

ATN ThOR Series

THERMAL OPTICAL RIFLESCOPES



THOR SERIES OPERATOR'S MANUAL (REV. 3, DECEMBER 2010)

operator's manual

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TECHNOLOGIES
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SAFETY SUMMARY

STUDY CAREFULLY THIS MANUAL BEFORE TURNING ON AND OPERATING THIS PRODUCT.

CAUTIONS

The ATN ThOR Series Thermal Optical Riflescopes are precision electro-optical instruments and requires careful handling.

To provide safe use of the systems the following instructions should be observed:

- Do not dismantle the device.
- Keep the device clean; protect it from moisture, sharp temperature drops and shocks.
- Be careful not to touch the glass surfaces. If you put fingerprints on, or contaminate the glass surfaces, use only clean and soft materials to clean it.
- Do not leave the device in on position during stops in operation.
- Remove the batteries from the device for the period of storage.

CAUTION:

THIS PRODUCT CONTAINS NATURAL RUBBER LATEX WHICH MAY CAUSE ALLERGIC REACTIONS

WARNING

Do not permanently attach the scope to dynamic-mount applications that continuously transmit vibration (such as on vehicles or heavy machinery).

WARNING

Do not point the scope directly at any high-intensity objects that you must not view with your eyes (such as the sun or a welding arc). If you do, you will damage the scope.

WARNING

Operating ThOR Series outside of its specified operating temperature range or voltage range can cause permanent damage and will void the warranty.

WARNING

Use the power button to turn the scope off before you remove power (remove batteries or disconnect external power supply).

WARNING

ThOR Series operates over a wide operating temperature range (-20°C to +60°C). Not all lithium batteries are specified over this same temperature span. Check the manufacturer's specifications of your selected battery to verify the valid temperature range.

WARNING

Do not use any battery other than a CR-123A lithium battery. DO NOT use any battery(ies) providing a (combined) voltage greater than 12.0 volts.

WARNING

Do not install batteries of different types (lithium with lithium-ion rechargeable). All batteries must be of the same type.

WARNING

Always replace ALL 4 batteries. If you install new batteries with used batteries, the result may be dangerous.

WARNING

Do not replace batteries in a possibly explosive environment, such as a gas station (or any place where you must turn off your vehicle engine). If you do, sparks can cause an explosion.

WARNING

Remove the batteries before you store the riflescopes for extended periods (2 weeks or more).

WARNING

Do not carry batteries in pockets containing metal objects such as coins, keys, etc. Metal objects can cause the batteries to short circuit and become very hot. In the case of lithium batteries, a short circuit could cause them to explode.

WARNING

Observe battery manufacturer's guidelines for safe handling and proper disposal of batteries.

EQUIPMENT LIMITATIONS

- The ThOR Series detector spectral band (7 to 14 mkm) provides a better penetration through smoke, smog, dust, water vapor etc.
- Infrared radiation does not travel through glass and therefore the scope does not sense objects if they are behind a glass window.

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SECTION I

INTRODUCTION

1.1 GENERAL INFORMATION

1.1.1. SCOPE

This manual contains instructions for use in operating and maintaining the ATN ThOR Series Thermal Optical Riflescopes. Throughout this manual, the ATN ThOR Series will be referred to as the scope or ThOR.

1.1.2. REPORTS

Reports from the user on recommendations for improvements are encouraged. Send reports to the address below.

American Technologies Network Corp.
1341 San Mateo Avenue
South San Francisco, CA 94080
(800) 910-2862
(650) 989-5100
(650) 875-0129 fax
info@atncorp.com
www.atncorp.com

1.1.3. STORAGE

Storage of ThOR should be done in the factory packing and after a thorough PMCS as outlined in Section 4.1 of this manual. This will ensure the scope remains in mission ready condition during storage. Batteries should be stored separately from the scope.

The scope should not be placed on the floor, in any area exposed to high temperatures or direct sunlight. Presence of acid and alkaline vapor, as well as of other aggressive admixtures in the air is unacceptable.

