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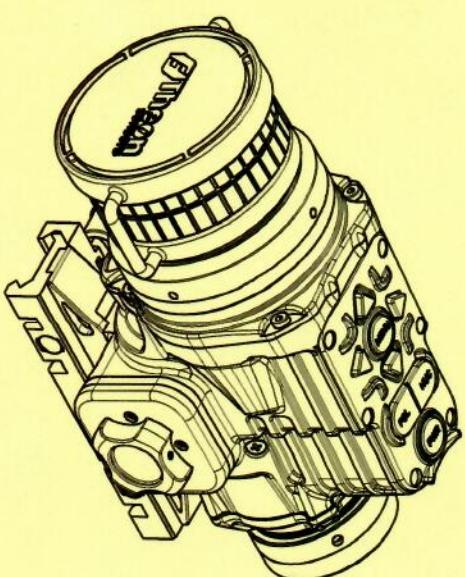
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**TECHNICAL MANUAL
OPERATOR'S MANUAL**

THERMAL CLIP-ON SIGHT

THERMIS



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10 September 2018

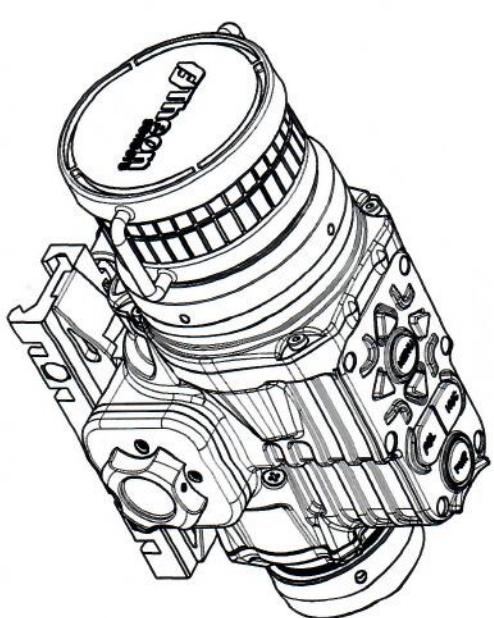
450-016

TECHNICAL MANUAL

OPERATOR'S MANUAL

THERMAL CLIP-ON SIGHT

THERMIS



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Table 12. Preventive Maintenance Checks and Services--continued

ITEM NO	INTERVAL	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:	CAUTION
		ITEM TO BE INSPECTED			
9.	Before/ After	Locking Knob	Rotate to ensure free movement and activation of the torque control mechanism.	Binding, not moving freely or too loose.	Do not ship or store THERMIS without removing the batteries.
10.	Before/ After	Transport and Storage Box Assembly	Remove all items, shake out loose dirt or foreign material. Inspect for excess wear, or damage to hinges or latches.	Box has extensive damages or cracks.	CAUTION To prevent thermal damage of THERMIS, never point it, either ON or OFF, directly at the sun or any other source of high intensity light that the unprotected human eye cannot tolerate (such as a welding arc). To prevent inadvertent exposure to these types of sources, never leave the equipment with the objective lens cover off.
11.	Before/ After	Carrying Bag	Remove all items and shake out loose dirt or foreign material. Inspect for tears, cuts, excess wear, or damage to mounting clips.	Damaged or extensive wear	CAUTION When installing the Battery Pack in the Battery Compartment of THERMIS, screw the Battery Pack Knob till it reaches the end of the thread and do NOT use excessive force, because this may cause irreparable damage to the Battery Pack or the Battery Compartment.
13.	Before/ After	Shoulder Strap	Inspect for cuts, tears, or excess wear or damaged clips.	Damaged or extensive wear	CAUTION The battery level is shown correctly on the screen ONLY IF the correct type of battery (that is currently in use) has been selected from the STATUS Submenu of the MENU (primary Lithium-L ₁ , or Alkaline-A, or Ni-MH rechargeable-N). In any other case the battery level indication will show either low battery warning while THERMIS has many remaining hours of operation with the installed batteries, or THERMIS will run out of battery without ANY indication of low battery.

CAUTION
Do not apply excessive force while cleaning the optical surfaces of THERMIS, because it is possible to scratch or pit these optical surfaces and cause permanent damage.

CAUTION
If THERMIS is deactivated by following the Emergency Shut Down procedure or by just removing the Battery Pack, some data or settings (such as Snapshots, Reticle zeroing Position, or Configuration Settings) may be lost, damaged or get corrupted.

When installing THERMIS on Weapon, take care not to touch the THERMIS optics with any metallic parts of the Day Sight or the weapon. In such a case, THERMIS' optics may be irreparably damaged.

Table 12. Preventive Maintenance Checks and Services.

ITEM NO	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
ITEM INTERVAL	ITEM TO BE INSPECTED	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
1.	Before/ After	Optical Surfaces	Inspect all lenses for dirt, fingerprint residue, chips, or cracks. If necessary, clean and dry lenses with water (or lens cleaning solution, if available) and lens tissue.
2.	Before/ After	External Surfaces	Inspect for cracks or damage. Scratches and gouges are OK if operation is not affected.
3.	Before/ After	Battery Pack and Battery Compartment	Check to make sure Battery Pack and its O-ring are present. Remove Battery Pack and inspect for moisture, cracks, corroded or defective spring contacts, and Battery Pack Knob can freely rotate.
4.	Before/ After	Objective Lens Focus Ring.	Rotate Objective Lens Focus Ring to ensure free movement.

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- Following this exact order, use firstly the Lens Cleaning Brush that is included in the delivered Lens Cleaning Kit and remove excessive dirt or sand from the optical surfaces of THERMIS.

CAUTION

Do not apply excessive force while cleaning the optical surfaces of THERMIS, because it is possible to scratch or pit these optical surfaces and cause permanent damage.

- Afterwards, clean the optical surfaces with the Lens Cleaning Cloth that is included in the delivered Lens Cleaning Kit.
- If necessary, rinse lenses with running water or use a wet cloth in order to remove sand, salt and other contaminants (do not apply pressure). Wipe the lens using a soft tissue paper or lens tissue.
- If available and if necessary, clean the lenses using optics cleaning paper soaked in lens cleaning solution. Wipe once gently performing a circular motion. Turn the cleaning paper on the other side and repeat the process until the glass is clean. Finally, repeat once more using dry optics cleaning paper.

How to use this manual

Usage

You must familiarize yourself with the entire contents of this manual before attempting to operate or maintain THERMIS.

Warning, caution and note notices

WARNING

Conditions, practices, or procedures that must be observed to avoid personnel injury or loss of life.

CAUTION

Conditions, practices, or procedures which must be observed to avoid damage to the equipment, destruction of equipment and/or long term health hazard.

NOTE

It draws attention to important directives that have to be followed and memorized in order to improve and accelerate the various procedures.

Table 11. Troubleshooting--continued

MALFUNCTION	TEST FOR INSPECTION	CORRECTIVE ACTION
10. Parts of Main MENU and Status Screen cannot be seen when observed through the Day Sight.	External NUC has been conducted without covering the Objective Lens.	Check if "STANDALONE" Mode is activated in MENU→MODE.
11. Thermal image quality is of very low quality or/and shows persistent patterns and/ or large non-uniformities.	External NUC has been conducted without covering the Objective Lens.	Change MODE setting to "CLIP-ON" (Main MENU). THERMIS Thermal Clip-On Sight's optics have been chosen for operation in CLIP-ON mode. Only the THERMIS MR model can be used effectively in STANDALONE Mode.
12. No Snapshot is saved and the "Saving Snapshot" icon designated with a red X (☒) appears on Status Screen.	Memory is full.	If the problem persists, refer to higher level of maintenance. Delete saved Snapshots (via a PC or the MENU) and try again. If the problem persists, refer to higher level of maintenance.
13. No Snapshot is taken and the Snapshot icon with a red X (☒) appears on Status Screen.	Snapshot Buffer is full.	Wait for 10-15 sec for the icon to disappear and try taking a Snapshot again. Restart THERMIS if the icon is still there. If the problem persists, refer to higher level of maintenance.

- Battery Cartridges (extra)
- Power and Communication Cable
- PC Software
- External Monitor
- Head Mounted Display

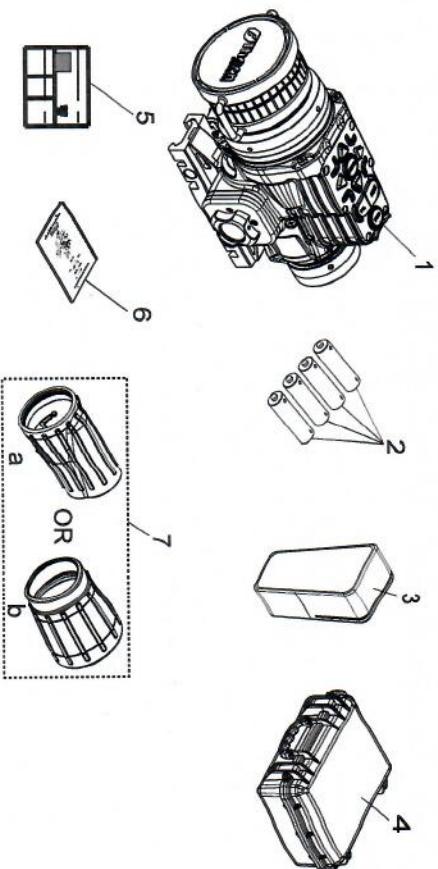


Figure 1. Composition of THERMIS kit

Characteristics, Capabilities and Features

THERMIS Overview

The Thermal Clip-On Sight, THERMIS is a Clip-on Afocal Sight for mounting in front of optical Day Sights (such as an Elcan SPECTER, Trijicon ACOG or sniper Day Sights, depending on the model). It provides observation, target acquisition and aiming capabilities during all night and daylight conditions. THERMIS is installed on the Weapon's Picatinny Rail in front of the Day Sight and it is attached on it using a simple weapon mount. Due to its exact set of 1X magnification the Day Sight's boresight settings are not affected. Reticle readings, eye relief distances and shooting/observation practices remain the same as in day time when only the Day Sight is installed on the weapon.

THERMIS operates in the wavelength region of 8 to 14 μm . The main principle of its operation is based on the collection of the thermal (non-visible) radiation that all bodies emit and the transformation of this radiation to a visible image. THERMIS can operate in usual and unusual (light rain, dust, dry smoke, or fog) conditions, during nighttime and daytime and it can also operate in conditions of complete darkness

Table 11. Troubleshooting -continued

MALFUNCTION	TEST FOR INSPECTION	CORRECTIVE ACTION
3. Light visible around Hood	Check if correct Hood is available (for specific THERMIS model and Day Sight)	Install the correct Hood.
4. Battery Pack Knob doesn't screw Battery Pack in Battery Compartment.	Check the distance between THERMIS and Day Sight. Check Hood for resiliency. Remove Battery Pack and check for any dirt, grit or broken parts/damages on it or on Battery Compartment	Re-adjust for proper THERMIS-Day Sight distance. If Hood is defective, replace with a new one. Clean with a wet cotton-tipped swab applicator. If broken axis, damaged thread or other damages are found, refer to higher level of maintenance.
5. THERMIS does not securely lock on the weapon Picatinny Rail.	Check Mounting Interface and mating surfaces for dirt.	Clean Mounting Interface and mating surfaces.
6. Fault Indication (Fig. 8/7) is active.	Check Mounting Interface and mating surfaces for damage.	If damaged, refer to higher level of maintenance.
7. Keyboard Buttons do not respond while THERMIS is activated.	Deactivate THERMIS and remove batteries. Install new ones and activate THERMIS again. If Fault Indication persists, refer to higher level of maintenance. If Keyboard Buttons do not respond still, refer to higher level of maintenance.	Apply Emergency shut down by long pressing the "PWR" Button for more than 10 seconds. Reactivate THERMIS and check again.

