery cap. Do not store the unit with the battery still in it.
5. Store the unit and all accessories in the case.



## 3.4 STORAGE

### 3.4.1 PREPARATIONS FOR STORAGE

Prepare the Avenger 10X for storage as follows:

1. Verify that the Avenger 10X and all accessories are clean and dry before returning them to the storage case.
2. Secure the cap over the objective lens.
3. Remove the battery.
4. Place the Avenger 10X and accessories in the appropriate locations in the case, and close the cover.

# PREVENTIVE MAINTENANCE AND TROUBLESHOOTING

## 4.1 PREVENTIVE MAINTENANCE CHECKS AND SERVICES

### 4.1.1 PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

Table 4-1: Preventive Maintenance Checks and Services has been provided so that you can keep your equipment operable and in good condition.

Perform all functional tests in the order listed in Table 4-1.

Operating Procedures are detailed in Chapter 3.

#### A. Cautions

Always observe any CAUTIONS that appear in the table.

#### B. Explanation of Table Entries

**SEQ NO. column.** Sequence numbers are for reference and appear in the order required to perform checks and services.

**LOCATION/ITEM TO CHECK/SERVICE column.** Indicates the location and the item to be checked or serviced.

**PROCEDURE column.** Details the checking/ servicing procedure.

**NOT FULLY MISSION CAPABLE IF column.** Indicates what faults will prevent your equipment from operating successfully.

**TABLE 4-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES**

SEQ NO.	LOCATION ITEM TO CHECK/SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF
BEFORE OPERATION CHECKS			
1	Completeness	Open the carrying case and inventory items by means of comparing with the data specified in this manual.	Items are missing.
2	Soft Carrying Case	Shake out loose dirt or foreign material. Inspect for tears, cuts, excess wear or damage to the mounting clips.	
3	External Surfaces	Inspect for cracks or damage. Scratches and gouges are OK if operation is not affected.	Cracked or damaged.

**TABLE 4-1. CONTINUED**

<b>SEQ NO.</b>	<b>LOCATION ITEM TO CHECK/SERVICE</b>	<b>PROCEDURE</b>	<b>NOT FULLY MISSION CAPABLE IF</b>
4	Lens Cap	Inspect for cracked, torn, or missing lens caps.	Cap is torn or cut. Cap is not secured to the housing of the lens.
5	Eyecup	Inspect for dirt, dust. Inspect for cracked or torn, bent, broken or improperly fitting eyecup. If necessary, clean as per Para 4.4.2.	Cup torn or cut.
6	Battery Adapter/Compartment/ Cap	Verify that the battery adapter is present. Inspect for corrosion, moisture, corroded or defective contacts. Verify that the o-ring is present.	Adapter is missing, contacts damaged or corroded, or o-ring is missing.
7	Function Switch	Check the switch for operation (without a battery).	Switch has no definite stopping points. Switch knob is broken or missing.
8	Pivotal Focusing Lens	Check to make sure pivotal focusing lens is present.	Pivotal focusing lens is missing.
9	Gain Control Knob	Check knob for operation.	Knob inoperative. Knob is missing.
10	Lenses	Inspect optical surfaces for dirt, fingerprint residue, scratches, chips, or cracks.	Scratches or chips hinder vision with Avenger 10X turned on. Cracks are present. Photoreceiver damaged. Pivotal focusing lens damaged.
11	Focusing Ring	Rotate the focusing ring to ensure free movement (range is approximately 1/3 turn).	Ring gets stuck or adversely affects the user's ability to properly focus the unit.
12	Eyepiece Ring	Rotate the eyepiece ring to make sure the eyepiece is not too tight or too loose. Range is approximately 1/2 turn.	Ring gets stuck, is too loose, or adversely affects the user's ability to properly adjust the diopter.
13	Optional Equipment	Inspect optional items for dirt, or corrosion, damage, and missing parts. Check for proper operation. If necessary, clean as detailed in Part 4.4.2.	Equipment is damaged or parts are missing.

**OPERATIONAL CHECKS**

**CAUTION:**

Do not activate the Avenger 10X in daylight unless the lens cap is on, or you are operating under dark conditions.

