ThOR Series

THERMAL WEAPON SIGHTS



OPERATOR'S MANUAL (ThOR Series) REV. 6 – MARCH, 2015

operator's manual

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AMERICAN TECHNOLOGIES NETWORK CORP.

Register your product warranty online at www.atncorp.com/warranty

Manual (ThOR Series) Revision 6 – March, 2015
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SAFETY SUMMARY

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

CAUTIONS

The ThOR Series Thermal Digital 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 finger-prints 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

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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HOW TO USE THIS MANUAL

- **Usage**

You must familiarize yourself with the entire manual before operating the equipment. Read and follow all warning notices.

- **Manual Overview**

The table of contents includes the paragraph number, paragraph title, and page number. An index provides additional references to the subject contents.

CHAPTER 1

INTRODUCTION

1.1. GENERAL INFORMATION

1.1.1. SCOPE

This manual contains instructions for use in operating and maintaining the ThOR Series Thermal Digital Riflescopes. Throughout this manual, the 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

NOTICE:

All ThOR models with manufacture date post January 1, 2014 are warranted by the following:

3 YEAR PRODUCT WARRANTY

This product is guaranteed to be free from manufacturing defects in material and workmanship under normal use for a period of 3 (three) years from the date of purchase. In addition the uncooled thermal sensor array carries a 10 year warranty. 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 of 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 to continental USA end-users/customers after warranty repair only if product is covered by aforementioned warranty. ATN will return product after warranty service by domestic ground service 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 Digital Riflescopes combines the ergonomic features of a handheld and the convenience of weapon mounting. Based on the proven 336x256 or 640x512 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.

b. Features

ThOR has the following important features:

- High resolution digital thermal imaging
- Compact, lightweight and durable housing
- True magnification
- High end OLED display
- Four-colors reticle system
- Rapid start-up in 3 seconds
- Up to 8 hours operation with three lithium batteries
- Three-Year Warranty
- Aluminum constructed body with class 3 hard anodized coating
- Digital Tactical Menu with quick view icons
- Memory Recall preserves operational settings
- Power-off safety feature prevents accidental shut down
- Recoil rated up to .308 caliber
- Polarity: white hot / black hot / color
- Thermal images viewable in up to 12-tone color palette.
- Five reticle patterns: duplex, post, post w/dot, crosshair w/dot, ballistic

- Four reticle colors: red, green, white, black
- Ten-step brightness control
- Flexible battery cartridge can run on 1, 2, or 3 batteries
- Batteries: (3) 3V lithium (CR123A)
- Battery life: 8 hours (3V)

1.2.2. THOR STANDARD COMPONENTS

The ThOR standard components are shown in Figure 1.1. and presented in Table 1.1.



FIGURE 1.1. THOR STANDARD COMPONENTS

TABLE 1.1. THOR STANDARD COMPONENTS

ITEM	DESCRIPTION	QTY
1	**Scope** The thermal imaging scope.	1
2	**Quick Release Mount** Used to mount scope to weapon.	1
3	**Hard Storage Case** A protective case used for shipping/storing ThOR and accessories.	1
4	**Lens Tissue** Uses for cleaning of lenses surface.	1
5	**Lithium Battery CR1223A** Three CR123A lithium batteries used to power the unit.	3
6	**Operator's Manual** Provides equipment description, use of operator controls and preventative maintenance checks and service.	1

1.2.3. SPECIFICATIONS

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

TABLE 1.2. SPECIFICATIONS

ITEM	ThOR-240 1x-4x	ThOR-336 1.5x-6x	ThOR-336 3x-12x	ThOR-336 4.5x-18x	ThOR-336 9x-36x	ThOR-640 1.1x-9x	ThOR-640 1.5x-12x	ThOR-640 2.5x-20x	ThOR-640 5x-40x
Sensor (microbolometer)	240x180	336x256	336x256	336x256	336x256	640x512	640x512	640x512	640x512
Frame rate, Hz	30	60				30			
Material	VoX								
Image Size (output resolution), px	800x600								
Video output	Digital NTSC / PAL								
Display	Color OLED matrix, SVGA< 800x600, Color background + color reticules								
Thermal Sensitivity, mK	<50								
Spectral Response, µm	7-14								
Focal length of the lens, mm	19	19	30	50	100	19	30	50	100
Field of View (H x V), deg	24 x 18	21 x 14	9 x 7	6 x 4.7	3 x 2.4	48 x 36	21 x 16	12.5 x 9.7	6 x 4.7
Eye Relief, mm	65								
Optical Magnification	1x	1.5x	3x	4.5x	9x	1.1x	1.5x	2.5x	5x
E-Zoom	2x, 4x	3x, 6x	6x,12x	9x, 18x	18x, 36x	2.2x, 4.5x, 9x	3x, 6x, 12x	5x, 10x, 20x	10x, 20x, 40x