1.1.4. WARRANTY INFORMATION

ONE YEAR PRODUCT WARRANTY

This product is guaranteed to be free from manufacturing defects in material and workmanship under normal use for a period of 1 (one) year from the date of purchase. In the event a defect that is covered by the foregoing warranty occurs during the applicable period stated above, ATN, at its option, will either repair or replace the product, and such action on the part of ATN shall be the full extent of ATN's liability, and the Customer's sole and exclusive remedy. This warranty does not cover a product (a) used in 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 ATN without prior written consent of ATN; (d) special order or "close-out" merchandise or merchandise sold "as-is" by either ATN or the ATN 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 ATN. ATN shall not be responsible for any defects or damage that in ATN's opinion is a result from the mishandling, abuse, misuse, improper storage or improper operation, including use in conjunction with equipment which 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. This warranty is extended only to the original purchaser. Any breach of this warranty shall be waived unless the customer notifies ATN 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.

LIMITATION OF LIABILITY

ATN 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. ATN'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 ATN 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 ATN and the Customer; ATN's obligations under this Agreement extend solely to the Customer. **ATN's liability hereunder for damages, regardless of the form or action, shall not exceed the fees or other charges paid to ATN by the customer or customer's dealer. ATN 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.

PRODUCT WARRANTY REGISTRATION

In order to validate the warranty on your product, ATN must receive a completed Product Warranty Registration Card for each unit or complete warranty registration on our website at www.atncorp.com. Please complete the included form and immediately mail it to our Service Center: ATN Corporation, 1341 San Mateo Avenue, South San Francisco, CA 94080.

OBTAINING WARRANTY SERVICE

To obtain warranty service on your unit, End-user must notify ATN service department by calling **800-910-2862** or **650-989-5100** or via e-mail service@atncorp.com to receive a Return Merchandise Authorization number (RMA). When returning please take or send the product, postage paid, with a copy of your sales receipt to our service center, ATN Corporation at the address noted above. All merchandise must be fully insured with the correct postage; ATN will not be responsible for improper postage or, missing or damaged merchandise during shipment. When sending product back, please clearly mark the RMA# on the outside of the shipping box. Please include a letter that indicates your RMA#, Name, Return Address, reason for service return, Contact information such as valid telephone numbers and/or e-mail address and proof of purchases 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. End-user/customer is responsible for postage to ATN for warranty service. ATN will cover return postage/shipping after warranty repair to end-user/customer only if product is covered by aforementioned warranty. ATN will return product after warranty service by domestic UPS ground and/or domestic mail. Any other requested, required or international shipping method the postage/shipping fee will be the responsibility of the end-user/customer.

1.2. DESCRIPTION AND DATA

1.2.1. DESCRIPTION

A. Purpose.

The ThOR Series Thermal Optical Riflescopes combines the ergonomic features of a handheld and the convenience of weapon mounting. Based on the proven 320 x 240 microbolometer core, the ThOR is an ideal product for force protection, border patrol officers, police SWAT and special operations forces providing them the tools they need to be successful in all field conditions both day and night. Uncooled thermal imaging cuts through dust, smoke, fog, haze, and other battlefield obscurants. Its use cannot be detected as it emits no visible light or RF energy and operates without the use of illuminators or IR lights.



FIGURE 1-1. ATN THOR-2 THERMAL OPTICAL RIFLESCOPE



FIGURE 1-2. ATN THOR-3 THERMAL OPTICAL RIFLESCOPE

B. Features.

ThOR has the following important features:

- High resolution digital thermal imaging
- Compact, lightweight and durable housing
- True magnification
- High end OLED display
- Two-colors reticle system
- Rapid start-up in 3 seconds
- Up to 6 hours operation with four lithium batteries
- One-Year Warranty

1.2.2. ThOR STANDARD COMPONENTS

The ThOR standard components are shown in Figure 1-3 and presented in Table 1-1.



FIGURE 1-3. THOR STANDARD COMPONENTS

TABLE 1-1. THOR STANDARD COMPONENTS

ITEM	DESCRIPTION	QTY
1	Scope	1
2	Quick Release Mount	1
3	Hard Storage Case	1
4	Lens Tissue	1
5	Lithium Battery CR123A	4
6	RCA Video/power Adapter	1
7	Operator's Manual	1

1) Scope

The thermal imaging scope.