**CAUTION:**

Do not forget to open the photoreceiver after finishing operational checks.

**NOTE:**

Daylight checks are described below.

14	Function Switch	Install the battery. Verify that the photoreceiver is open. Turn the switch from OFF to ON. Look for the green glow in eyepiece (it should appear after a slight delay), and wait about 10 s for image to disappear. Look for a flashing red light in eyepiece viewing area.	Image is present. Red light is flashing.
		Close the photoreceiver by placing the pivotal focusing lens in rightmost position. Pull out the IR and turn the switch from ON to the IR position. Look for a permanent red glow in the eyepiece viewing area. Turn the switch from IR to ON position.	Permanent red glow is absent
15	Gain Control	Rotate the gain control knob to verify that it adjusts the screen's brightness level. Inspect for a broken or missing knob.	Knob does not adjust the screen's brightness level.
16	Viewed Image	Inspect for any operational defects (refer to Part 4.3.1: Identification of Operational Defects).	Shading, edge glow, flashing, flickering, and intermittent operation, or excessive cosmetic defects are found.

TABLE 4-1. CONTINUED

SEQ NO.	LOCATION ITEM TO CHECK/SERVICE	PROCEDURE	NOT FULLY MISSION CAPABLE IF
AFTER CHECKING PROCEDURES			
17		Turn the unit OFF. Verify that the green glow fades from the eyepieces.	
		Remove the battery.	
		Return the unit and all accessories to the soft carrying case.	

## 4.2 TROUBLESHOOTING

### 4.2.1 OPERATOR TROUBLESHOOTING

The purpose of troubleshooting is to identify the most frequently occurring equipment malfunctions, their probable causes, and the corrective actions required to fix them.

Table 4-2 lists common malfunctions that may occur during the operation or maintenance of the Avenger 10X. Perform the tests, inspections, and corrective actions in the order listed in the table.

**This table does not list all of the malfunctions that may occur with your device, or all of the tests and corrective actions that may be necessary.** If you experience an equipment malfunction that is not listed, or is not fixed by the corrective actions listed in the table, please contact Armasight's Customer Service center.

TABLE 4-2. OPERATOR TROUBLESHOOTING

MALFUNCTION	PROBABLE CAUSE/TEST/INSPECTION	CORRECTIVE ACTION
Monocular fails to activate.	Battery is dead, missing or improperly installed.	Replace the battery or install it correctly.
	Battery contact surfaces or contact springs are dirty or corroded.	Clean the contact surfaces with a pencil eraser and/ or alcohol and cotton swabs.
	Defective image intensifier.	Please contact Customer Support.
Battery adapter difficult to remove.	Check for damaged battery adapter and battery cap.	If damaged please contact Customer Support.
IR illuminator fails to activate.	Turn the IR illuminator on in a dark area. Visually estimate whether or not the observed scene is illuminated.	If the IR illuminator fails to activate, please contact Customer Support.
LED indicators fail to activate.	Visual inspection.	Please contact Customer Support.
Poor image quality.	Check objective lens or eyepiece focus.	Refocus the lens.
	Check for fogging or dirt on the lens.	Clean the lens as detailed in Part 4.4.2. If image quality is still poor, please contact Customer Support.
	Damaged optical components.	Please contact Customer Support
Light is visible around the eyecup.	Check the exit pupil distance value.	Readjust for proper eye-relief distance.
	Check the eyecup resilience.	If the eyecup is defective, please contact Customer Support.
Focusing ring cannot be moved.	Check to see if the focusing ring is bent or broken.	If damaged, please contact Customer Support.
Eyepiece ring cannot be moved.	Check to see if the eyepiece ring is bent or broken.	If damaged, please contact Customer Support.

## 4.3 IDENTIFICATION OF OPERATIONAL DEFECTS

### 4.3.1 OPERATIONAL DEFECTS

Operational defects relate to the reliability of the intensifier, and are an indication of instability. If identified, the user will need to return the Avenger 10X immediately. Operational defects include shading, edge glow, flashing, flickering, and intermittent operation.