ITEM	ThOR-240 1x-4x	ThOR-336 1.5x-6x	ThOR-336 3x-12x	ThOR-336 4.5x-18x	ThOR-336 9x-36x	ThOR-640 1.1x-9x	ThOR-640 1.5x-12x	ThOR-640 2.5x-20x	ThOR-640 5x-40x
Diameter of exit pupil, mm	14								
Distance of the human detection, m (w/o zoom)	500	625	1100	1500	2500	750	1100	1500	2500
Distance of the human recognition, m (w/o zoom)	225	280	400	600	1100	300	400	600	1100
Distance of the human Identification, m (w/o zoom)	135	170	225	360	600	180	225	360	600
Distance of the vehicle detection, m (w/o zoom)	1100	1375	2425	3300	5000	1650	2425	3300	5000
Distance of the vehicle recognition, m (w/o zoom)	495	620	875	1320	2200	660	875	1320	2200
Distance of the vehicle Identification, m (w/o zoom)	300	375	525	800	1400	400	525	800	1400
Reticle	Multiple Reticles to Choose From								
Reticle Color	Red, Green, Blue, White & Black								
Smart Zoom	Thor's Reticle will Automatically Adjust its position when using E-Zoom (Note: Most thermal scopes allow the user to use the scope for observation only, in E-Zoom due to the lack of this feature.)								
Brightness adjustment	Manual								
Sharpness adjustment	Automatic								
Polarity control	White hot / Black hot / Multiple Color Modes								

ITEM	ThOR-240 1x-4x	ThOR-336 1.5x-6x	ThOR-336 3x-12x	ThOR-336 4.5x-18x	ThOR-336 9x-36x	ThOR-640 1.1x-9x	ThOR-640 1.5x-12x	ThOR-640 2.5x-20x	ThOR-640 5x-40x
Start up time, s	<3								
Waterproof	Waterproof / Dustproof								
Battery type	3 x CR123A battery type								
Battery Life, h	8+								
Weight, grams	685	685	710	850	1417	685	710	850	1417
Mounting bracket	MIL-STD 1913 Picatinny (Quick)								
Output computer set up	Yes								
Video output	Yes								
Low Battery Indicator	Yes								
Iconology	Quick access, Icon driven feature controls								
Housing	Aircraft Aluminum 6061 T6 w/ class III hard anodized coating								
Objective lens	Janus, full MIL SPEC, DLC (Diamond Like Carbon) coating								
Dimensions (LxWxH), inc/mm (without bracket)	6.73x2.72x2.87 171x69x73	6.73x2.72x2.87 171x69x73	6.73x2.72x2.87 171x69x73	8x2.72x2.87 203x69x73	10.3x3.7x2.87 262x94x73	6.73x2.72x2.87 171x69x73	6.73x2.72x2.87 171x69x73	8x2.72x2.87 203x69x73	10.3x3.7x2.87 262x94x73

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

1.2.4. MECHANICAL FUNCTION

The mechanical adjustments of the ThOR sights allow for physical differences between individual operators using the system. The scope functions include the Keypad, Output Connector, Eyepiece Diopter Adjustment Ring, Focusing Ring, Battery Module, Accessory Rail, and Weapon Mount. The controls are identified in Figure 1.2.

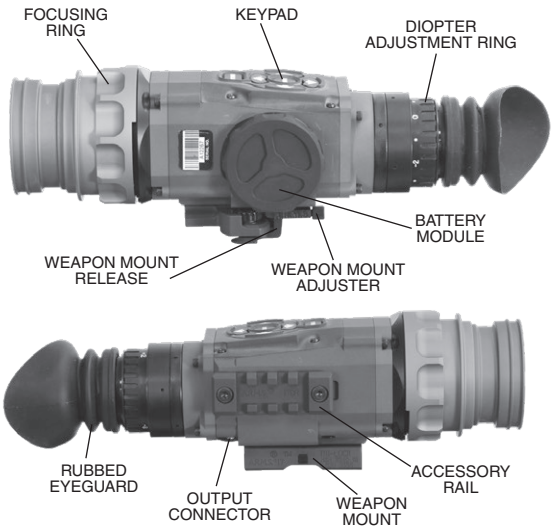


FIGURE 1.2. THOR MECHANICAL CONTROLS

1.2.5. 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.