2) Quick Release Mount

Used to mount scope to weapon.

3) Hard Storage Case

A protective case used for shipping/storing ThOR and accessories.

4) **Lens Tissue**

Uses for cleaning of lenses surface.

5) **Lithium Battery CR123A**

Four CR123A lithium batteries used to power the unit.

6) **RCA Video/power adapter**

RCA Video/power adapter used for video transmission and to connect external power sources.

7) **Operators Manual**

Provides equipment description, use of operator controls and preventative maintenance checks and service.

1.2.3. THOR OPTIONAL COMPONENTS

The ThOR optional components are shown in Figure 1-4 and presented in Table 1-2.



FIGURE 1-4. THOR OPTIONAL COMPONENTS

TABLE 1-2. THOR OPTIONAL COMPONENTS

DESCRIPTION	QTY
DVC	1

1) **DVC**

DVC - Digital View Clip-on dual day/low-light high-resolution CCD video camera attachment .

1.2.4. SPECIFICATIONS

The following tables provide information pertaining to the operational, electrical, mechanical, optical and environmental characteristics for the sights.

TABLE 1-3. SPECIFICATIONS

	THOR-2X	THOR-3X
Sensor (microbolometer)	320x240	
Type	Uncooled 30hz	
Image Size (output resolution)	NTSC: 640x480 30hz	
Video output	NTSC	
Display	OLED 852x600	
Thermal Sensitivity, mK	50	
Spectral Response, μm	7-14	
Focal length of the lens	50	75
Field of View (H x V), deg	12x9	8x6
Angular resolution, mrad	0.6	0.4
Diopter	± 5	
Eye Relief, mm	45	
Magnification	2x (digital 4x)	3x (digital 6x)
Digital Zoom	2	
Focus	Manual	
Focusing range, m	3 to infinity	5 to infinity
Diameter of exit pupil, mm	10	
Distance of the human detection, m	915	1350
Distance of the human recognition, m	450	675
Reticle	Crosshair, 2 colors	
Windage and Elevation Adjustment	$\pm 2^\circ$	$\pm 1^\circ$
Step of Windage and Elevation Adjustment	3/4 MOA	1/2 MOA
Brightness adjustment	Manual	
Sharpness adjustment	Automatic	
Polarity control (only in Black and White mode)	White hot / Black hot	
Start up time, seconds	<3	
Storage temperature, $^\circ\text{C}$	-50 to +90	
Operating temperature, $^\circ\text{C}$	-20 to +60	

	THOR-2X	THOR-3X
Waterproof	+	
Battery type	4(CR123A)x3V	
Battery Life, h	6	
Weight, g (without bracket, with batteries)	920	1050
Weight, g (with bracket, with batteries)	1050	1180
Dimensions (L x W x H), mm (without bracket)	215x77x83	260x77x83
Dimensions, inches (without bracket)	8.5x3.0x3.3	10.2x3.0x3.3
Dimensions (L x W x H), mm (with bracket)	215x77x88	260x77x88
Dimensions, inches (with bracket)	8.5x3.0x3.5	10.2x3.0x3.5
Mounting bracket	Quick Release Picatinny	
External power	9 - 12V DC	
Other Options		
Video output	Yes	
Video in	Yes	
Low Battery Indicator	Yes	

* ATN reserves the right to change the above specifications at any time without notice

1.2.5. MECHANICAL FUNCTION

The mechanical adjustments of the ThOR sights allow for physical differences between individual operators using the system. The scope functions include the switchboard, refresh button, universal connector, eyepiece diopter adjustment ring, focusing ring, battery compartment cover, mounting rail. The mechanical controls are identified in Figure 1-5.