#### A. Shading

If shading is persistent, you will not be able to see a fully circular image (Figure 4-1). Shading is a very dark, high-contrast area with a distinct line of demarcation present, and you cannot see an image through it. Shading always begins on the edge, and will eventually migrate inward until it spans across the entire image area. If you notice shading with your device, please contact Customer Support.

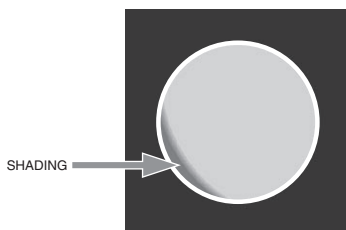


FIGURE 4-1. SHADING

#### NOTE:

Verify that any shading is not the result of improper eye-relief adjustment.

#### B. Edge Glow

Edge glow is a bright area (it sometimes appears to be sparkling) in the outer portion of the viewing area (see Figure 4-2). To check for edge glow, block out all light from the device by cupping a hand over the lens. If the image tube is displaying edge glow, the bright area will still show up; if edge glow occurs, please contact Customer Support.

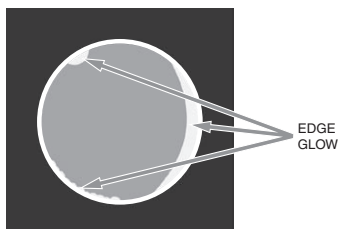


FIGURE 4-2. EDGE GLOW

#### C. Flashing, Flickering, or Intermittent Operation

The image may appear to flicker or flash. If there is more than a single flicker, check for a loose battery adapter or a weak battery. If flickering continues, please contact Customer Support.

### 4.3.2 COSMETIC BLEMISHES

Cosmetic blemishes are usually the result of manufacturing imperfections. They **do not** affect the reliability of the image intensifier, and are not normally a cause for returning the Avenger 10X. However,

some types of cosmetic blemishes can worsen over time and interfere with the user's ability to properly operate the device during missions. If you believe a cosmetic blemish is cause for returning the device, record the specific nature of the problem on the maintenance forms and use the clock method to identify the position of the blemish and its approximate distance from the center (e.g., 5:00 toward the outside, 2:30 near the center, or 1:00 midway).

The following are examples of cosmetic blemishes:

### A. Bright Spots

A bright spot is a small, non-uniform bright area that may flicker or appear constant (Figure 4-3).

Not all bright spots make the Avenger 10X rejectable. Cup your hand over the lens to block out all light. If the bright spot remains please contact Customer Support.

Bright spots usually go away when all light is blocked out. Verify that any bright spots are not simply the result of bright light in the area you are observing. Bright spots are acceptable if they do not interfere with the user's ability to view the scene or perform missions.

### B. Emission points

Emission points are steady or fluctuating pinpoints of bright light in the image area that do not go away when all external light is blocked from the objective lens (Figure 4-3). The position of an emission point within the image area does not move. Not all emission points are cause to return the Avenger 10X. Verify that emission points are not simply light sources present in the scene you are observing. Emission points are acceptable if they do not interfere with the user's ability to perform missions.

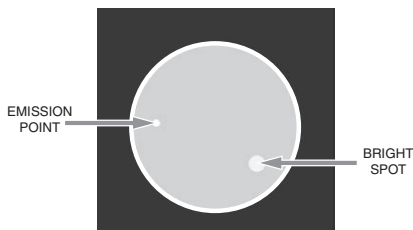


FIGURE 4-3. EMISSION POINTS AND BRIGHT SPOTS

### C. Black Spots

Black spots are cosmetic blemishes in the image intensifier or debris between the lenses. Black spots are acceptable as long as they do not interfere with the user's ability to observe the scene. No action is required if this condition is present, unless the spots interfere with the operator's ability to perform missions.

### D. Fixed-pattern Noise

Fixed-pattern noise is usually a cosmetic blemish characterized by a faint hexagonal (honeycomb) pattern that appears throughout the viewing area. This typically occurs in excessively lit environments or when viewing very bright lights (See Figure 4-4). This pattern can be seen in every image intensifier if the level of light is high enough. This condition is acceptable as long as the pattern does not interfere with the user's ability to view an image or interfere with their ability to perform missions.