1.2.6. ELECTRICAL FUNCTION

The electronic circuit is powered by replaceable four 3V lithium batteries (CR123A). Power from the batteries is supplied to the components through the Power button.

CHAPTER 2

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 1, 2 or 3 CR123A Lithium batteries type. For best battery performance use all 3 batteries.

Install CR123A Lithium batteries as follows.

1. Remove the battery module by unscrewing it counter clockwise.
2. Observe polarity, by placing the negative side of the battery against the spring, and insert the 3.0 Volt CR 123A Lithium batteries into the battery module.

3. Replace battery module into the housing. Screw clockwise until finger tight.



FIGURE 2.1. LOADING BATTERY MODULE



FIGURE 2.2. INSTALL BATTERY MODULE

2.1.2. EXAMINATION FOR OPERATION

Before getting started, make sure to follow these steps:

1. Push Power 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)

ARMS #17 Lever Quick Release Mount (QRM) is used for fast installation/removing the ThOR on MIL-STD-1913/Picatinny rail.



FIGURE 2.3. LEVER QUICK RELEASE MOUNT

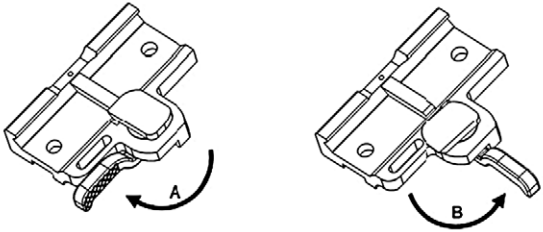


FIGURE 2.4. QUICK RELEASE MOUNT ADJUSTMENT

1. To open the QRM, slide the cam latch forward (arrow A).

2. Place the scope onto rail. Be sure to engage the recoil lug into the groove on the top mounting surface of the rifle.
3. Turn the cam backwards pushing the latch to close the mount (arrow B).
4. The QRM may be adjusted to eliminate excessive play when mounted on the rail by using the adjustment knob on the lever to release the lever from the adjuster.

2.2.2. VIDEO OUTPUT

This version of the ThOR Sighting System is equipped with the added feature of being able to connect directly to a remote video monitor or recorder via an integrated 8 PIN port.



FIGURE 2.5. WITH VIDEO CABLE

To use this feature, the following optional components are required (see illustrations below):

1. 8 PIN-to-BNC adapter.



FIGURE 2.6. VIDEO CABLE WITH 8 PIN TO RCA

2. BNC Plug to RCA Jack Adapter



FIGURE 2.7. RCA JACK ADAPTER

3. RCA style video cables



FIGURE 2.8. RCA CABLES

Connection Setup:

1. Connect the 8 PIN-to-BNC (Figure 2.6.) cable to the sights 8 PIN port.
2. Connect the BNC Plug to RCA Jack Adapter (Figure 2.7.), to the 8 PIN-to-BNC cable.
3. Connect the Yellow (video) plug of the RCA Cables (Figure 2.8.), to the RCA jack adapter.
4. Connect the opposite end of the yellow male RCA cable to the monitor's yellow RCA plug.

Operation:

1. Turn on the system by pressing the POWER button.
2. Let screen image settle before transferring video to the monitor.
3. Press the "Up" and "Down" arrow buttons simultaneously, as show in the photo above. The Video image will now be able to

be viewed through the ThOR eyepiece and the monitor at the same time.



FIGURE 2.9. OPERATION SWITCHBOARD

The user, while looking through the ThOR eyepiece, will be able to tell if video is being displayed on the monitor, because the VID icon will be visible in the bottom left corner of the eyepiece.

4. To turn off the Remote Video Output, repeat step 3.

NOTE

The image seen in the ThOR sight will be smaller than its actual resolution, due to the video processing differing from that of a monitor.

To utilize image capture and review follow next:
1. With no menu visible press and hold the “Enter” button until a camera icon appears on screen (Figure 2.10.).

2. Images are captured by pressing the enter button quickly.

3. To turn off image capture press and hold the “Enter” button until the camera icon disappears from the display. Images can be viewed by entering “Menu 3” (Screenshot) and pressing the left and right arrow buttons. Pressing the down button “trash can icon” button will erase all captured images.