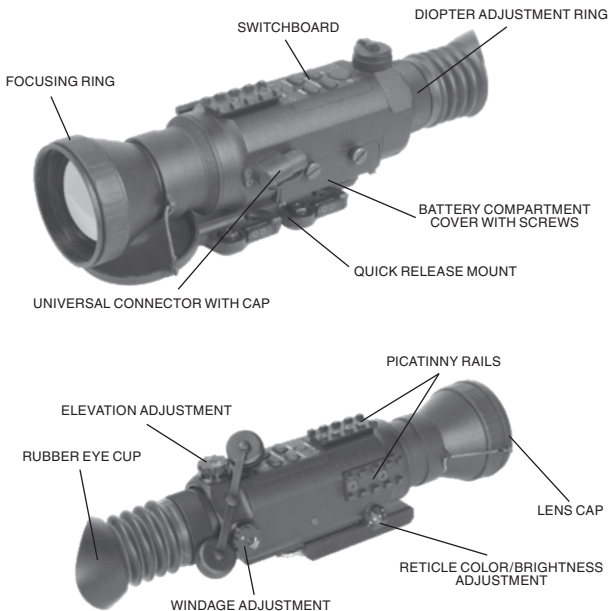


FIGURE 1-5. THOR MECHANICAL CONTROLS

1.2.6. OPTICAL FUNCTION

The optical functions include an objective lens, thermal imaging detector, display and eyepiece. Infrared energy is emitted proportionally to the temperature of an object. The warmer the object, the more energy it emits. The infrared energy from the objects is focused by the optics, onto an infrared detector. The information from infrared detector is passed to electronics for image processing. The signal processing circuitry translates the infrared detector data into an image that can be viewed on the built-in OLED display. The image is observed through an eyepiece by operator.

1.2.7. ELECTRICAL FUNCTION

The electronic circuit is powered by replaceable four 3V lithium batteries (CR123A).

ThOR can be connected to an external 12 VDC/ 2A power supply using video cable.

Power from the batteries or external power supply is supplied to the components through the ON/OFF switch button.

SECTION II

ASSEMBLY AND PREPARATION

2.1. PREPARATION

2.1.1. PREPARATION FOR USE

This chapter contains the information necessary to prepare the scope for operation. This includes unpacking, examination for damage, and batteries installation.

A. Unpacking.

The following steps must be accomplished prior to each mission where the sight is used.

1. Open carrying case, remove the scope and check contents for completeness.
2. Inspect the scope for obvious evidence of damage to optical surfaces, body, eyecups, operation buttons, etc. Ensure that all optical surfaces are clean and ready for use. Clean with lens tissue.

B. Installation of Batteries.

WARNING

The lithium battery contains sulfur dioxide gas under pressure.

Do not heat, puncture, disassemble, short circuit, attempt to recharge or otherwise tamper with the batteries.

Turn off equipment if battery compartment becomes unduly hot. If possible, wait until the batteries have cooled before removing them.

If you inhale sulfur dioxide, seek medical attention.

The ThOR will operate with four CR123A Lithium batteries type.

Install CR123A Lithium batteries as follows.

1. Open the battery compartment cover by unscrewing the screws counterclockwise.
2. Observe polarity, as indicated on the inside of the battery compartment, and insert four 3.0 Volt CR 123A Lithium batteries into the battery compartment.
3. Replace compartment cover and screw two fixing screws. Tighten screws firmly to ensure a watertight seal.



FIGURE 2-1. INSTALL BATTERIES

2.1.2. EXAMINATION FOR OPERATION

Before getting started make sure to follow these steps:

1. Push ON/OFF button on the scope.
2. Make sure that the luminance in ocular is present.
3. Observe the scene, and adjust the diopter and/or lens for optimal image clarity.

2.2. ASSEMBLY

2.2.1. REMOVE/INSTALLATION OF QUICK RELEASE MOUNT (QRM)

ATN Double Lever Quick Release Mount (QRM) is used for fast installation/removing the ThOR on MIL-STD-1913/Picatinny rail.