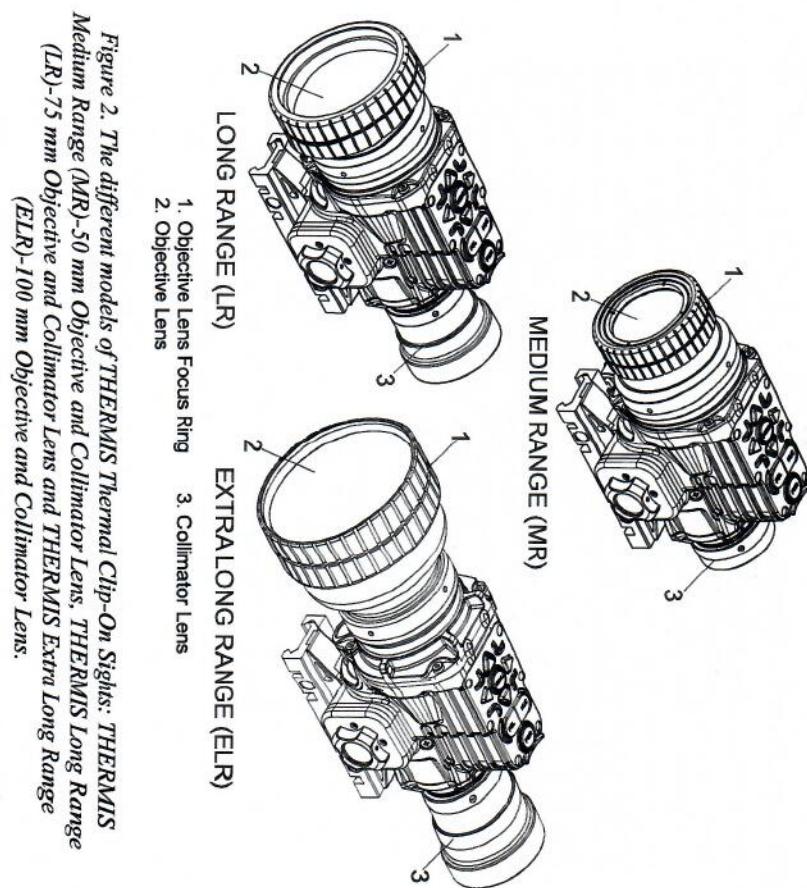


Figure 2. The different models of THERMIS Thermal Clip-On Sights: THERMIS Medium Range (MR)-50 mm Objective and Collimator Lens, THERMIS Long Range (LR)-75 mm Objective and Collimator Lens and THERMIS Extra Long Range (ELR)-100 mm Objective and Collimator Lens.

General Characteristics

- Easy to use and operate.
 - Rugged.
 - Passive device, undetectable by the enemy (it does not emit visible or IR radiation when installed with its Hood and the Day Sight on the weapon).
 - Self-contained battery for portable operation.
 - Operates in conditions of complete darkness.
- Limitations
- Due to the nature of the infrared radiation 8-14 μm , THERMIS cannot see through common glass (e.g. in cars or buildings).
 - The equipment is less effective through heavy rain, fog, sleet, snow or dense smoke.

- Hardness — Do not use DS-2 for decontaminating THERMIS. To decontaminate, use 5% sodium hypochlorite and rinse with hot (158°F - 70°C) soapy water.

Operation at Low Temperatures

At low temperatures (below zero) more effort might be required in order to operate THERMIS. In this case do not attempt to force the mechanical controls since this may damage the moving parts of THERMIS.

The capacity of the battery is reduced at low temperatures, especially in the case of alkaline battery. The reduction in the battery life is to be expected and the battery life should increase as the temperature rises.

Periodically removing batteries and warming them with body heat can increase battery run time.

Operation at High Temperatures

THERMIS can operate at temperatures up to +55°C. Nevertheless you should protect the battery from exposure to very high temperatures whenever possible.

THERMIS should not be exposed to sudden changes of temperature. If THERMIS is moved to an environment of much higher temperature, condensation might occur at the external optical surfaces.

stackable and it is also equipped with an automatic air pressure compensation valve.

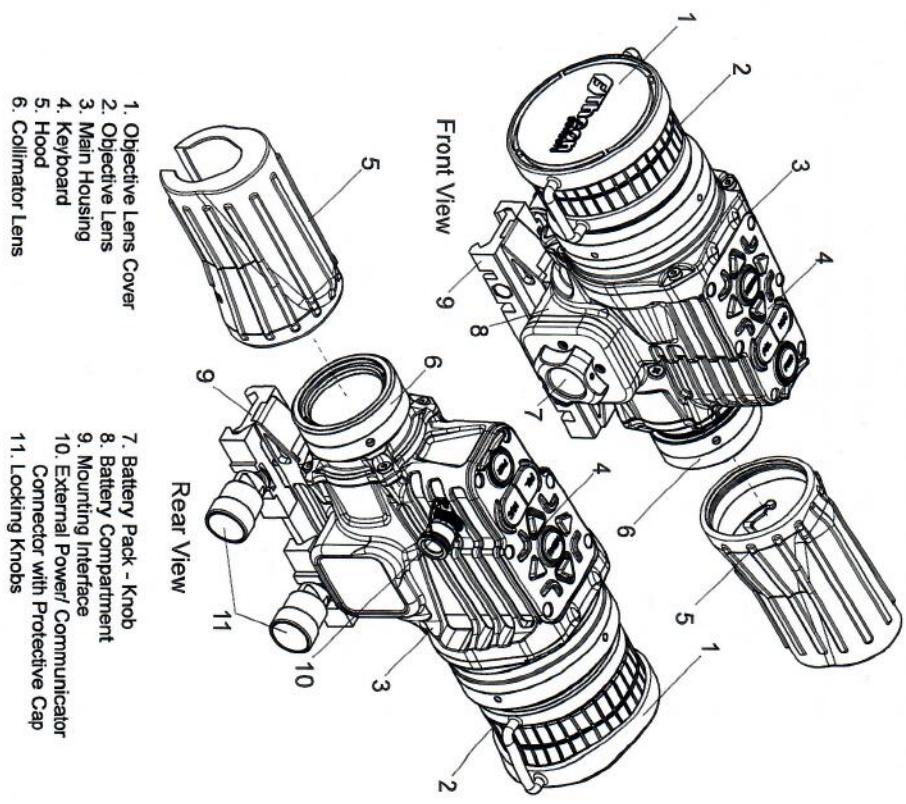


Figure 3. Location and Description of Major Components

NOTES

The sharpest image will be observed only when the Objective Lens is properly focused. The Objective Lens Focus Ring is adjusted so as to focus on objects of different distances. As there is no Diopter Adjustment on the Collimator, the user will be able to see clearly the image and the symbols on the screen only if his vision is corrected (e.g. with glasses).

5. Single press the "POL" Button (Fig.7/16) to change the polarity of the observed scene. Certain observation targets may appear better in one of the two polarities depending on the environment temperature and the background.
6. If the under observation target is constantly located at a specific part of the screen single-press the "RIGHT" (Fig.7/12) or "LEFT" (Fig.7/18) Buttons to adjust the observed thermal scene to a different Region-Of-Interest (ROI) in order to be able to see more details in the selected area.
7. If you need to enhance the contrast between the object and the background, or if you want to see more details when large temperature differences or large uniform areas exist in the scene, use the Image Enhancement algorithms by single-pressing the "UP" (Fig.7/11) or "DOWN" (Fig.7/13) Buttons to switch between different Image Enhancement Modes.
8. When the uniformity of the observed image is lost single-press the "NUC" (Fig.7/14) button for a Quick NUC or cover the Objective Lens and long-press (for 2 sec.) the "NUC" (Fig.7/14) button. In both cases, the observed scene will "freeze" for a fraction of a second until the NUC is finalized.

Table 4. Optical Data, THERMIS.

ITEM	DATA		
	MR	LR	ELR
Optical Magnification	1X, 2X and 4X	1X	
Digital Magnification	12.4°	8.3°	6.2°
Field of View			
Focus Range	10 m or 20 m to infinity (according to specification)		

Table 5. Environmental Data.

ITEM	DATA
Operating Temperature	-40°C to +55°C
Storage Temperature	-40°C to +71°C

Table 6. IR Sensor Data.

ITEM	DATA
Sensor	Uncooled Microbolometer
Spectral Response	8 - 14 µm
Sensor Size	640 X 480 pixels
Pitch	17 µm

7. Single press the "POL," Button (Fig.7/16) to change the polarity of the observed scene. Certain observation targets may appear better in one of the two polarities depending on the environment temperature and the background.
8. If the under observation target is constantly located at a specific part of the screen single-press the "RIGHT" (Fig.7/12) or "LEFT" (Fig.7/18) Buttons to adjust the observed thermal scene to a different Region-Of-Interest (ROI) in order to be able to see more details in the selected area.
9. If you need to enhance the contrast between the object and the background, or if you want to see more details when large temperature differences or large uniform areas exist in the scene, use the Image Enhancement algorithms by single-pressing the "UP" (Fig.7/11) or "DOWN" (Fig.7/13) Buttons to switch between different Image Enhancement Modes.
10. When the uniformity of the observed image, is lost single-press the "NUC" (Fig.7/14) button for a Quick NUC or cover the Objective Lens and long-press "freeze" for a fraction of a second until the NUC is finalized.

Weapon-mounted operation (operation as Thermal Standalone Weapon Sight)

Perform the following procedures for weapon-mounted operation as a Thermal Standalone Weapon Sight (only for THERMIS MR).

1. Ensure that the batteries are installed per §2.2.
2. Install THERMIS on weapon as per §2.2. Do not install Hood on THERMIS and Day Sight on weapon.
3. Make sure that the correct Reticle corresponding to the weapon that is currently in use is activated.
4. Remove the Objective Lens Cover (Fig.7/1).
5. If THERMIS is not zeroed for the specific weapon, perform zeroing on the weapon as per §2.2.

NOTE

In order to maintain THERMIS zeroing when it is dis-mounted from and re-mounted on the same weapon, mount THERMIS using the same slots of the weapon's Picatinny Rail that you used during zeroing.

6. Single press the «PWR» Button (Fig.7/15) to activate THERMIS.

7. Direct THERMIS towards the target and adjust the Objective Lens Focus Ring (Fig.2/1) until you observe a sharp image of the observed target. The observed target must be at a distance of at least 10 m (or 20 m for some THERMIS models-450-016

7. Single press the "POL," Button (Fig.7/16) to change the polarity of the observed scene. Certain observation targets may appear better in one of the two polarities depending on the environment temperature and the background.

8. If the under observation target is constantly located at a specific part of the screen single-press the "RIGHT" (Fig.7/12) or "LEFT" (Fig.7/18) Buttons to adjust the observed thermal scene to a different Region-Of-Interest (ROI) in order to be able to see more details in the selected area.

9. If you need to enhance the contrast between the object and the background, or if you want to see more details when large temperature differences or large uniform areas exist in the scene, use the Image Enhancement algorithms by single-pressing the "UP" (Fig.7/11) or "DOWN" (Fig.7/13) Buttons to switch between different Image Enhancement Modes.

10. When the uniformity of the observed image, is lost single-press the "NUC" (Fig.7/14) button for a Quick NUC or cover the Objective Lens and long-press "freeze" for a fraction of a second until the NUC is finalized.

Optical Functions

The optical functions of THERMIS include the Objective Lens, the Thermal Sensor, the OLED Display and the Collimator Lens (Figure 5).

The Objective Lens (Fig.5/1) collects the infrared radiation of the observed scene and focuses it onto the Thermal Sensor (Fig.5/2). The Thermal Sensor receives, processes and transforms, via the electronics of the THERMIS Thermal Engine, the infrared scene and projects it on the OLED display (Fig.5/3). Finally, the transformed thermal scene is projected by the Collimator Lens (Fig.5/4) to the Day Sight (Fig.5/5) and the user sees through it the thermal scene. The Collimator Lens (Fig.5/4) is factory-set to have the same focal length with the Objective Lens (Fig.5/1), resulting in 1X system magnification. THERMIS Thermal Clip-On Sight can be used in both daytime and nighttime conditions, even in complete darkness in the observed scene.

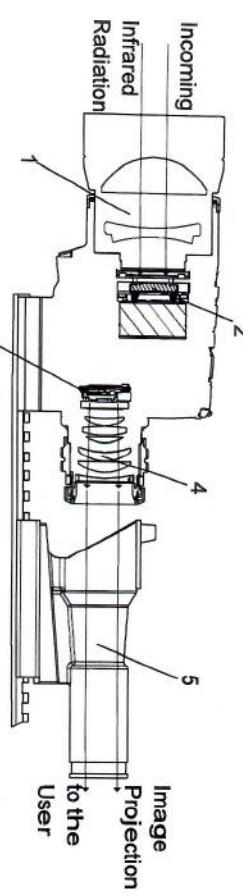


Figure 5. Optical Function Diagram.

CAUTION

Do not ingest, touch, or inhale particles or parts of a broken thermal objective lens. Thermal lenses contain materials that can cause irritation to eyes, skin, upper and lower respiratory tracts, or gastrointestinal tract. If contacted, flush eyes or skin with large amounts of water. If ingested, DO NOT induce vomiting. Rinse mouth with water and give victim 2-4 cups of milk or water. Fragments of the lens may be sharp enough to cut personnel if touched.

CHAPTER 2 OPERATOR INSTRUCTION

2.1 Description and Use of Operator Control and Indicators

2.1.1 Operator Control and Indicators of THERMIS

When THERMIS is used in-line with a magnified Day Sight, THERMIS should be put in CLIP-ON Mode from the main MENU and zeroing procedures associated with the Day Sight should be followed, in accordance with the Day Sight's Operator Manual. Mounting THERMIS in front of an already zeroed Day Sight on a specific weapon, does not necessitate rezeroing.

WARNING

Aiming through the Day Sight's Reticle must only be done when the Digital Zoom of THERMIS is 1X. The 2X or 4X Digital Zoom options must only be used for observation.

Table 7.

Table 7. THERMIS Controls and Indicators.