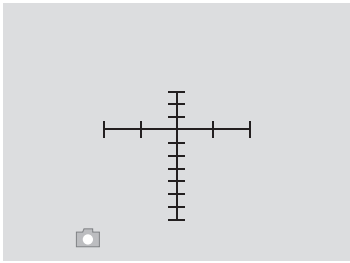


FIGURE 2.10. CAMERA ICON ON SCREEN

How to download images to PC:

1. Install ATN Interface Software on your PC.
2. With Thor On plug in image capture cable to Thor and PC.
3. Open “ATN Scope Interface” software.
4. Click on menu named: Settings.
5. Select “Connect”
6. Choose the correct port for the ThOR cable.
7. Click on menu named: Settings.
8. Select “Image Directory”
9. Choose a location to save the images to.
10. Click on menu item “Download Images”



FIGURE 2.11. IMAGE CAPTURE CABLE

CHAPTER 3

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.

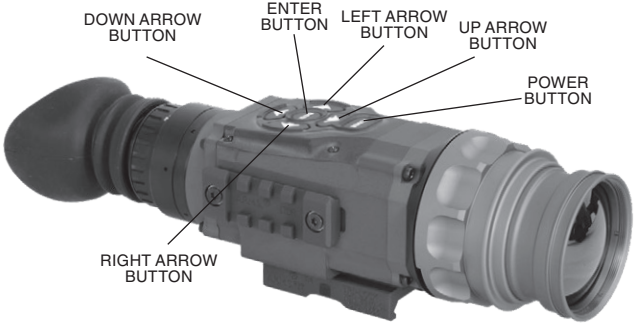


FIGURE 3.1. CONTROLS

TABLE 3.1. CONTROLS AND INDICATION

ITEMS	CONTROLS AND INDICATORS	FUNCTIONS
1	POWER Button	Controls scope power. To turn the unit on and off press the button
2	ENTER Button	Used to select or enter selection
3	Up Arrow	Digital Zoom, Reticle Color, Elevation Up Adjustment
4	Down Arrow	Brightness, Calibration, Elevation Down Adjustment
5	Left Arrow	Polarity, Reticle Type, Windage Left Adjustment
6	Right Arrow	Color Modes, Reticle Adjustment, Windage Right Adjustment

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 POWER.

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 THOR

3.2.2. FOCUSING AND DIOPTER ADJUSTMENT

To focus the scope you need to adjust the diopter first. The scope has an adjustable eyepiece with a range of +2 to -6 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.

The ThOR models have 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 AND DIOPTER 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. ISM – INTERACTIVE SYMBOLOGY MENU

The ThOR features the all new ISM interactive symbology menu that enables you to easily navigate through the feature sand modes without having to go into a complex menu structure. Every mode and option can be found on one of the following ISM screens.

When you turn on the device, you can see Start Screen:

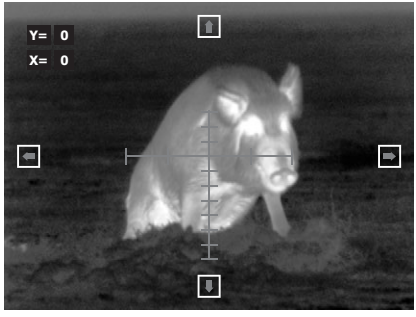


FIGURE 3.4. START SCREEN OF ISM

Top button	Move reticle up
Left button	Move reticle left
Right button	Move reticle right
Bottom button	Move reticle down

NOTE

The live adjustment menu is for on the fly adjustments that do not save to a profile.

NOTE

The reticle control menu allows for adjustments to be saved to a profile and recalled as needed

After Start Screen press enter-button once you can see the MAIN MENU:

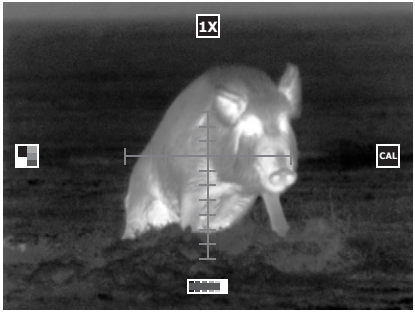


FIGURE 3.5. ISM MAIN MENU

Top button	Digital zoom control. To press button you change magnification so: 1X -> 2X -> 4X (If your ThOR has resolution 640 x 512 1X -> 2X -> 4X -> 8X). **NOTE** The Electronic Zoom [E-Zoom] is not the same as overall system magnification. To calculate system magnification you must multiply E-Zoom by Optical Magnification. Example: ThOR 336 3-12 X has an optical magnification on 3X. When used in 1X E-Zoom mode your system overall magnification is 3X [3 x 1 = 3]. However, when E-Zooming to 2X your system magnification will be 6X [3 x 2 = 6] and when E-Zooming to 4X your system magnification will be 12X [3 x 4 = 12].
Left button	Polarity b&w and color palette (long press) **NOTE** To change mode from White-Hot to Black-Hot and back - press button shortly. To change Color Mode - long press to choose.
Right button	Calibration (NUC)
Bottom button	Brightness control (6 levels)