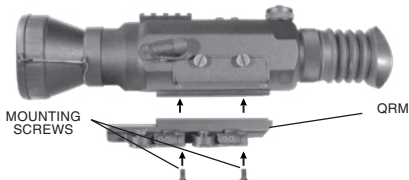


FIGURE 2-2. DOUBLE LEVER QUICK RELEASE MOUNT

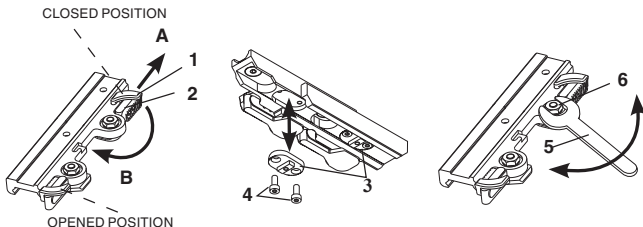


FIGURE 2-3. DOUBLE LEVER QUICK RELEASE MOUNT ADJUSTMENT

1. To remove the QRM from the scope unscrew the two mounting screws, which attach the QRM to the body of the scope.
2. Mount the QRM onto the scope with two mounting screws.
3. To open the QRM, slide the cam latch (1) forward (arrow A) and turn the cam (2) backward (arrow B).
4. Your QRM comes with 2 shoes (3). One for standard weaver rails (designated by the letter W stamped on the shoe) one for MIL-STD-1913/Picatinny rail (designated by the letter P stamped on the shoe). Depending on which rail you are attempting to mount you must remove the other.

5. The shoes can also be adjusted for different mounting positions. To remove shoe unscrew the two screws (4) and place shoe in desired position.
6. Place the scope onto rail. Be sure to engage the recoil lug into the groove on the top mounting surface of the rifle.
7. Turn the cam forward pushing the latch to close the mount.
8. The QRM may be adjusted to eliminate excessive play when mounted on the rail by using the provided wrench (5) to increase/decrease the cam latch nut (6).

2.2.2. VIDEO OUTPUT

The ThOR incorporates a sealed connector used for video transmission and to connect external power sources. RCA video/power adapter attaches the scope to the video facilities for video recording or video transmission (1) to the external display, though at the same time it accepts the external power supply(2).

Connect the scope to an external video display/recorder and to an external power supply as follows:



FIGURE 2-4. THOR WITH VIDEO CABLE

1. Remove the batteries.
2. Remove the protective cap from the connector socket.
3. Attach the video cable to the ThOR output connector socket.
4. Attach the RCA plug of the RCA video/power adapter to a compatible jack on an external video display/recorder, or extension cable.

2.2.3. EXTERNAL POWER SOURCE

WARNING

When the unit is to be powered with external sources, first make sure the batteries have been taken out.

As an external power source, a standard AC controller with outer voltage of 12V and current of over 2A can be applied. To connect an external source recommend to use a 6 mm standard double-pole socket in the way the positive contact is the central contact.

Use the RCA video/power adapter to connect an external 12V DC/ 2A power supply to the ThOR.

Connect an external power supply to the scope as follows:

1. Remove the batteries.
2. Remove the protective cap from the scope output connector socket.
3. Attach the RCA video/power adapter to the output connector socket.
4. Attach the power jack socket of the cable to a 12 V DC/ 2 A power supply.

NOTES

1. **The external power supply plug must have a 6 mm OD contact with center pin positive.**
2. **Avoid a sudden removal of power source: use the power button ON/OFF to turn the scope off before you remove batteries or disconnect external power supply.**
3. **Replace the protective cap on the scope output connector socket after disconnecting the cable.**

2.2.4. DVC INSTALLATION

WARNING!

You are strongly recommended to mount the camera onto the scope and to adjust it after the scope is adjusted or the weapon is zeroed to fire with the scope pre-installed on it.

DVC Camera with QRM preinstalled can be mounted onto the Picatinny rail of the ThOR.



FIGURE 2-7. INSTALLATION ONTO THE ATN THOR

1. Place the DVC onto ThOR rail (Figure 2-7). Be sure to engage the recoil lug into the groove on the mounting surface.

NOTE

Operations with QRM of DVC are similar to the operations with QRM described in Unit 2.2.1.