CONTROLS AND INDICATORS	FUNCTION
Objective Lens Cover (Fig.7/1)	Covers and protects the Objective Lens (Fig.3/2) from scratches and dirt, as well as from the exposure to very bright light. The Objective Lens Cover (Fig.7/1) must always be installed on the Objective Lens (Fig.3/2) when THERMIS is not in use.
Object	CAUTION To prevent thermal damage of THERMIS, never point it, either on or off, directly at the sun or any other source of high intensity light that the unprotected human eye cannot tolerate (such as a welding arc). To prevent inadvertent exposure to these types of sources, never leave the equipment with the objective lens cover off.
ive Lens Focus Ring (Fig.7/2)	Focuses the Objective Lens (Fig.3/2) of Thermis covering a range from 10-20 m (depending on the specification) till infinity. Rotate the Objective Lens Focus Ring (Fig.7/2) to focus THERMIS to objects at different distances.
Hood (Fig.7/4)	Prevents stray light from entering the Day Sight (Fig.5/2) and prevents exposure of the operator due the glow coming out of the Collimator Lens (Fig.3/6) from the operating OLED Display.

CAUTION

Do not attempt to operate THERMIS before reading carefully and understanding all the instructions given in this manual.

NOTE

If the equipment fails to operate, refer to the Troubleshooting Procedures in § 3.1.

CAUTION

The controls and indicators for the system are shown in Figure 7 and described in Table 7.

Any undesirable emission of light from the Collimator Lens (even with the Hood installed) can be detected by the enemy.

Table 7. THERMIS Controls and Indicators. -continued

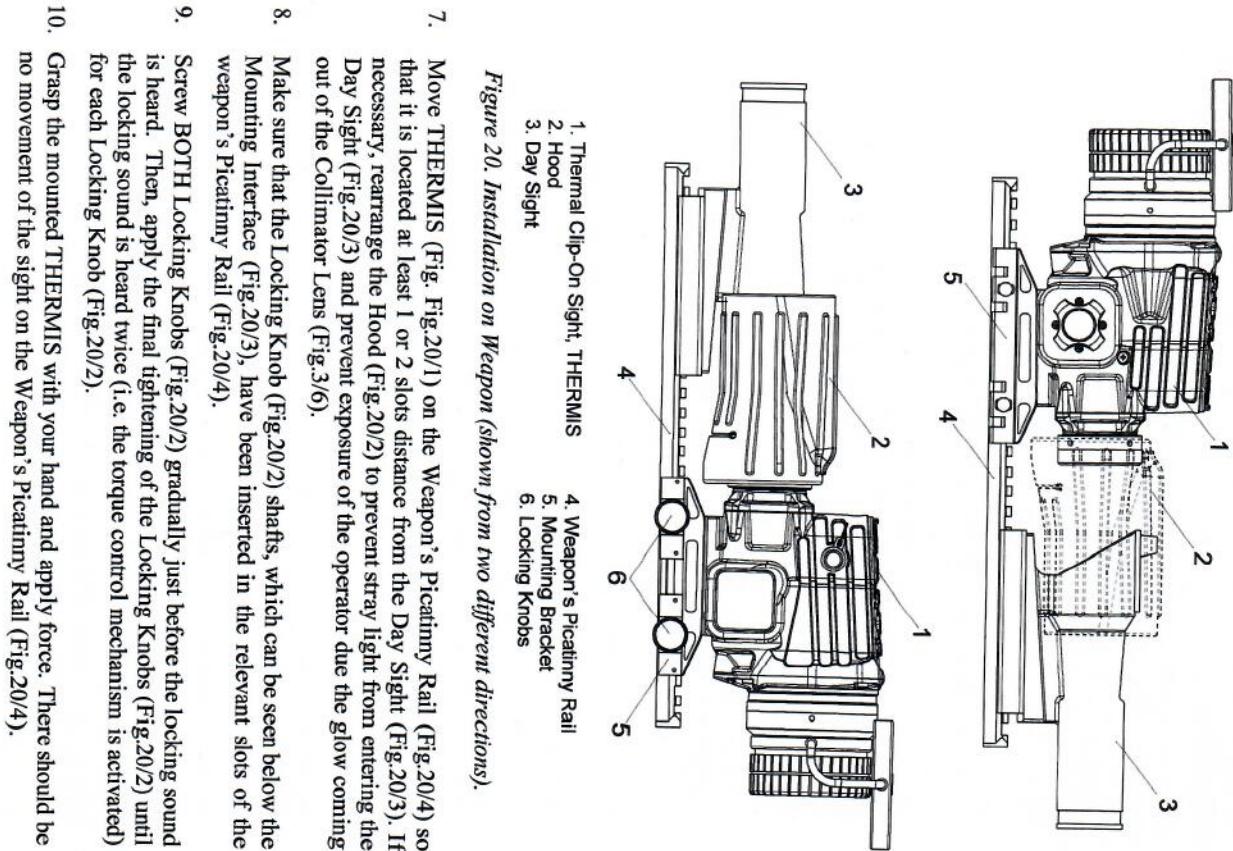
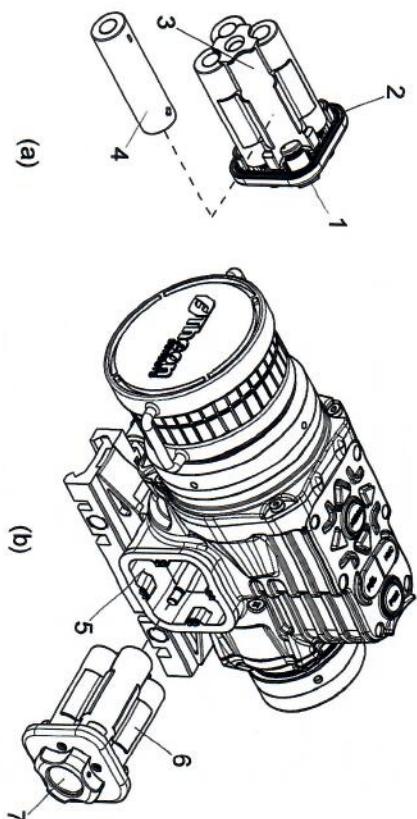


Figure 20. Installation on Weapon (shown from two different directions).

7. Move THERMIS (Fig. 20/1) on the Weapon's Picatinny Rail (Fig. 20/4) so that it is located at least 1 or 2 slots distance from the Day Sight (Fig. 20/3). If necessary, rearrange the Hood (Fig. 20/2) to prevent stray light from entering the Day Sight (Fig. 20/3) and prevent exposure of the operator due the glow coming out of the Collimator Lens (Fig. 3/6).
8. Make sure that the Locking Knob (Fig. 20/2) shafts, which can be seen below the Mounting Interface (Fig. 20/3), have been inserted in the relevant slots of the weapon's Picatinny Rail (Fig. 20/4).
9. Screw BOTH Locking Knobs (Fig. 20/2) gradually just before the locking sound is heard. Then, apply the final tightening of the Locking Knobs (Fig. 20/2) until the locking sound is heard twice (i.e. the torque control mechanism is activated).
10. Grasp the mounted THERMIS with your hand and apply force. There should be no movement of the sight on the Weapon's Picatinny Rail (Fig. 20/4).

CONTROLS AND INDICATORS	FUNCTION
Battery Pack Knob (Fig. 7/6)	<p>CAUTION</p> <p>When installing the Battery Pack in the Battery Compartment of THERMIS, screw the Battery Pack Knob till it reaches the end of the thread and do NOT use excessive force, because this may cause irreparable damage to the Battery Pack or the Battery Compartment.</p>
Mounting Interface (Fig. 7/8)	<p>The Mounting Interface (Fig. 7/8) with its Locking Knobs (Fig. 7/19) is used to securely attach THERMIS on the Picatinny interface (in accordance with MIL-STD-1913) of a weapon. Place THERMIS on the Picatinny rail in front of the Day Sight and screw BOTH Locking Knobs (Fig. 7/19) gradually just before the locking sound is heard. Then, apply the final tightening of the Locking Knobs (Fig. 7/19) until the locking sound is heard twice (i.e. the torque control mechanism is activated).</p> <p>External Power/Communicator Connector (Fig. 7/8)</p> <p>The External Power/Communicator Connector (Fig. 7/8) is used in tandem with the (optional) Power and Communication Cable and the related PC Software. The user can, through this Connector, power THERMIS externally, control the system remotely, download Maintenance Data and the grabbed Snapshots and provide Analog Video signal to an external monitor (or to a Head Mounted Display). When the External Power/Communicator Connector (Fig. 7/8) is not in use, always install the Protective Cap on it to avoid dust/dirt or mold to enter inside its contacts.</p>

4. Install the Battery Pack (Fig.19/1) back in the Battery Compartment (Fig.19/5) of THERMIS and screw the Battery Pack Knob (Fig.19/7) till it reaches the end of the thread.



*Figure 19. Battery Installation: a) Installation of batteries in Battery Pack,
b) Installation of Battery Pack in THERMIS.*

Button "NUC"
(Fig.7/14)

-QUICK NUC (Non-Uniformity Correction): Single-press the "NUC" Button (Fig.7/14) for the quick Non-Uniformity Correction (NUC) to take place. A quick NUC is needed if the observed scene shows non-uniformity in some parts of it when surfaces of uniform temperature are observed, or if the image shows a shadowy background. During the Quick NUC the observed scene will freeze for a fraction of a second until the NUC is finalized. This NUC takes place via the built-in mechanical shutter which covers the Thermal Sensor and the uniformity of the image is re-calibrated.

Every THERMIS is factory set to carry out automatically a Quick NUC at least every 30 minutes, or if it detects a significant ambient temperature change on the Thermal Sensor. This automatic Quick NUC setting can change through the MENU (see NUC setting in Main MENU – Table 9).

-EXTERNAL SHUTTER NUC (Non-Uniformity Correction): Cover the thermal Objective Lens (Fig.3/2) with the Objective Lens Cover (Fig.7/1) and Long-press (for 2 sec) the "NUC" Button (Fig.7/14) until the External Shutter NUC takes place. This is the best NUC option available (compared to the Quick NUC) as it takes additionally into consideration the imperfections of the Objective Lens (Fig.3/2).

Table 7. THERMIS Controls and Indicators. -continued

CONTROLS AND INDICATORS	FUNCTION
Button "POL" (Fig.7/16) -continued	<p>-SNAPSHOT: Longpress (for 2 sec) the "POL" Button (Fig.7/16) to grab a Snapshot of the observed scene. This photo can then be downloaded to a PC using the Power and Communication Cable and the related Software (optional equipment). The total number of Snapshots that can be saved in the memory of THERMIS and their quality depend on the Compression Quality Factor (Q.FACTOR) that can be set in the MENU (see Q.FACTOR setting in Photo SNAP Submenu – Table 9).</p>

2.2 Assembly and Preparation for use

Table 7. THERMIS Controls and Indicators. -continued

Unpacking

The following steps must be accomplished prior to each mission where THERMIS is used:

1. Release the latch securing the top of the Transport and Storage Box Assembly and then open top.
2. Check the contents of the Carrying Bag, and/or the Transport and Storage Box Assembly for completeness (Figure 1) according to the items procured.
3. Inspect THERMIS for obvious evidence of damage to optical surfaces, housings, hood, keyboard, mounting interface, locking knobs, etc. Ensure that all the optical surfaces are clean and ready for use. Clean with the provided cleaning kit, if needed.

CAUTION

To prevent thermal damage of THERMIS, never point it, either on or off, directly at the sun or any other source of high intensity light that the unprotected human eye cannot tolerate (such as a welding arc). To prevent inadvertent exposure to these types of sources, never leave the equipment with the objective lens cover off.

CAUTION

Do not ingest, touch, or inhale particles or parts of a broken thermal objective lens. Thermal lenses contain materials that can cause irritation to eyes, skin, upper and lower respiratory tracts, or gastrointestinal tract. If contacted, flush eyes or skin with large amounts of water. If ingested, DO NOT induce vomiting. Rinse mouth with water and give victim 2-4 cups of milk or water. Fragments of the lens may be sharp enough to cut personnel if touched.

Installation of Batteries

The system can operate with three battery types (primary Alkaline, primary Lithium or Ni-MH rechargeable battery), two of which are identified in Table 10. In the typical kit there are 4 AA batteries supplied (lithium or alkaline).

Table 10. Estimated Battery Life.

BATTERY TYPE	TEMPERATURE	ESTIMATED BATTERY LIFE
AA Alkaline	+23° C	>5 hrs
AA Lithium	+23° C	>10 hrs

CONTROLS AND INDICATORS	FUNCTION
Button "RIGHT" (Fig.7/12) and Button "LEFT" (Fig.7/18) - continued	The Region-of-Interest is reset back to whole screen ROI (default value) when THERMIS is deactivated. When the Image Enhancement Modes "ENH 2: ADAPTIVE" or "ENH 3: WIDE RANGE" have been selected (see below), the change of ROI doesn't affect the under observation target. -CONTRAST ADJUSTMENT: Long-press (for 2 sec) the "RIGHT" Button (Fig.7/12) or "LEFT" Button (Fig.7/18) to adjust the contrast of the observed scene (when MENU is deactivated). A horizontal contrast bar appears. Press again quickly the "RIGHT" Button (Fig.7/12) or "LEFT" Button (Fig.7/18) to move the contrast cursor and adjust the contrast to the desired level. Not pressing any button for approximately 1 sec reverts THERMIS back to the Status Screen (Figure 8) and the "LEFT" and "RIGHT" buttons revert to the adjustment of ROI (see above). The Contrast resets back to the default central value when THERMIS is deactivated.