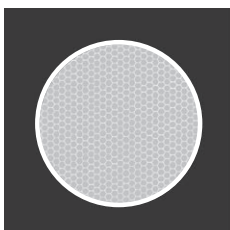


FIGURE 4-4. FIXED-PATTERN NOISE

## E. Chicken Wire

Chicken wire is an irregular pattern of dark thin lines that can appear in the field of view, either throughout the image area or in sections of the image area (See Figure 4-5). In the worst-case scenario, these lines will form hexagonal or square-wave shaped lines. No action is required if this condition is present, unless it interferes with the user's ability to view the image or their ability to perform missions.

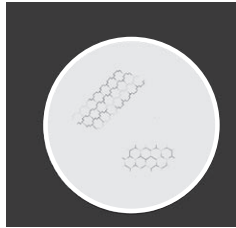


FIGURE 4-5. CHICKEN WIRE

## 4.4 MAINTENANCE

### 4.4.1 GENERAL

The section regarding Avenger 10X operator maintenance consists of operational tests, inspections for the unit serviceability, cleaning and mounting procedures, troubleshooting, and replacement instructions for a limited number of parts. Maintenance instructions covered elsewhere in this manual (PMCS, troubleshooting, etc.) are not repeated in this section.

#### CAUTION:

The Avenger 10X is a precision electron-optical instrument, and must be handled carefully at all times to prevent damage to the device's body or mechanisms.

### 4.4.2 CLEANING PROCEDURES

#### CAUTION:

The coating on the demist shield can be damaged if the shield is cleaned while wet, or if it is cleaned with wet lens paper. Clean the shield only when it is dry, and only use dry lens paper.

#### CAUTION:

Thoroughly dry each item before placing them into the storage case.

Clean the Avenger 10X as follows:

1. Gently brush off any dirt from the unit's body using a clean, soft cloth.
2. Moisten the cloth with fresh water and gently wipe external surfaces (**except** for glass surfaces).
3. Dry any wet surfaces (**except** for glass surfaces) with another clean, soft, dry cloth.
4. Using a lens brush, carefully remove all loose dirt from the glass surfaces.
5. Slightly dampen a cotton swab with ethanol. Gently and slowly wipe the lenses (including the photoreceiver and the pivotal focusing lens). Without touching the lens holders, clean the glass surfaces in circular movements, beginning in the center and moving out towards the edge. Change the cotton swab after each circular stroke. Repeat until the glass surfaces are clean.

6. Clean the battery contact surfaces and contact springs with a pencil eraser and/ or alcohol-dampened cotton swabs.

Clean optional mounting devices with a soft brush (cloth), soap, and water as required.

Clean optional lenses as detailed in items 4 and 5 above (**except** for the demist shield).

### **4.4.3 BATTERY REMOVAL AND REPLACEMENT**

Refer to Part 3.1.1 for battery installation procedures. No special tools are required to replace the battery.

## **4.5 SERVICE/PACKING AND UNPACKING**

### **4.5.1 RETURN INSTRUCTIONS**

For service, repair or replacements, please email [service@armasight.com](mailto:service@armasight.com).

To assist the Service Representative (SR) 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 of how the malfunction, defect or damage occurred, if known.

If the SR determines that the item is under warranty or should be returned for repair, a Return Material Authorization number (RMA#) will be provided. RMA can be obtained via e-mail to [service@armasight.com](mailto:service@armasight.com) or via phone by calling Armasight Customer Service at (888)959-2259 Ext. 2 or via fax (888)959-2260.

When returning the Avenger 10X for service or repair, the following procedures should be followed to prevent any additional damage:

1. Verify that the Avenger 10X is free of all contaminants such as dirt or any other foreign material.
2. Remove the battery.
3. Place the cap over the lens.
4. Place the Avenger 10X in the hard shipping/ storage case or soft carrying case (if available). If the hard shipping/ storage case is not available, individually package each Avenger 10X unit being returned in a suitable container.

Place the Avenger 10X 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#. Ship the items using the fastest, most easily traceable, prepaid method to Armasight Inc., 815 Dubuque Avenue, South San Francisco, CA 94080, USA.