2. Remove the protective cap from connector socket of ThOR. Insert DVC connector to the socket.

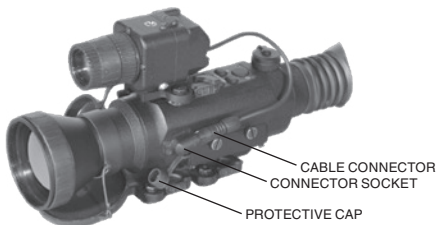


FIGURE 2-8. CAMERA CABLE CONNECTION

SECTION III

OPERATION

3.1. GENERAL INFORMATION

3.1.1. GENERAL

This section contains instructions for operation of ThOR. The function of controls and indicators is explained.

CAUTION

The ThOR scope is a precision electron-optical instrument and must be handled carefully at all times.

3.1.2. CONTROLS AND INDICATION

The ThOR scope is designed to adjust for different users and corrects for most differences. The controls for the scope are shown or described in Figure 3-1 and Tables 3-1.

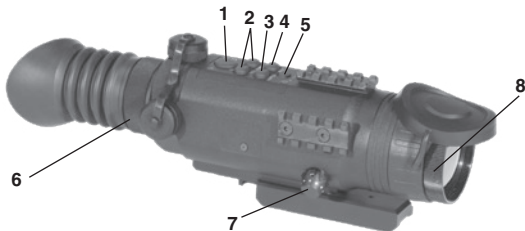


FIGURE 3-1. CONTROLS

TABLE 3-1. CONTROLS AND INDICATION

ITEMS	CONTROLS AND INDICATORS	FUNCTIONS
1	ON/OFF Button	Controls scope power. To turn the unit on and off press the button .
2	BRIGHTNESS Buttons	Adjustment of the output image brightness.
3	POLARITY Button	Switch from hot-white/cold-black into hot-black/cold-white mode (only in Black and White mode).
4	ZOOM Button	Digital magnification On.
5	TOUCH UP Button	Maintains an optimum thermal image.
6	Diopter Adjustment	Focuses eyepiece lens without the need for glasses. Adjusts for sharper image of intensifier screen.
7	Reticle color/ brightness adjustment knob	Adjusts color (red or green) and brightness (5 steps) of reticle
8	Objective Lens Focus	Focuses objective lens. Adjusts for sharpest image of viewed object.

3.2. OPERATING PROCEDURE

3.2.1. TURNING ON

Open the objective lens cover.

NOTE

The objective lens cover protects the scope from inadvertent exposure to extremely high levels of radiant flux. Never leave the scope with the objective lens cover off.

To turn the unit on press the button labeled ON/OFF.

After a warm-up time of approximately 3 seconds, video of the thermal scene appears.

NOTE

During the warm-up time, a logo comes into view on the monocular display. Next the thermal image replaces the logo.

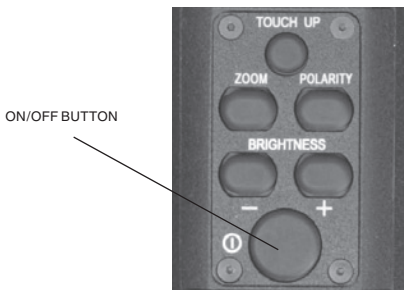


FIGURE 3-2. SWITCHBOARD OF ATN THOR

3.2.2. FOCUSING

To focus the scope you need to adjust the diopter first. The scope has an adjustable eyepiece with a range of +5 to -5 diopter. Simply turn the diopter clockwise until it stops. Then concentrate on any object and slowly turn the diopter back counter clockwise until the grain in the image is sharp. Then rotate the eyecup to accommodate use over the left or right eye.

You scope has ability to focus either long range or short. Focus the front lens to rotate it until the image and the grain are both sharp.



FIGURE 3-3. FOCUS ADJUSTMENT

NOTE

The front lens should be readjusted for viewing objects at different distances. Rotate the focusing ring clockwise for far focus, counterclockwise for near focus.

3.2.3. POLARITY

The function of polarity switching is accessible only in Black and White models.



HOT-WHITE/COLD-BLACK MODE



HOT-BLACK/COLD WHITE MODE

FIGURE 3-4. DISPLAY POLARITY MODES

POLARITY button switches the direct display mode into the reverse one, i.e. from hot-white/cold-black into hot-black/cold-white mode. If the polarity is white-hot, the image will be with hotter objects displayed as white, and the rest of the image displayed as black, and vice versa: with hotter objects displayed as black, if the polarity is black-hot.