2.1.4. Typical Reticle Description (for Standalone Mode)

Table 7. THERMIS Controls and Indicators. -continued

The Reticle may be ballistic or non-ballistic.

A typical non-ballistic reticle (Fig. 8/5) is shown at the center of the Status Screen in Figure 8.

A typical ballistic reticle is illustrated in Figure 11 and it is analyzed in Figure 18a. The ballistic reticle is used for targeting and shooting. For shooting at ranges different than 200 meters, correct the shooting using the relevant graduation of the ballistic reticle, from 200 meters up to as many meters as the reticle is graduated, (e.g. 1100 meters, as in the example in Figure 18a), with dots (crosses or lines, depending on the reticle) per 100 meters. Each number in the reticle must be then multiplied with 100 to find the shown range for targeting. See Table 9 for details on how to activate this reticle from the MENU.

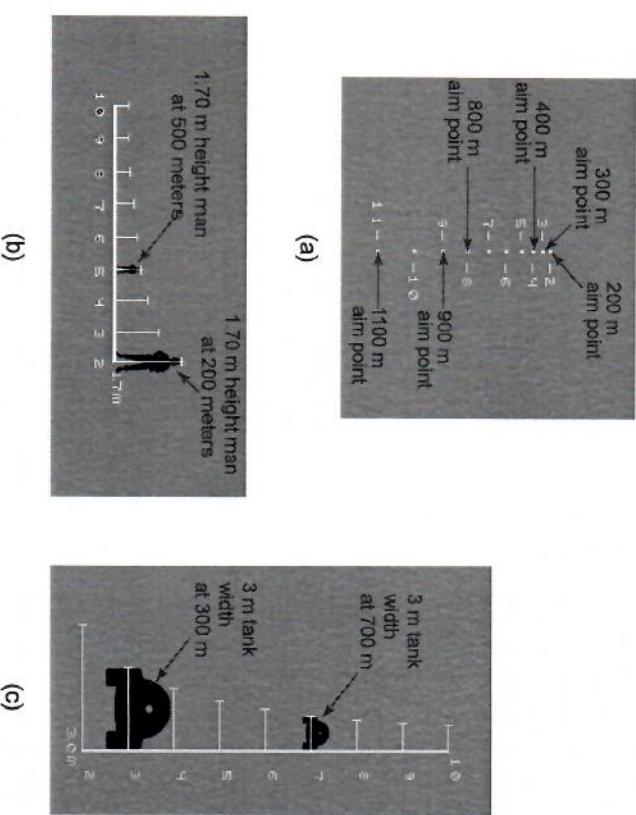


Figure 18. Reticles: a) Typical ballistic reticle aim point examples, b) Stadiometric data reticle (Part 2) and range estimation example (1.70 m standing man), c) Stadiometric data reticle (Part 1) and range estimation example (3 m tank width).

The distance of the target can be estimated either with a Laser Range Finder or by activating the Stadiometric Data (see Table 9 for details on how to activate it from the MENU).

CONTROLS AND INDICATORS	FUNCTION
Button “UP” (Fig.7/11) and Button “DOWN” (Fig.7/13)- continued	- BRIGHTNESS ADJUSTMENT: Long-press (for 2 sec) the “UP” Button (Fig.7/11) or “DOWN” Button (Fig.7/13) to adjust the brightness of the observed scene (when MENU is deactivated). A vertical brightness bar appears. Press again quickly the “UP” (Fig.7/11) or “DOWN” Button (Fig.7/13) to move the brightness cursor and adjust the brightness to the desired level. Not pressing any button for approximately 1 second reverts THERMIS back to the Status Screen (Figure 8) and the “UP” and “DOWN” buttons revert to the adjustment of Image Enhancement Modes (see above). The Brightness resets back to the default central value when THERMIS is deactivated.

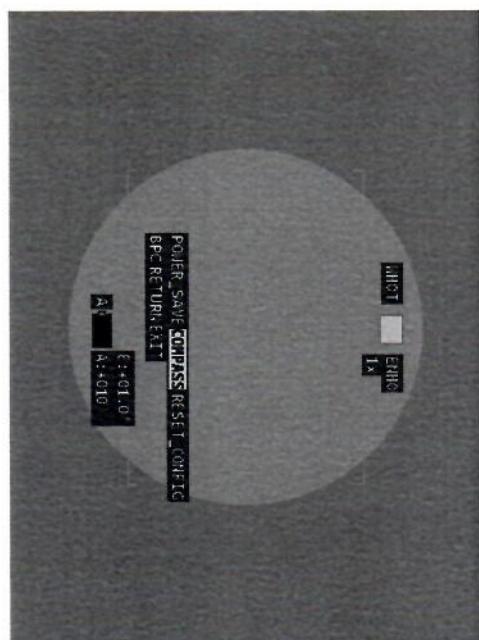
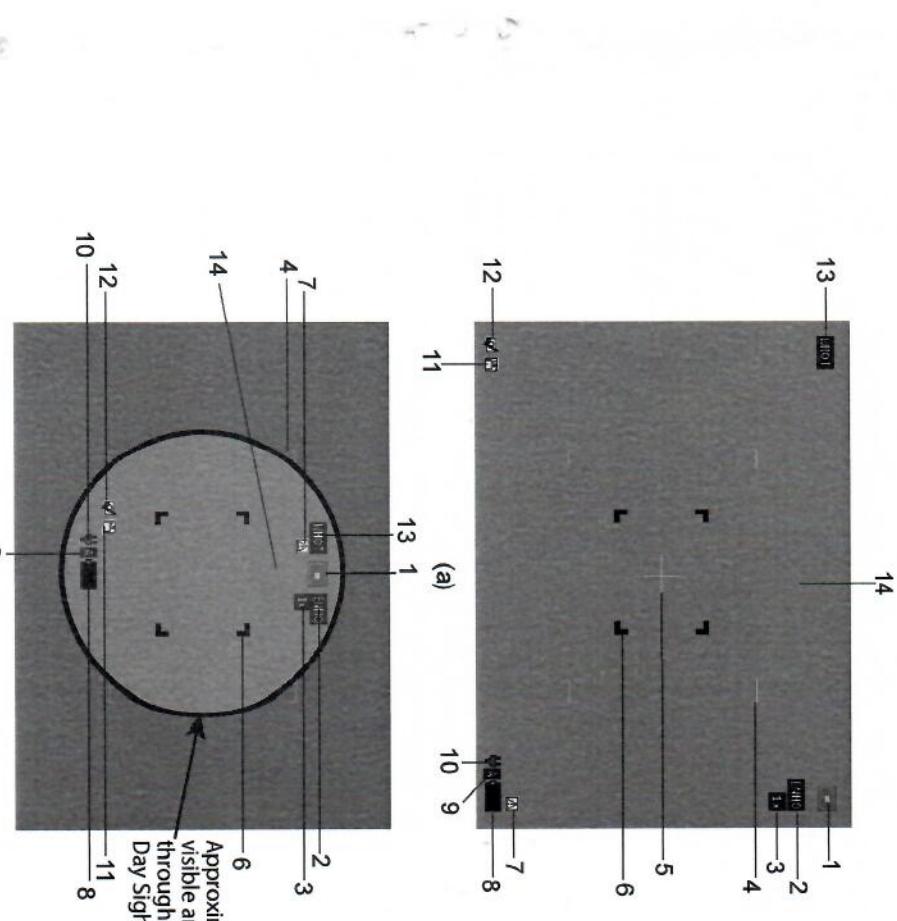
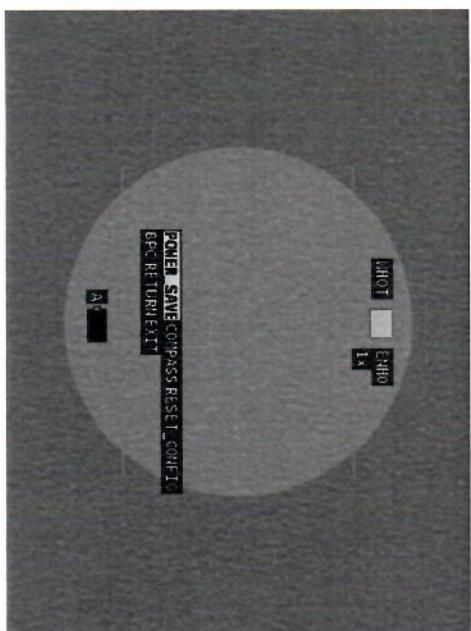


Figure 16.C CONFIG Submenu
(Clip-On Mode).



The actual size of the visible area of the OLED Display through the Day Sight depends on the THERMIS model and the Day Sight that is in use.

NOTE

1. Region-Of-Interest (ROI)
2. Image Enhancement Mode
3. Digital Zoom
4. Central Area Frame (permanent)
5. Reticule (if activated)
6. Selected Region-Of-Interest Frame (momentary)
7. Fault Indication
8. Battery Level
9. Battery Type (set from MENU)
10. External Power indication
11. "Saving Snapshot" indication
12. "Snapshot Grab" indication
13. Image Polarity
14. Notifications Area

Figure 17. Elevation and Azimuth data on Status Screen
(Clip-On Mode).

Table 9. MENU Settings.– continued

SELECTION	FUNCTION
SNAP	<p>Unfolds the Photo SNAP Submenu (Figure 14) where the user can adjust all the related to Snapshots settings:</p> <ul style="list-style-type: none"> The number on the left side of the Submenu (in Figure 14 it is “0000”) represents the number of the already saved snapshots in the memory of THERMIS. GRAB: Grabs a Snapshot of the observed scene. Alternatively, long-press (for 2 sec.) the “POI” Button (Fig.7/16). SHOW: Shows a preview of the saved Snapshots. The phrase “LOADING IMAGE” will appear momentarily in the Notifications Area (central top area - Fig. 8/14) while the image is loading. Then, the saved image will be projected on the screen with its index number (upper-left side of the screen - Figure 15). Note that all the elements of the Status Screen (Figure 8) will disappear, with the exception of the Battery Level (Fig. 8/8) and Battery Type (Fig. 8/9) indicators. Navigate between snapshots by short-pressing the “LEFT” (Fig.7/8) or “RIGHT” (Fig.7/12) Buttons. Long-press the same Buttons to skip 10 Snapshots. Similarly, if the “UP” (Fig.7/11) or “DOWN” (Fig.7/13) Buttons are short-pressed 20 Snapshots are skipped, while with a Long-press (for 2 sec.) of the same Button 50 Snapshots are skipped. Short-press the “MENU” Button (Fig.7/17) to return to the SNAP Submenu (Figure 14). <p>When the preview is seen through the installed Day Sight, only the central part of the saved preview will be visible (see bright area in Figure 15).</p> <ul style="list-style-type: none"> Q.FACTOR: Allows to adjust the Compression Quality Factor of the Snapshots. The bigger the Q.FACTOR, the better is the quality of the saved snapshots and the less Snapshots can be saved in total in the memory of THERMIS. The smaller Q.FACTOR exists at the LOW setting and then the MEDIUM, HIGH and ULTRA settings follow in sequence. In the ULTRA setting the quality of the saved snapshots is the maximum possible but only a very small number of snapshots can be saved in the memory of THERMIS (approx. 20). It is recommended that the user sets the Q.FACTOR at HIGH so that enough Snapshots can be saved (approx. 100) at a good quality. DEL_ALL: Deletes all the saved Snapshots from the memory of THERMIS.

Table 8. Status Screen indications.-continued

INDICATION	FUNCTION
External Power indication (Fig. 8/10)	Indication that an External Power Supply has been connected to the External Power/ Communication Connector and the system is powered externally.
Selected Region-Of-Interest Frame (Fig. 8/6)	Shows momentarily the selected Region-Of-Interest (ROI) on the Status Screen in the form of a Frame. After pressing the “RIGHT” Button (Fig.7/12) or “LEFT” Button, the brackets of the frame containing the selected Region-Of-Interest area (Fig.8/6) appear for approximately 1 second on the Status Screen (only if the Digital Zoom is set to 1X). This momentary Frame may be partially or not at all visible when THERMIS is mounted in front of a Day Sight. After 1 second the Frame disappears and the information about the selected ROI will be shown only at the Region-Of-Interest (ROI) icon (Fig. 8/1) of the Status Screen.
Fault Indication (Fig. 8/7)	This is an indication that a critical fault exists in the system. When this indication appears, deactivate the system, remove the Battery Pack or any other external power supply, install new batteries in the Battery Pack, re-install the Battery Pack in the system and re-activate THERMIS. If the problem persists, forward THERMIS to a higher level of maintenance.
CAUTION	
Battery Level (Fig. 8/8)	The battery [level] is shown correctly on the screen ONLY IF the correct type of battery (that is currently in use) has been selected from the STATUS Submenu of the MENU (primary Lithium-L, or Alkaline-A, or Ni-MH rechargeable-N). In any other case the battery Level indication will show either low battery warning while THERMIS has many remaining hours of operation with the installed batteries, or THERMIS will run out of battery without ANY indication of low battery.
Battery Type (Fig. 8/9)	Shows the current Battery Level (only if the correct Battery Type (Fig. 8/9) has been selected). When the battery runs low this icon becomes red indicating that the user must replace the batteries.
Indication of the Battery Type that is currently in use:	
	<ul style="list-style-type: none"> • L: Primary Lithium Battery • A: Primary Alkaline Battery • N: Rechargeable Ni-MH Battery.
Change the Battery Type from the STATUS Submenu in the main MENU (see Table 9).	
Every time THERMIS is activated the set Battery Type is also presented on the Notifications Area (Fig.8/14) for 1-2 seconds.	