After Start Screen press enter-button once you can see the RETICLE MENU:



FIGURE 3.6. ISM RETICLE MENU

Top button	Reticle color adjustment You can choose color of your reticle (red, white, black, green)
Left button	Reticle type choice You can choose type of your reticle: **Ballistic** **Duplex** **Post** **Post with dot** **Cross with dot**
Right button	Reticle control menu (see next page)
Bottom button	Saved reticle menu You can choose one of the four saved reticle profiles.

RETICLE CONTROL MENU screen:



FIGURE 3.7. ISM RETICLE CONTROL MENU 1

1. Press the Up/Down/Left/Right buttons to move the reticle to the desired position.
2. When the Reticle has been adjusted to the desired position, press the ENTER button.

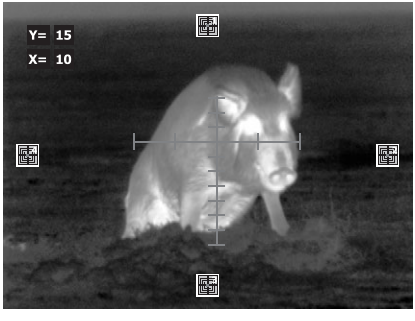


FIGURE 3.8. ISM RETICLE MENU 2

3. The Saved Reticle menu will be displayed on screen providing 4 locations to save reticle profiles.

4. Press the arrow button correlating with the desired profile location. The “SV?” (Save) Icon will appear.



FIGURE 3.8. ISM RETICLE MENU 3

5. To insure the new Reticle position is saved, continue holding the ENTER button down until the “OK” icon appears.

This position is now your new “Zero”

Pressing the ENTER button at this point will continue the rotation through the THOR menu’s as normal.



FIGURE 3.9. SAVED RETICLE MENU

After Start Screen press enter-button three times can see the CAPTURED IMAGE REVIEW MENU:



FIGURE 3.10. CAPTURED IMAGE REVIEW MENU 1

Top button	No function
Left button	Review captured images left
Right button	Review captured images right
Bottom button	Erase all saved images

To take a picture do the following:

When you press and hold the ENTER button for 2 sec. the camera icon appears; when you press ENTER the picture is taken.

To return to the previous Menu screen press and hold the ENTER button for 2 sec.

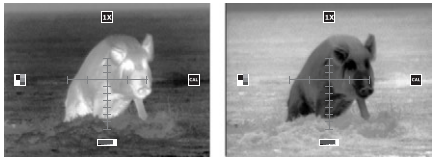


FIGURE 3.11. CAPTURED IMAGE REVIEW MENU 2

To back to MAIN MENU press ENTER-button shortly

3.2.4. POLARITY

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



WHITE HOT BLACK HOT

FIGURE 3.12. 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.

To select polarity do the describing on page 3-11.

3.2.5. COLOR MODES

The ThOR has 10 additional color palettes to choose from in addition to the white hot and black hot polarity.

Fusion, Rainbow, Globow, Ironbow1, Ironbow2, Sepia, Color1, Color2, Ice Fire, Rain.

To select a different colors mode go to ISM Main menu and push Right arrow button to cycle through the 10 additional pallets. To go back to Black hot – white hot mode push left arrow button in ISM Main menu.

3.2.6. ZOOM

240x180 and 336x256 models have 2 steps of digital zoom (factor of 2x and 4x). 640x512 models have 3 steps of digital zoom (factor of 2x, 4x and 8x).

To cycle through the digital zoom steps go to ISM Main menu and push Up arrow button.

When ZOOM button is pushed first time, the scope will digitally zoom a scene by 2 times the scopes optical magnification. When the zoom button is pushed the second time the scope will digitally zoom a scene by 4 times the scopes optical magnification for ThOR models with the 240x180 and 336x256 core. To reset the magnification to the default optical magnification press ZOOM button third time. For ThOR models with the 640x512 core when the zoom button is pushed the third time the scope will digitally zoom a scene by 8 times the scopes optical magnification. To reset the magnification to the default optical magnification press ZOOM button fourth time.