3.2.4. BRIGHTNESS

Press BRIGHTNESS + and BRIGHTNESS – buttons for brightness adjustment. Each short push of the buttons BRIGHTNESS + or BRIGHTNESS – raises or lowers the display brightness, correspondingly, in stepwise way.

NOTE

Levels 1 to 8 range from full dim to full bright.

3.2.5. ZOOM

ZOOM button activates a digital zoom function.

The ThOR default digital zoom is 1X. When ZOOM button is pushed first time, the scope will display a scene magnified 2X. To reset the magnification to the 1X press ZOOM button again.

3.2.6. MANUAL IMAGE REFRESH

Degradation of the image (image blurring) is caused by charge accumulation on the detector array.

Use the TOUCH UP button to maintain an optimum thermal image. During this refresh, the video will freeze for approximately 0.5 second.

NOTE

While performing very frequent Refreshes can provide the best possible image quality but also can decrease substantially the battery life.

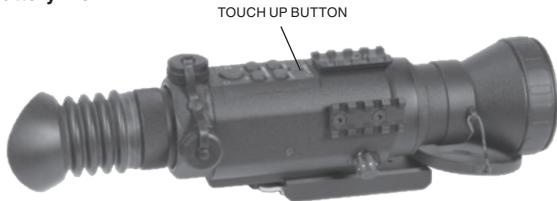


FIGURE 3-5. TOUCH UP BUTTON

3.2.7. RETICLE COLOR/BRIGHTNESS ADJUSTMENT

Your scope has a reticle with two color and 5 degrees of brightness of illumination for each color. The knob of brightness adjustment reticle and color select is located on the side of the body of the scope. On the knob there are color dots marking with color of illumination of reticle.

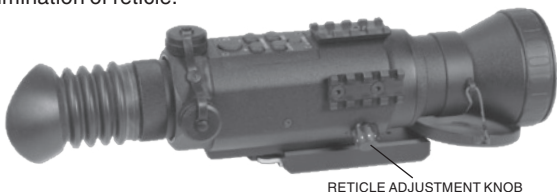


FIGURE 3-6. RETICLE ADJUSTMENT

3.2.8. WINDAGE AND ELEVATION

The vertical and horizontal adjustments for the scope can be achieved by turning the elevation and windage adjustment mechanisms (remove dust caps first). Each click is 3/4 MOA (ThOR-2) or 1/2 MOA (ThOR-3). When reaching the maximum range of rotation do not use force.

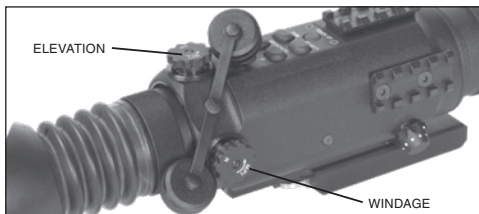


FIGURE 3-7. WINDAGE AND ELEVATION OF THOR

3.2.9. SHUT DOWN OPERATIONS

To finish the work, perform the following:

1. Use the ON/OFF button to turn the scope off.
2. Replace the protective cover on the objective lens.
3. Disconnect the cable (if present). Replace the protective cap on the scope output connector socket.
4. Return the scope and the cable to the case.

SECTION IV

MAINTENANCE INSTRUCTIONS

4.1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

4.1.1. PURPOSE OF PMCS

PMCS is performed daily when in use to be sure that the sight is ready at all times. Procedures listed in Table 4-1 are a systematic inspection of ThOR that will enable you to discover defects that might cause the sight to fail on a mission.

4.1.2. FREQUENCY OF PERFORMING PMCS

The frequency of performing PMCS is as follows:

- A. Daily when the sight is in use.
- B. When it is removed from the case for any reason.