Table 9. MENU Settings.—continued

SELECTION	FUNCTION
AV	<p>Transfers the Thermal Image to the OLED Display in the Collimator Lens (“OLED” Selection), or to Analog Video (“AV” Selection) through connection to the External Power/Communicator Connector (Fig. 7/8), or enables the image to be directed simultaneously to both the above outputs (“DUAL” Selection). The connection to the External Power/Communicator Connector (Fig.7/8) is done via an optional Power and Communication Cable.</p> <p>NOTE</p> <p>When the thermal scene is projected to the user via a Day Sight, in Clip-On mode, only the central part of it will be visible (see Figure 8b). However the full Thermal Image will be simultaneously available to the user in the form of Analog Video.</p> <p>NOTE</p> <p>When the Thermal Image is transferred to the AV output (to be projected on a head mounted display or a screen with AV input) by selecting “AV”, the image will not be visible on the OLED Display of the Collimator Lens. In order to have the Thermal Image visible simultaneously on the OLED Display and the device connected to the External Power/Communicator Connector the “DUAL” selection has been chosen.</p> <p>NOTE</p> <p>When THERMIS is restarted the output is returned to the OLED Display in the Collimator Lens only (default “OLED” Selection).</p> <p>MODE</p> <p>For THERMIS Thermal Clip-On Sight the user must always have the CLIP-ON mode selected and use THERMIS in-line with a magnified day sight. The optics of the THERMIS Thermal Clip-On Sight have been optimized for Clip-On Mode.</p> <p>If the user needs to use THERMIS as a Standalone weapon sight (or as a handheld device) he must enable the STANDALONE Mode. The Standalone mode can be effectively used <i>only for the THERMIS MR model</i> having though some limitations (i.e. no diopter adjustment and no light security).</p>

2.1.3 MENU Settings

- To enter the main MENU (Figure 9) long-press (for 2 sec) the “MENU” Button (Fig.7/17). You can navigate in it using the “UP” (Fig.7/11), “DOWN” (Fig.7/13), “LEFT” (Fig.7/18) and “RIGHT” (Fig.7/12) Buttons.
- To unfold a Submenu or to confirm a choice, single-press the “MENU” Button (Fig.7/17).
- To exit a Submenu and get back to the main MENU long-press the “MENU” Button (Fig.7/17) or navigate in it and choose RETURN. For a vertical Submenu you can also press the “LEFT” Button (Fig.7/18).
- To exit the main MENU or a Submenu and get back to Status Screen choose EXIT (either from the main MENU or from one of the Submenus).

All the capabilities and settings of the main MENU and Submenus are analyzed in Table 9.

THERMIS has been designed to be used primarily as a Clip-On Sight. When THERMIS is used as a Clip-On Sight there is no need for a reticle in THERMIS, as the operator uses the Day Sight’s Reticle. In this case only the central part of the OLED Display will be visible through the deployed Day Sight (see Figure 9b) and the Menu/Submenus are restricted near the center of the OLED Screen. The remaining part of the OLED Display can be seen only if THERMIS is handheld, if the Day Sight is removed, or if Analog Video signal is provided to an external Screen or Head Mounted Display (select “AV” or “DUAL” in AV selection of main MENU, as described in Table 9).

THERMIS can be used effectively as a Standalone Weapon Sight only in the case of THERMIS MR. When *Standalone* Mode is selected from the MENU (see Table 9 for details), a bigger part of the OLED Display is visible through the Collimator Lens (at the absence of the Day Sight) and the Menu/Submenus are expanded throughout the whole visible part of the OLED Display (as in Figure 9a).

Table 9. MENU Settings.—continued

SELECTION	FUNCTION
OLED	<p>Adjusts the brightness of the OLED display. Choose OLED and press the “UP” (Fig.7/11) or “DOWN” (Fig.7/13) Buttons to adjust the brightness of the OLED Display in the Collimator Lens. Confirm with the “MENU” Button (Fig.7/17).</p>

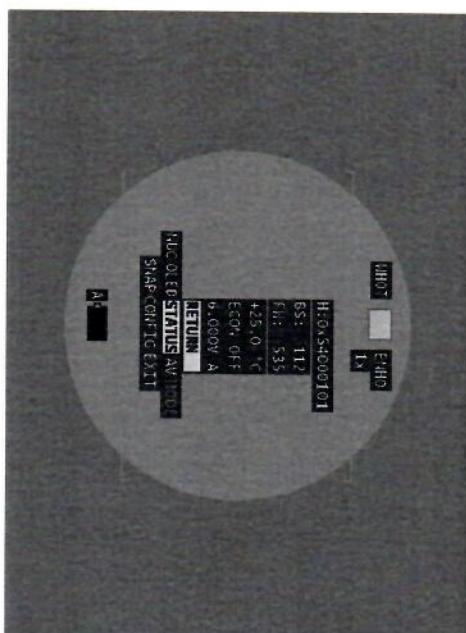


Figure 13. STATUS Submenu (Clip-On Mode).

SELECTION	FUNCTION
NUC	<ul style="list-style-type: none"> Activates/deactivates the automatic Non-Uniformity Correction (NUC): <ul style="list-style-type: none"> AUTO ON: NUC is carried out periodically at least every 30 minutes or when the temperature difference at the Thermal Sensor is detected to be more than 1 °C. The user can still perform Quick NUC or External Shutter NUC manually with the “NUC” Button (Fig.7/14) (see Table 7 for details). AUTO OFF: Deactivates the periodic automatic NUC. NUC is done only manually with the “NUC” Button (Fig.7/14) when needed (see Table 7 for details).

RETICLE	<p>Unfolds the RETICLE Submenu (Figure 10) to adjust the Reticle and its position on the Status Screen.</p> <p>The Standalone Mode can be used effectively only in the case of THERMIS MR and if the reticle of the weapon in use is available. The RETICLE Submenu consists of the below selections:</p> <ul style="list-style-type: none"> ADJUST: Boresight adjustment by changing the position of the Reticle on the Status Screen. After selecting it with the “MENU” Button (Fig.7/17) move the reticle by using the “UP” (Fig.7/11), “DOWN” (Fig.7/13), “LEFT” (Fig.7/18) and “RIGHT” (Fig.7/12) Buttons. When the Reticle is at the desired position press the “MENU” Button (Fig.7/17) to confirm current position. For more details regarding the Boresight-Zeroing Adjustment of THERMIS consult the Chapter §2.2, Paragraph “Zeroing on the Weapon”. MODE: Adjustment of the Reticle Color. The user can choose “RED” for red color, “BLACK” for black color, “WHITE” for white color, or “POL” for variable color that changes with reference to the polarity of the Thermal Image (so that the Reticle is always visible). Note that the color of the Central Area Frame (Fig.8/4) and the Stadiometric Data Reticle (Fig.11/2) is always the same with the Reticle’s color and changes accordingly. WEAPON: Activates, deactivates or changes the Reticle. Deactivate the Reticle by selecting “OFF”, activate a non-ballistic cross reticle (like the one presented in Fig.8/5) by selecting “CROSS”, or activate a ballistic Reticle for a specific weapon (a typical example is presented in Fig.11/1 - for an indicative list of Reticles see Figure 12).
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Table 9. MENU Settings:—continued

SELECTION	FUNCTION
RETICLE - continued	<p>Depending on the contract and the configuration the number and types of the available reticles may differ from Figure 12. See Chapter §2.1, Paragraph 2.1.4 for analytical presentation how to use the Reticle.</p> <ul style="list-style-type: none"> STAD: Activates (“STAD ON”) or deactivates (“STAD OFF”) the Stadiometric Data Reticles (Fig.11/2 and Fig.11/3) for the estimation of distances. The estimation can be done either by comparing the Stadiometric Data Reticle – Part 1 (Fig.11/2) with the width of an armored vehicle or tank (length 3 m) or by comparing the Stadiometric Data Reticle – Part 2 (Fig.11/3) with a standing man’s height (1.70 m). See Chapter 2.1.4” for analytical presentation how to use the Stadiometric Data Reticles. When activating the Stadiometric Data Reticles it is possible that one of the two parts (Part 1 or Part 2 in Figure 11) is not available, depending on the contract and the configuration.

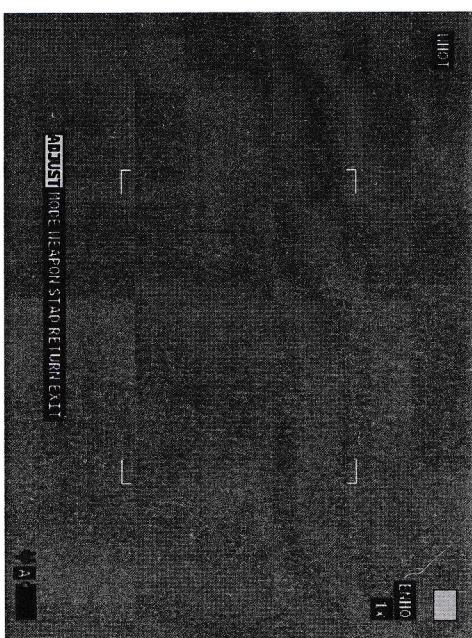
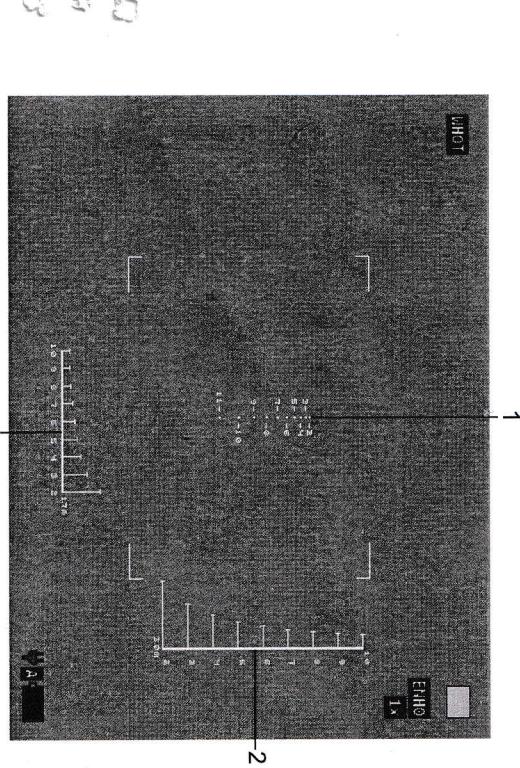


Figure 10. RETICLE Submenu (Standalone Mode).



1. Ballistic Reticle (indicative)
2. Stadiometric Data Reticle - Part 1 (vehicle front side - length 3 m)
3. Stadiometric Data Reticle - Part 2 (standing man - height 1.70 m)

Figure 11. Ballistic Reticle and Stadiometric Data Reticles (indicative illustrations available only in Standalone Mode).

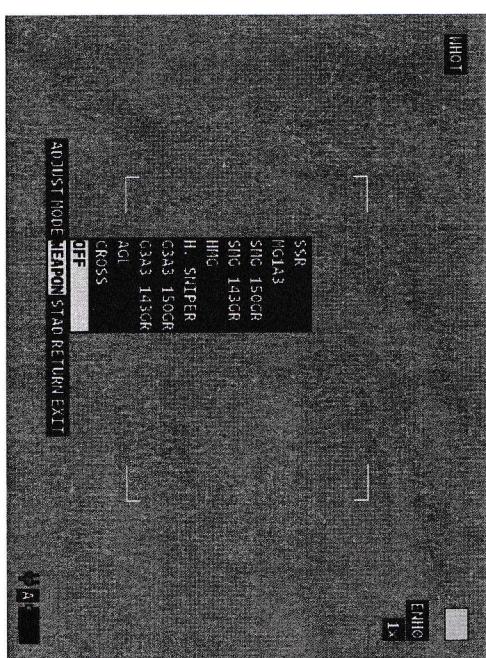


Figure 12. Indicative Selection of Reticles in RETICLE Submenu (Standalone Mode).