NOTE

Resolution decreases with each step of digital magnification.

The reticle has a built in compensation to shift and stay on the target during digital zoom operations

3.2.7. MANUAL IMAGE REFRESH / CALIBRATION

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

To use the calibration icon go to ISM Reticle menu and push down arrow button to maintain an optimum thermal image. During this refresh, the video will freeze for approximately 0.5 second.

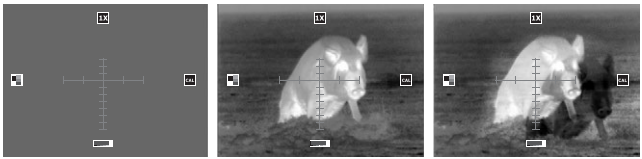
IMPORTANT:

To Perform calibration of unit. Cover front lens with cap or hand and push Calibration button to calibrate image. Failure to do this step may result in degradation of the image. Degradation may consist of unusual blurriness or ghost like spots in the image. During use if you see any degradation of image please recalibrate the scope.

Perform a calibration upon every substantial environmental temperature change.

NOTE

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



DURING CAL
CORRECT VIEW

CORRECT CAL
IF LENS IS COVERED

INCORRECT CAL
IF LENS IS NOT COVERED

FIGURE 3.13. CALIBRATION (NUC)

3.2.8. RETICLE COLOR

Your scope has Four reticle colors to choose from: red, green, white, black, the latest firmware also includes many bonus colors.

To select reticle colors go to ISM Reticle menu and push Up arrow button to cycle through the reticle colors (page 3-7).

3.2.9. RETICLE PATTERN

Your scope has many reticle types/patterns to choose from: ballistic, duplex, crosshair with dot, post, post with dot.

To select reticle type go to ISM Reticle menu and push Left arrow button to cycle through the reticle patterns (page 3-7).

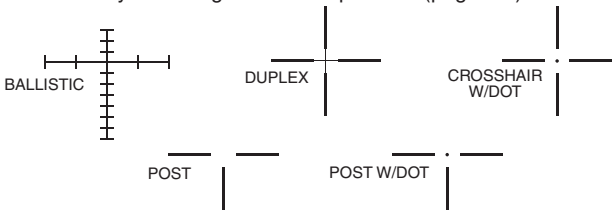


FIGURE 3.14. RETICLE PATTERNS

3.2.10. RETICLE ADJUSTMENT AND SAVE INSTRUCTIONS

A Reticle Position Indicator has been incorporated, in order for the operator to have visual confirmation of the reticle position change. How to make it - see page 3-8.

3.2.11. SHUT DOWN OPERATIONS

To finish the work, perform the following:

1. Use the POWER button to turn the scope off.
2. Hold down the POWER button (3 seconds) until the ? icon goes away then release the POWER button. This is a safety so the system is not accidentally turned off.
3. Return the scope to the case.

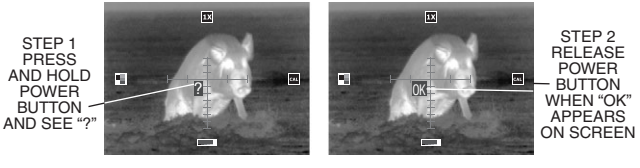


FIGURE 3.15. POWER DOWN

CHAPTER 4

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	Lenses	Inspect for cleanliness, scratches, chips or cracks. Clean as required.	Chipped, cracked or if scratches hinder vision through the sight.
6	Objective Lens	Check to ensure the objective lens is not loose.	Objective lens loose.

SEQ. NO.	ITEM TO CHECK	CHECKING PROCEDURE	NOT FULLY MISSION CAPABLE IF:
7	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
8	Rubber Eye-cup	Inspect for cuts or tears	Rubber Eye-cup torn or cut
AFTER CHECKING PROCEDURES			
9	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 a 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 set too 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 center 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:

6. Check the scope for serviceability as outlined in item 4.1 of this manual.
7. Remove the batteries.
8. Clean the scope and accessories.
9. Replace all items in the case.

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For customer service and technical support, please contact

American Technologies Network Corp.
1341 San Mateo Avenue, South San Francisco, CA 94080
phone: 800-910-2862, 650-989-5100; fax: 650-875-0129

www.atncorp.com©

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