**A. PRODUCT WARRANTY REGISTRATION CARD**

In order to validate the warranty on your product, Armasight must receive a completed Product Warranty Registration Card for each unit, or the user must complete warranty registration on our website ([www.armsight.com](http://www.armsight.com)). Please complete the included form and immediately mail it to our Service Center: Armasight Inc., 815 Dubuque Avenue, South San Francisco, CA 94080, USA

**ARMASIGHT PRODUCT WARRANTY REGISTRATION CARD**

**PRODUCT INFORMATION**

Product Name \_\_\_\_\_ Purchased From \_\_\_\_\_

Purchase Date \_\_\_\_\_ Product Serial # \_\_\_\_\_

**CUSTOMER INFORMATION**

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Country \_\_\_\_\_ Zip \_\_\_\_\_

Day Phone # \_\_\_\_\_ Home Phone # \_\_\_\_\_

E-mail address \_\_\_\_\_

.....  
Customer Signature Required

## B. AVENGER 10X LIST OF SPARE PARTS

The parts authorized in this list of spare parts are required for operator maintenance. This list includes parts that must be removed in order to replace authorized parts.

ITEM NO. Column indicates the number used to identify items in Figure B-1.

PART NO. Column indicates the primary number used by the manufacturer to identify an item; this number controls the design and characteristics of the item by means of its engineering, specifications, standards, and inspection requirements.

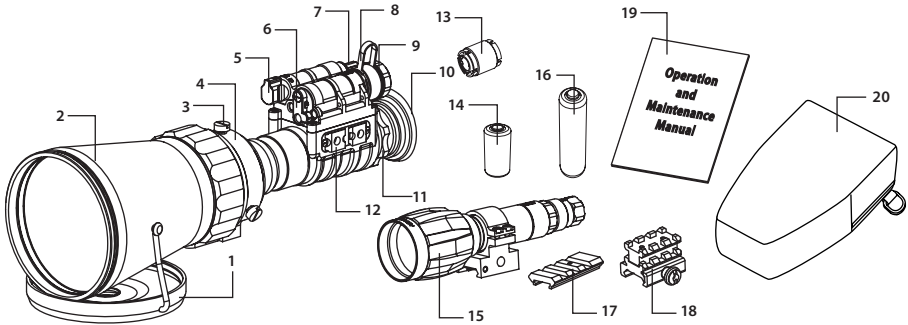


FIGURE B-1. AVENGER 10X SPARE PARTS

**TABLE B-1. AVENGER 10X LIST OF SPARE PARTS**

<b>ITEM NO.</b>	<b>DESCRIPTION</b>	<b>PART NO.</b>
1.	Lens Cap	AVN10LC
2.	Objective Lens Assembly	AVN10OLA
3.	Fixing Screw of Tripod Mounting Ring	AVN10TMRS
4.	Tripod Mounting Ring	AVN10TMR
5.	Turn-pull Function Switch	AVN10FS
6.	Pivotal Focusing Lens	AVN10PFL
7.	Gain Control Knob	AVN10GCK
8.	Battery Cap Retainer	AVN10BCR
9.	Battery Cap	AVN10BC
10.	Eyecup Assembly	AVN10ECA
11.	Eyepiece Assembly	AVN10EPA
12.	Rail	AVN10PR
13.	Battery Adapter	AVN10BA
14.	CR123A Lithium Battery	ALT
15.	XLR-IR850 Detachable Wide Angle Adjustable Long-Range Infrared Illuminator	IAIR850IR000003
16.	16650 Rechargeable Battery for XLR-IR850	ALT
17.	Dovetail to Weaver Transfer Piece #21	AVN10TP21
18.	Riser for XLR-IR (10 mm) #182	ARSXLR182
19.	Operation and Maintenance Manual	AVN10OUMM
20.	Soft Carry Case	AVN10SCC
21.	Charger for 18650 Rechargeable Battery (not shown)	ALT



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**CAUTION:**

**This product contains natural rubber latex which may cause allergic reactions!** The FDA has noted an increase in the number of reported deaths that are associated with an apparent sensitivity to natural latex proteins. If you are allergic to latex, it is a good idea to learn which products contain it and strictly avoid exposure to those products.

[www.armasight.com](http://www.armasight.com)