Table 9. MENU Settings.—continued

SELECTION	FUNCTION
STATUS	<p>Shows Status information of THERMIS and enables the user to change the declared type of the batteries that are in use. It is a vertical Submenu (see Figure 13) that consists of the below selections:</p> <ul style="list-style-type: none"> On the upper part of the vertical Submenu (see Figure 13) H, BS and FW represent status elements related to the hardware and software version of THERMIS (in Figure 13 the H version is 0x54000101, the BS version is 112 and the FW version is 535). Below the hardware and software version, the indicative Thermal Sensor temperature is presented (in Figure 13 the Thermal Sensor temperature is 25°C). After that, information is given whether the Power Save mode has been enabled (“ECON ON”) or disabled (“ECON OFF”). For more details regarding the Power Save Mode see CONFIG selection below (main MENU). At the bottom of the STATUS Submenu an indication of the current total Battery Voltage is given for all four batteries (in Figure 13 the total Voltage is 6 V). Note that the battery voltage value is not an accurate predictor of the remaining battery life. Navigate with the “UP” (Fig.7/11) and “DOWN” Buttons on the estimated Voltage and press the “MENU” Button (Fig.7/17) (Fig.7/13) to change the types of used batteries: <ul style="list-style-type: none"> - L: Lithium battery (primary) - A: Alkaline battery (primary) - N: Rechargeable Ni-MH battery. When the desired battery type has been selected, press the RETURN option below and get back to the main MENU. <p>CAUTION</p> <p>The battery level is shown correctly on the screen ONLY IF the correct type of battery (that is currently in use) has been selected from the STATUS Submenu of the MENU (primary Lithium-L, or Alkaline-A, or Ni-MH rechargeable-N). In any other case the battery level indication will show either low battery warning while THERMIS has many remaining hours of operation with the installed batteries, or THERMIS will run out of battery without ANY indication of low battery.</p>

(b)

Figure 9. Main MENU: a) Standalone Mode, b) Clip-On Mode.

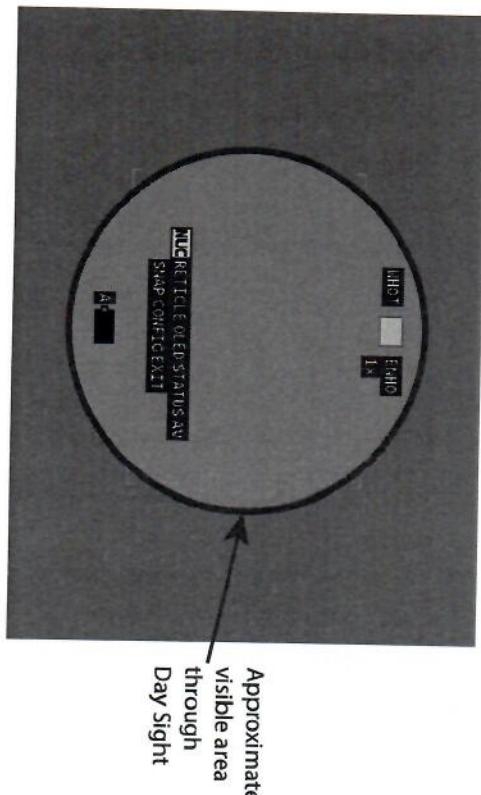


Table 8. Status Screen indications -continued

INDICATION	FUNCTION
“Saving Snapshot” indication (Fig. 8/11)	Indication that a Snapshot is being saved in the memory of THERMIS. When the saving procedure finishes this indication vanishes.
“Snapshot Grab” indication (Fig. 8/12)	When the memory of THERMIS is 90% full (or more) then the “Saving Snapshot” icon designated with a yellow warning triangle (■) will appear on this position on the screen. The user will still be able to take some Snapshots but the memory will soon get full. When the “Saving Snapshot” indication designated with a red X (☒) appears, this means that no more Snapshots can be saved in THERMIS because the internal memory is full. In both the above cases, it is recommended to download all Snapshots to a PC and delete them from the memory (through the PC or through the MENU – see next Chapter) so that new Snapshots can be taken.
Image Polarity (Fig. 8/13)	When Snapshots have been deleted via the MENU (see next Chapter), then a “broken” “Saving Snapshot” icon will appear (☒) on this position while the deletion procedure takes place.
Notifications Area (Fig. 8/14)	Indication that a Snapshot has been grabbed successfully. When the grab of a Snapshot isn’t successful then the same icon designated with a red X (☒) appears at this position on the screen. This happens, most probably, because the user has taken a large number of Snapshots during the previous seconds and the system is processing previous snapshots. Wait for 10-15 seconds, until the icon disappears, and then try to take another Snapshot again.
The central top area of the Status Screen where useful notifications appear when needed. As an example, when activating THERMIS, the description of the selected Image Enhancement Mode and Battery Type appears here.	

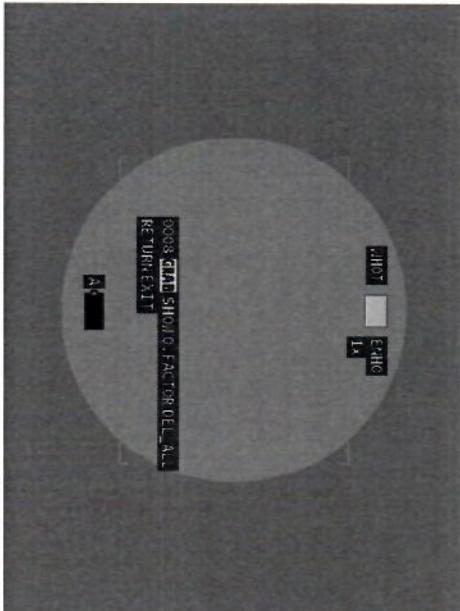


Figure 14. Photo SNAP Preview example (Clip-On Mode).

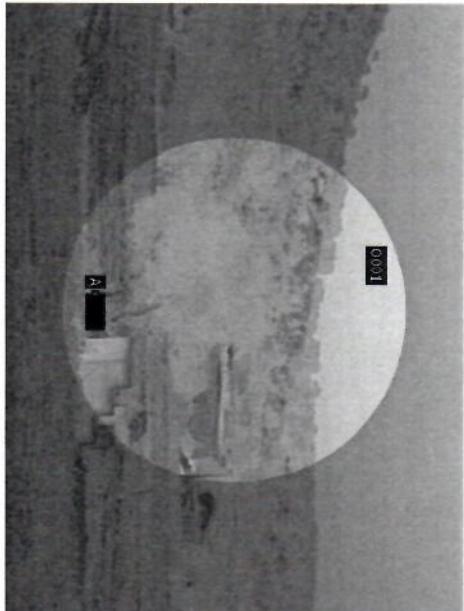


Figure 15. Photo SNAP Preview example (Clip-On Mode).

Table 8. Status Screen indications.

INDICATION	FUNCTION
Region-Of-Interest (ROI) (Fig. 8/1)	Shows the selected Region-Of-Interest (ROI) in the form of a bright white rectangular (compared to the darker gray background that represents the whole screen). This indication is permanent showing constantly the selected ROI when THERMIS is activated.
Image Enhancement Mode (Fig. 8/2)	Shows the selected Image Enhancement Mode ("ENH0" or "ENH1" or "ENH2" or "ENH3"). This indication is permanent showing constantly the selected Image Enhancement Mode when THERMIS is activated. For detailed explanation of the above abbreviations refer to Table 7.
Digital Zoom (Fig. 8/3)	After pressing the "UP" (Fig. 7/12) or "DOWN" (Fig. 7/13) Button to change the Image Enhancement Mode, the full description of the selected Mode is shown momentarily for approximately 1 second on the central top area (Notifications Area - Fig. 8/14) of the Status Screen.
Central Area Frame (Fig. 8/4)	Presents the current Digital Zoom setting (1x, 2x or 4x).
Reticle (Fig. 8/5)	Aiming through the Day Sight's Reticle must only be done when the Digital Zoom is 1X. The 2X or 4X Digital Zoom options must only be used for observation.

Table 9. MENU Settings- continued

SELECTION	FUNCTION
CONFIG	<ul style="list-style-type: none"> • POWER_SAVE: Allows to increase the battery life reducing the frame rate of THERMIS. The default frame rate on the OLED Display of THERMIS when the Power Save Mode is deactivated ("POWER_SAVE OFF" selection) is 60 fps. This setting is ideal when the user observes scenes with rapid movement. When the Power Save Mode is activated ("POWER_SAVE ON") the frame rate is reduced to 30 fps and the battery life is increased. When the Power Save Mode is set to automatic ("POWER_SAVE AUTO") then THERMIS' frame rate will be 60 fps until the battery reaches a low battery level and the frame rate is set automatically to 30 fps. The correct battery in use has to be selected from the STATUS Submenu (see above in the explanation of STATUS Submenu) if the user needs the Automatic Power Save Mode to operate correctly. Note that when the Analog Video output has been enabled from the MENU, the frame rate is set automatically to 30 fps. • COMPASS: Allows the projection of Compass Data on the Status Screen (see Figure 17). Elevation data ("ELEVATION" selection) and/or Azimuth ("AZIMUTH" selection) data are then permanently shown on the Status Screen. Elevation data are shown in reference to the horizon. Note that Elevation and Azimuth data are indicative values, as they get severely affected by the presence of metal objects (e.g. guns, cars) and the change of location. It is, thus, expected that a discrepancy between the shown and the actual values exists. • The first time the THERMIS compass is used or when the shown data are far from the actual ones, the user must conduct a calibration (by selecting "CALIBRATE"). Then the user must fully rotate (360°) THERMIS once along the horizontal (optical) axis, then fully rotate it along the vertical axis and finally follow the same procedure along the side axis (each axis must be perpendicular to the other two). • RESET_CONFIG: Resets THERMIS to Factory Settings. The saved Snapshots will not be deleted in such a Factory Reset.

2.1.2 Status Screen Indications

The observed thermal scene is overlaid with the Status Screen (see Figure 8), which gives information to the user regarding important current THERMIS settings. THERMIS has been designed to be used primarily as a Clip-On Sight (*Clip-On Mode* is selected from the MENU - see Table 9) that operates in tandem with a Day Sight as shown in Figure 7. In this case only the central part of the OLED Display (and subsequently of the thermal scene) will be visible through the deployed Day Sight. This is the reason that the Status Screen is intentionally restricted near the center of the screen (as shown in Figure 8b). The remaining part of the OLED Display can be seen only if THERMIS is handheld, if the Day Sight is removed, or if Analog Video signal is provided to an external Screen or Head Mounted Display (select “AV” or “DUAL” in AV selection of main MENU, as described in Table 9).

THERMIS can be used effectively as a Standalone Weapon Sight (in order to aim without a Day Sight) only in the case of THERMIS MR. When *Standalone* Mode is selected from the MENU (see Table 9 for details), the whole OLED Display is visible through the Collimator Lens (in the absence of the Day Sight) and this is the reason the Status Screen is expanded throughout the whole OLED Display (as in Figure 8a). The elements or indications of the Status Screen can be either permanent, which means that they appear constantly on the OLED Display as long as THERMIS is activated, or momentary, meaning that they disappear after a period of time. The basic indications of the Status Screen are presented and analyzed in Figure 8 and Table 8.