TABLE 4-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

SEQ. NO.	ITEM TO CHECK	CHECKING PROCEDURE	NOT FULLY MISSION CAPABLE IF:
1	Completeness	Inventory items by means of comparing with the data specified in this manual.	Items missing.
2	Sight Body	Inspect for missing screws or connector cap.	Screws or connector cap missing.
3	Front Lens Cap	Inspect for cuts, tears and dirt. Clean as required.	Cap torn or cut.
4	Battery Compartment	Check for corrosion, springs tension.	Springs corroded or damaged.
5	Reticle adjustment knob	Check for operation (without batteries).	Knob inoperative. Knob missing.
6	Lenses	Inspect for cleanliness, scratches, chips or cracks. Clean as required.	Chipped, cracked or if scratches hinder vision through the sight.

SEQ. NO.	ITEM TO CHECK	CHECKING PROCEDURE	NOT FULLY MISSION CAPABLE IF:
7	Objective Lens	Check to ensure the objective lens is not loose.	Objective lens loose.
8	Focus Ring	Check to ensure: — the focus ring cannot be moved along the sight body; — there is free rotation of the focus ring (more than 3/4 turn).	Focus ring able to move along sight body. Focus ring cannot be rotate.
9	Rubber Eye-cup	Inspect for cuts or tears.	Rubber Eye-cup torn or cut.
AFTER CHECKING PROCEDURES			
10		Replace protective covers on the lenses. Remove the batteries. Return the scope and all accessories to the storage case.	

4.2. TROUBLESHOOTING

4.2.1. GENERAL

This section contains information for locating and removal most of the ThOR operating troubles which may occur. Each malfunction for an individual component or assembly is followed by a list of tests or inspections that will help determine probable causes and corrective action to take. Perform the tests/inspections and corrective actions in the order listed.

This manual cannot list all possible malfunctions that may occur, or all tests or inspections and corrective actions. If a malfunction is not listed (except when malfunction and cause are obvious), or is not corrected by listed corrective actions, contact to the service center.

4.2.2. TROUBLESHOOTING PROCEDURES

Troubleshooting procedures are listed in Table 4-2.

TABLE 4-2. TROUBLESHOOTING PROCEDURES

PROBLEM	PROBABLE CAUSE	CORRECTIVE ACTION
Image is absent	Batteries are missing or improperly installed.	Insert batteries or install correctly.
	Batteries are dead.	Replace batteries.
	Batteries contact surfaces or contact springs dirty or corroded.	Clean the contact surfaces with a pencil eraser and/or alcohol and cotton swabs.
Cannot achieve the sharp image of the object.	Objective and output lenses dirty.	Clean thoroughly the lenses surfaces.
	Damaged optical components.	Send the sight to the service center.
The brightness of the image on the screen is low.	The batteries have a low voltage.	Replace the batteries.
	Factory alignment broken.	Send the scope to the service center.

4.3. MAINTENANCE PROCEDURES

4.3.1. SCOPE MAINTENANCE

The ThOR maintenance consists of external inspection of its components for serviceability, cleaning and installation of the standard and optional accessories. Maintenance instructions covered elsewhere in this manual (PMCS, troubleshooting, etc.) are not repeated in this section.

CAUTION

The ThOR is a precision electron-optical instrument and must be handled carefully at all times to prevent damage.

4.3.2. CLEANING PROCEDURES

A. Cleaning the scope

1. Gently brush off any dirt from the sight body using only a clean soft cloth.
2. Moisten the cloth with fresh water and gently wipe the external surfaces (except lenses).
3. Dry any wet surfaces (except lenses) with another dry and clean soft cloth.
4. Using lens brush, carefully remove all loose dirt from the lenses.
5. Slightly dampen a cotton swab with ethanol and lightly and slowly wipe the lenses. Clean the glass surfaces by circular movements from the centre to the edge, not touching the lens holder and changing cotton swab after each circular stroke. Repeat this step until the glass surfaces are clean.

B. Cleaning of accessories

Clean accessories with a soft brush (cloth) and soap and water as required.

CAUTION

Dry thoroughly each item before replacing into the storage case.

4.3.3. PREPARING FOR EXTENDED STORAGE

To prepare the ThOR for extended storage, perform the following:

1. Check the scope for serviceability as outlined in item 4.1 of this manual.
2. Remove the batteries.
3. Clean the scope and accessories.
4. Replace all items in the case.



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