Table 9. MENU Settings.—continued

SELECTION	FUNCTION
CONFIG-continued	<ul style="list-style-type: none"> BPC: Allows the user to eliminate any bad pixels that have appeared on the thermal sensor during the use of THERMIS. After selecting the “BPC” field, a cross cursor appears with a dot at the center, which indicates the currently selected pixel. The navigation to the desired pixel position is done via the Arrow Buttons (“UP”, “DOWN”, “LEFT” and “RIGHT”) in a zoomed screen in order to aid the easier selection of pixels. The shown screen is only a part of the full thermal image (at 1X zoom) and the user can move beyond this screen by navigating with the cursor vertically and/or horizontally to reach all the ends of the full thermal image at 1X zoom. Quick navigation is done by long-pressing the relevant Arrow Buttons. The characterization of a pixel is changed (between “OK”: good pixel and “BAD”: bad pixel) by long pressing the Button “POL” (Fig.7/16). At the bottom left corner of the screen the position of the pixel as well as the user’s characterization of it (“OK” or “BAD”) are displayed. Note that the pixel positions start from (0, 0) and end to (639, 479) resulting to a 640 x 480 pixel’s map. For example, a (300, 50 BAD) indication means that the selected pixel is at the horizontal position 300, vertical position 50, and it is characterized by the user as bad pixel.
WARNING	<p>As long as the saving of the Bad Pixels Table takes place and the “SAVING BAD PIXEL MAP” message appears on screen DO NOT remove the Battery Pack or perform an Emergency Shut Down with the “PWR” Button, as the pixel characterization map may get severely corrupted in such a case.</p> <p>If you do not want to apply the current characterization of good and bad pixels press the “MENU” Button (Fig.7/17) and use the “UP” (Fig.7/11) or “DOWN” (Fig.7/13) Buttons to select “DISCARD”. Confirm by pressing the “MENU” Button (Fig.7/17) and THERMIS will exit the MENU without affecting the current characterization of bad pixels.</p> <p>If you want to continue the process and exit the “SAVE/DISCARD” Submenu select “RETURN” and the pixel position and characterization will again be visible on screen.</p>

Table 7. THERMIS Controls and Indicators. -continued

CONTROLS AND INDICATORS	FUNCTION
Button "UP" (Fig.7/11) and Button "DOWN" (Fig.7/13)	<p>-IMAGE ENHANCEMENT MODES: Single-press the "UP" (Fig.7/11) or "DOWN" (Fig.7/13) Buttons to switch between different presets of Image Enhancement Modes (when MENU is deactivated). These Modes provide presets that may assist the advanced user in certain circumstances (depending on the conditions and tasks). They may enhance the performance of the system especially when very cold (e.g. ice), very hot (e.g. a fire) or large uniform areas (e.g. sky or sea horizon) exist in the observed scene. Note that when using the above Modes it is also normal to observe more noise in the scene, compared to the default setting.</p> <p>After pressing the "UP" (Fig.7/11) or "DOWN" (Fig.7/13) Button, the complete description of the selected Image Enhancement Mode is shown for approximately 1 second on the Notifications Area (Fig. 8/14) of the Status Screen. The selected Image Enhancement Mode is permanently presented in the right upper corner of the visible Status Screen ("ENH0" or "ENH1" or "ENH2" or "ENH3" - Fig.8/2). The available Image Enhancement Modes are:</p> <ul style="list-style-type: none"> • Basic ("ENH 0: BASE"): The default setting for images that do not need special Enhancement. • Image Sharpening ("ENH 1: SHARP"): Enhancement and sharpening of the hotter objects' edges in the ROI region. • Adaptive ("ENH 2: ADAPTIVE"): Contrast Enhancement via the separation of the image to different regions and adaptation to the specifics of each scene's region. Ideal for slightly cluttered scenes (objects with large temperature differences in the scene) or for objects appearing in front of large uniform areas. • Wide Range ("ENH 3: WIDE RANGE"): Similar to the Adaptive Image Enhancement (above) but performing more aggressive contrast Enhancement. Ideal for heavily cluttered scenes (several objects with large temperature differences in the scene) or for several objects appearing in front of large uniform areas. <p>The Image Enhancement Mode resets back to ENH0 (default value) when THERMIS is deactivated.</p>

The range estimation pattern of the **Stadiometric Data** is used for the range estimation of a standing man (Stadiometric Data Reticle - Part 2 - Figure 18b) or the width of a main battle tank (Stadiometric Data Reticle - Part 1 - Figure 18c):

- The vertical lines of the Stadiometric Data Reticle - Part 2 (Figure 18b) are used for the range estimation of a 1.70 meters tall man. The distance of the standing man is found if his figure fits fully one of the vertical lines. The readings of each line is in units of hundreds of meters.
- In order to conduct range estimation of a battle tank the Stadiometric Data Reticle - Part 1 (Figure 18c) must be used. If the width (front or back side) of the tank (3 meters long) fits fully on one of the horizontal lines of the Stadiometric Data Reticle Part 1 (Fig. 11/2) then its distance can be estimated. The readings of each line is again in units of hundreds of meters.

Table 7. THERMIS Controls and Indicators. -continued

CONTROLS AND INDICATORS	FUNCTION
<p>Button "MENU" (Fig.7/17)</p> <p>Button "RIGHT" (Fig.7/12) and Button "LEFT" (Fig.7/18)</p> <p>Button "RIGHT" (Fig.7/12) or "LEFT" (Fig.7/18)</p> <p>-REGION OF INTEREST (ROI) ADJUSTMENT: Single-press the "RIGHT" Button (Fig.7/12) or "LEFT" Button (Fig.7/18) to navigate between different Regions-Of-Interest (when MENU is deactivated). The observed scene will then be adjusted for optimum observation and sharper thermal image of the selected area on the screen. This is very useful when the target is located at a specific part of the screen. After pressing the "RIGHT" Button (Fig.7/12) or "LEFT" Button, the brackets (Fig.8/6) containing the selected area appear for approximately 1 second on the Status Screen (this applies only if the Digital Zoom is set to 1X). The selected Region-Of-Interest is also shown permanently as white area (symbolizing the ROI) on a gray background (symbolizing the whole screen) on an icon on the upper right corner (Fig.8/1) of the Status Screen. Note that it is normal to lose some scene details or information when they are located outside of the selected ROI area.</p>	<p>-DIGITAL ZOOM: Single-press the MENU Button to circle between 1X, 2X and 4X Digital Zoom of the observed scene. The selected Digital Zoom is presented on the right upper corner (Fig.8/3) of the visible Status Screen.</p> <p>Note that when the 4X Digital Zoom has been selected in Standalone Mode, the Reticle and the Stadiometric Data will not be visible on the Status Screen, even if they are enabled from the MENU (see RETICLE Submenu in Standalone Mode - Table 9).</p> <p>WARNING</p> <p>Aiming through the Day Sight's Reticle must only be done when the Digital Zoom of THERMIS is 1X. The 2X or 4X Digital Zoom options must only be used for observation.</p> <p>-ENTER MENU: Long-press (for 2 sec) the "MENU" Button (Fig.7/17) to enter the MENU of THERMIS. Use the "UP", "DOWN", "LEFT", "RIGHT" and "MENU" Buttons to navigate in the MENU (see Chapter 2.1.3 for details).</p> <p>-REGION OF INTEREST (ROI) ADJUSTMENT: Single-press the "RIGHT" Button (Fig.7/12) or "LEFT" Button (Fig.7/18) to navigate between different Regions-Of-Interest (when MENU is deactivated). The observed scene will then be adjusted for optimum observation and sharper thermal image of the selected area on the screen. This is very useful when the target is located at a specific part of the screen. After pressing the "RIGHT" Button (Fig.7/12) or "LEFT" Button, the brackets (Fig.8/6) containing the selected area appear for approximately 1 second on the Status Screen (this applies only if the Digital Zoom is set to 1X). The selected Region-Of-Interest is also shown permanently as white area (symbolizing the ROI) on a gray background (symbolizing the whole screen) on an icon on the upper right corner (Fig.8/1) of the Status Screen. Note that it is normal to lose some scene details or information when they are located outside of the selected ROI area.</p>
	<p>NOTE</p> <p>The values of this table are indicative. The battery life may vary significantly during actual field usage.</p> <p>CAUTION</p> <p>Do not install batteries that have signs of leakage.</p> <p>WARNING</p> <p>Do not use THERMIS with a mix of old and new batteries, or batteries of different brands.</p> <p>WARNING</p> <p>Do not dispose batteries in fire due to explosion hazard.</p> <p>WARNING</p> <p>Danger of Explosion</p> <ul style="list-style-type: none"> • Lithium batteries may explode if overheated. • 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. • Do not use batteries which look bulged or have burst. • Do not discard batteries. Turn defective batteries in for proper disposal <p>CAUTION</p> <p>THERMIS operates only with four (4) AA type (1.5 V) primary (lithium or alkaline) or rechargeable (Ni-MH) batteries. Do not use batteries of any other type. Batteries of higher voltage, than the ones recommended, will cause damage to THERMIS.</p>

- NOTE**
- The values of this table are indicative. The battery life may vary significantly during actual field usage.
- CAUTION**
- Do not install batteries that have signs of leakage.
- WARNING**
- Do not use THERMIS with a mix of old and new batteries, or batteries of different brands.
- WARNING**
- Do not dispose batteries in fire due to explosion hazard.
- WARNING**
- Danger of Explosion
- Lithium batteries may explode if overheated.
 - 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.
 - Do not use batteries which look bulged or have burst.
 - Do not discard batteries. Turn defective batteries in for proper disposal
- CAUTION**
- THERMIS operates only with four (4) AA type (1.5 V) primary (lithium or alkaline) or rechargeable (Ni-MH) batteries. Do not use batteries of any other type. Batteries of higher voltage, than the ones recommended, will cause damage to THERMIS.
- Install the four (4) AA batteries as follows:
1. Fully unscrew the Battery Pack Knob (Fig.19/7) and pull the Battery Pack (Fig.19/1) outwards away from the Battery Compartment (Fig.19/5) of THERMIS.
 2. If old batteries are already installed in the Battery Pack (Fig.19/1) remove them. Install new AA batteries (Fig.19/4) by snap-fitting each one of them in the Battery position (Fig.19/3) of the Battery Pack (Fig.19/1). The orientation of the batteries is the same for all the batteries and it is shown in Figure 19a. Install four AA batteries with the positive terminals facing the battery door. The right orientation is also depicted on the Battery Pack (Fig.19/1). Make sure that all the batteries are installed correctly, otherwise THERMIS will not operate.
 3. Check to ensure that the o-ring (Fig.19/2) is present. Replace if not.
- CAUTION**
- When installing the Battery Pack in the Battery Compartment of THERMIS, screw the Battery Pack Knob till it reaches the end of the thread and do NOT use excessive force, because this may cause irreparable damage to the Battery Pack or the Battery Compartment.

Table 7. THERMIS Controls and Indicators. -continued

CONTROLS AND INDICATORS	FUNCTION
Keyboard (Fig.7/3) Button "PWR" (Fig.7/15)	<p>The Keyboard (Fig.7/3) is the basic interface with the User. All the functions of the Keyboard Buttons are analyzed below:</p> <p>-POWER OFF: Long-Press (for 3 sec) the POWER Button "PWR" (Fig.7/15) to deactivate THERMIS.</p> <p>-POWER ON: Single-Press the POWER Button "PWR" (Fig.7/15) to activate THERMIS.</p> <p>-SHUTTING DOWN: Long-Press the "PWR" Button (Fig.7/15) to deactivate THERMIS. If the "PWR" Button (Fig.7/15) is pressed for approximately 1 sec, the phrase "SHUT DOWN?" will appear on the screen. If the "PWR" Button (Fig.7/15) is released, the deactivation of THERMIS is aborted. If the "PWR" Button (Fig.7/15) remains pressed the phrase "SHUTTING DOWN" will appear on the screen and then the system will be deactivated.</p> <p>If any pending Snapshots exist in the memory they will be permanently saved in the memory of THERMIS before the "SHUTTING DOWN" indication appears on the screen.</p> <p>-EMERGENCY SHUT DOWN: Long-Press the "PWR" Button (Fig.7/15) for more than 10 seconds to cut the power to THERMIS and deactivate it. This shut down procedure is equivalent to removing the Battery Pack and it must be followed only in the unlikely case of emergency when the system doesn't respond or the observed image is frozen.</p>

CAUTION

If THERMIS is deactivated by following the Emergency Shut Down procedure or by just removing the Battery Pack, some data or settings (such as Snapshots, Reticle zeroing Position or Configuration Settings) may be lost, damaged or get corrupted.

Button "POL"
(Fig.7/16)

-POLARITY ADJUSTMENT: Single-press the "POL" Button (Fig.7/16) to change the Polarity of the observed scene between "BHOT" (Black Hot: the hotter objects appear black and the colder white) and "WHOT" (White Hot: the hotter objects appear white and the colder black). Certain observation targets may look better in one of the two polarities depending on the environmental temperature and the background.

Weapon Mounting

THERMIS can be installed on all the Weapons that have an installed Picatinny Rail on top. This section describes the installation procedure:

1. It is assumed that the Day Sight (Fig.20/3) is already installed on the Weapon's Picatinny Rail (Fig.20/4).

WARNING

Be sure the weapon is CLEAR and SAFE before proceeding.

CAUTION

When installing THERMIS on Weapon, take care not to touch the THERMIS' optics with any metallic parts of the Day Sight or the weapon. In such a case, THERMIS' optics may be irreparably damaged.

NOTE

When installing THERMIS on Weapon, take care not to touch the THERMIS' optics with your fingers. If the optics get fingerprints or dirt on them, the cleaning procedures of the Paragraph 3.2 must be followed before use of THERMIS.

2. Mating surfaces on the Weapon's Picatinny Rail (Fig.20/4) and the Mounting Bracket (Fig.20/5) must be clean and dry. Check mating surfaces for dirt or damages. If needed, clean them with a dry cloth.
3. Check that there is enough empty space on the Weapon's Picatinny Rail (Fig.20/4) in front of the Day Sight (Fig.20/3) in order to mount THERMIS (Fig.20/3) and THERMIS' (Fig.20/1) Collimator Lens (Fig.3/6). Bigger distances (2 or more slots, as it is depicted in Figure 20) can be also acceptable as long as no dark surrounding area (vignetting) is observed through the Day Sight (Fig.20/3) around the thermal scene.
4. Install the available Hood (Fig. Fig.20/2) on the THERMIS Collimator Lens (Fig.3/6) so that it doesn't allow any light to enter the interface between the Collimator Lens (Fig.3/6) and the Hood (Fig.20/2).
5. Fully loosen (unscrew) the Locking Knobs (Fig.20/2) of THERMIS.
6. Taking extra care in order not to touch and damage the optics of the Collimator Lens with any metallic parts of the Day Sight (Fig.20/3) and the optics of the Objective Lens with the metallic parts of the weapon, pass the other part of the Hood (Fig.20/2) through the front part of the Day Sight (Fig.20/3) while placing THERMIS (Fig.20/1) on the Weapon's Picatinny Rail (Fig.20/4).

Zeroing on the Weapon (Standalone Mode)

Follow the below procedures to zero THERMIS on the Weapon (this applies only in Weapon Sight Mode and when a reticle for a specific weapon is available):

1. Install new batteries in THERMIS and install THERMIS on the Weapon.
2. Activate THERMIS and choose from the MENU the right Ballistic Reticle corresponding to the weapon in use (go to MENU→ RETICLE→ WEAPON).
3. Observe the first dot of the reticle (it is normally either 1 or 2—for aiming at 100 or 200 meters respectively) and subsequently set the target at 100 or 200 meters distance.
4. Remove the Objective Lens Cover (Fig.7/1).

If the target is placed at 100 meters distance, set the reticle aiming point that corresponds at target range of 100 meters on the target and fire five (5) rounds. If the target is placed at 200 meters distance, set the reticle aiming point that corresponds at target range of 200 meters on the target and fire five (5) rounds.

5. Observe the five bullets Mean Point of Impact (MPI),
6. Go to MENU→ RETICLE→ADJUST and use the "UP" (Fig.7/11), "DOWN" (Fig.7/13), "LEFT" (Fig.7/18) and "RIGHT" (Fig.7/12) Buttons to move the reticle towards this direction until the 200 m aiming point meets the MPI:

A. Use the "LEFT" (Fig.7/18) and "RIGHT" (Fig.7/12) Buttons to adjust for windage. Moving the Reticle to the right will move the MPI to the left. Moving the Reticle to the left will move the MPI to the right.

B. Use the "UP" (Fig.7/11) and "DOWN" (Fig.7/13) Buttons to adjust for elevation. Moving the Reticle up will move the MPI down. Moving the Reticle down will move the MPI up.

Every press of these Buttons will move the Reticle **one pixel** towards the direction of the pressed button. For **THERMIS MR** (that can be effectively used as a Standalone system) one pixel movement corresponds to **bore sight increment of 0.35 mili**, which equals to a 3.5 cm increment at 100 m distance.

7. Perform additional firing until you verify that the MPI and the reticle aiming point coincide.
8. Exit the MENU to save the current position of the Reticle.
9. Memorize or note THERMIS mounting position on the weapon's Picatinny Rail.
10. Memorize or note THERMIS mounting position on the weapon's Picatinny Rail.

CAUTION

If THERMIS is deactivated by following the Emergency Shut Down procedure or by just removing the Battery Pack, some data or settings (such as Snapshots, Reticle zeroing Position, or Configuration Settings) may be lost, damaged or get corrupted.

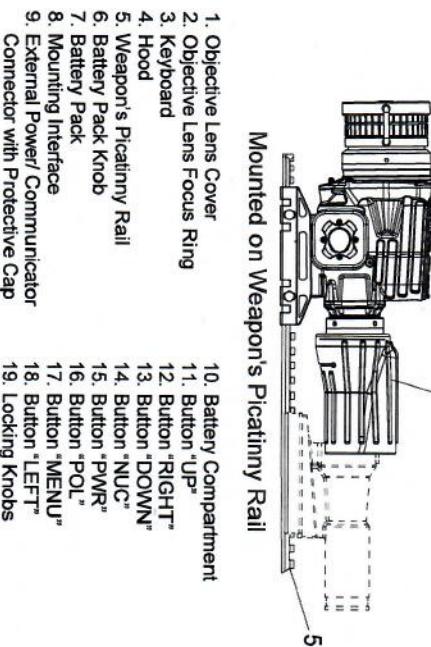


Figure 7. THERMIS Controls and Indicators.

Electric Circuit Functions

The electronic circuit (Figure 6) regulates the direct-current voltage from the batteries to the electronics. It also monitors the total output voltage of the batteries and activates/deactivates THERMIS via the Keyboard Buttons. Via the Keyboard Buttons the user can adjust various parameters of the system and navigate in the MENU. The observed scene, the status screen with all the indications, as well as the parameters of the MENU are projected via the Thermal Engine onto the OLED Display that exists in the Collimator Lens. Furthermore, if the (optional) Power and Communication Cable is available and connected to the External Power/Communicator Connector, the user can through this: a) power the system externally, or b) receive Analogue Video Signal, or c) control the system remotely (if the related software is available), or d) download maintenance data and/or saved snapshots (if the related software is available).

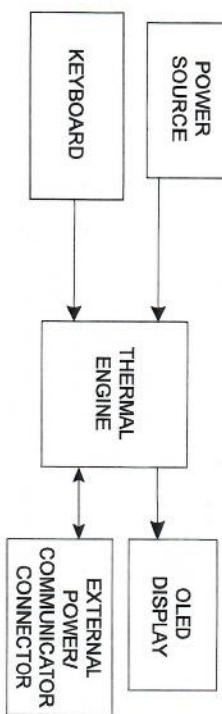


Figure 6. Electrical Function.

2.3 Operation under Usual Conditions

Scope

This paragraph contains operating procedures for using THERMIS as a weapon-mounted or hand-held device. Prior to operating THERMIS, make certain that all the steps in paragraph § 2.2., Assembly and Preparation for Use, have been read and performed.

CAUTION
THERMIS is a precision electro-optical instrument, so handle it carefully.

Weapon-mounted operation (operation as Thermal Clip-on Sight)

Perform the following procedures for weapon-mounted operation as a Thermal Clip-On Sight:

1. Ensure that the batteries are installed per §2.2.
2. Install Day Sight per instructions of the manufacturer and, then, install THERMIS and the Hood on weapon as per §2.2.
3. Remove the Objective Lens Cover (Fig.7/1).

WARNING

Aiming through the Day Sight's Reticle must only be done when the Digital Zoom of THERMIS is 1X. The 2X or 4X Digital Zoom options must only be used for observation.

4. Single press the «PWR» Button (Fig.7/1/5) to activate THERMIS.
5. Direct THERMIS towards the target and adjust the Objective Lens Focus Ring (Fig.2/1) until you observe a sharp image of the observed target through the day sight. The observed target must be at a distance of at least 10 m (or 20 m for some THERMIS models- according to the specification) to focus correctly. For targets at different distances refocusing of the Objective Lens Focus Ring (Fig.2/1) may be necessary.

NOTES

The sharpest image will be observed only when the Objective Lens is properly focused. The Objective Lens Focus Ring is adjusted so as to focus on objects of different distances.

6. If the Day Sight is equipped with Parallax Adjustment (setting often available in sniper sights), eliminate Parallax by using the relevant Knob. Refer to the Day Sight's Operator's manual, if needed. Unless otherwise specified, for **THERMIS MR** adjust Day Sight's parallax to **100 m**, for **THERMIS LR** adjust Day Sight's parallax to **300 m** and for **THERMIS LR** adjust Day Sight's parallax to **800 m**.

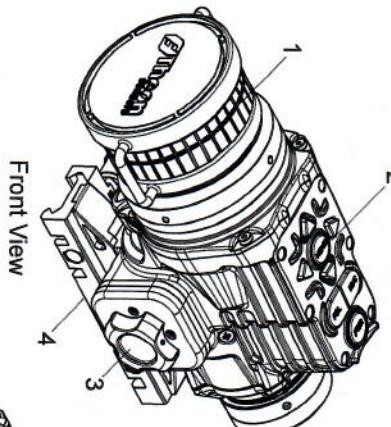
1.3 Principles of Operation

Mechanical Functions

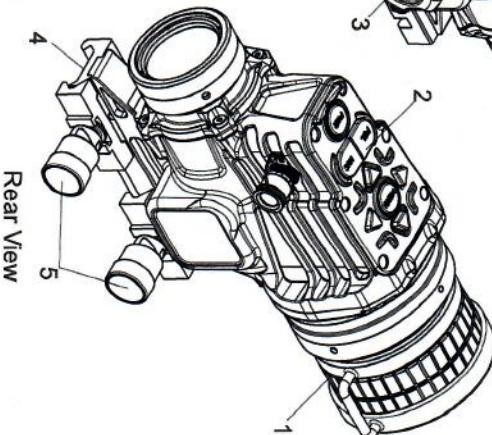
The designed functions of the system allow for adjustments of the system's mechanical parameters resulting in a user-customizable unit. These functions include:

1. **On the Thermal Weapon Sight:** The Objective Lens Focus Ring (Fig.4/1), the Keyboard (Fig.4/2), the Battery Pack with its Knob (Fig.4/3) and the Mounting Interface (Fig.4/4) with the Locking Knobs (Fig.4/5).

2.



Front View



Rear View

1. Objective Lens Focus Ring
2. Keyboard
3. Battery Pack - Knob

Figure 4. Mechanical Controls.

according to the specification) to focus correctly. For targets at different distances refocusing of the Objective Lens Focus Ring (Fig.2/1) may be necessary.

NOTES

The sharpest image will be observed only when the Objective Lens is properly focused. The Objective Lens Focus Ring is adjusted so as to focus on objects of different distances. As there is no Diopter Adjustment on the Collimator, the user will be able to see clearly the image and the symbols on the screen only if his vision is corrected (e.g. with glasses).

8. Single press the "POL" Button (Fig.7/16) to change the polarity of the observed scene. Certain observation targets may appear better in one of the two polarities depending on the environment temperature and the background.
9. If the under observation target is constantly located at a specific part of the screen single-press the "RIGHT" (Fig.7/12) or "LEFT" (Fig.7/18) Buttons to adjust the observed thermal scene to a different Region-Of-Interest (ROI) in order to be able to see more details in the selected area.
10. If you need to enhance the contrast between the object and the background, or if you want to see more details when large temperature differences or large uniform areas exist in the scene, use the Image Enhancement algorithms by single-pressing the "UP" (Fig.7/11) or "DOWN" (Fig.7/13) Buttons to switch between different Image Enhancement Modes.
11. When the uniformity of the observed image is lost single-press the "NUC" (Fig.7/14) button for a Quick NUC or cover the Objective Lens and long-press (for 2 sec.) the "NUC" (Fig.7/14) button. In both cases, the observed scene will "freeze" for a fraction of a second until the NUC is finalized.

Handheld Operation

Perform the following procedures for operation.

1. Ensure that the batteries are installed per §2.2.
2. Single press the «PWR» Button (Fig.7/15) to activate THERMIS.
3. Remove the Objective Lens Cover (Fig.7/1).
4. Direct THERMIS towards the under observation target and adjust the Objective Lens Focus Ring (Fig.2/1) until you observe a sharp image of the observed target. The observed target must be at a distance of at least 10 m (or 20 m for some THERMIS models- according to the specification) to focus correctly. For targets at different distances refocusing of the Objective Lens Focus Ring (Fig.2/1) may be necessary.

Equipment Data

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

Table 1. Operator Adjustment Limits.

ITEM	LIMITS
Objective Focus	10 m or 20 m to infinity (according to specification)

Table 2. Electrical Data.

ITEM	DATA
Power Source	4 × Batteries

Battery Requirements
(1,5 V / Lithium or Alkaline
or Rechargeable Ni-MH)

Table 3. Mechanical Data

ITEM	DATA
Transport and Storage Box Assembly	Size: 420 × 325 × 180 mm

Weight (MR): < 1.0 kg
Weight (LRR): < 1.1 kg
Weight (ELR): < 1.4 kg

Note: Weight of THERMIS includes 4 Alkaline batteries and Objective Lens Cover. It does not include other accessories.

2.4 Operation Under Unusual Conditions

Operation in Dusty or Sandy Areas

CAUTION

Operation in dusty or sandy areas can pit and scratch the optical elements and damage the mechanical components unless the precautions given below are taken.

1. Avoid pointing THERMIS against the wind unless necessary for operation.
2. Keep the Objective Lens Cover on the Objective Lens unless THERMIS is in use.
3. Keep the Carrying Bag closed unless removing or replacing items.
4. Ensure that all dust and sand is removed from THERMIS and Carrying Bag after operation.

Operation in Rainy or Humid Conditions

CAUTION

Operation in rainy or humid conditions can cause corrosion and deterioration of THERMIS unless the precautions given below are observed.

1. Keep the Carrying Bag closed unless removing or replacing items.
2. Keep the Objective Lens Cover on the Objective Lens unless THERMIS is in use.
3. Dry THERMIS and accessories after exposure to rain or high humidity and before storage. This will prevent mildew from forming in the case.
4. Do NOT store THERMIS in a wet Carrying Bag or a wet Transport and Storage Box Assembly.

Operation in Salt Water Areas

1. After exposure to salt water, clean the exterior of THERMIS and accessories with fresh water.
2. Dry all items completely (do NOT disassemble).
3. Use the supplied Lens Cleaning Kit or lens cleaning paper to clean the Objective Lens and the Collimator Lens.

Operation in NBC Environments

1. Decontamination — Wear a protective mask while using THERMIS after decontamination process.

Location and description of major components

- THERMIS:** Thermis (Figure 3) consists of 4 primary subassemblies: the Objective Lens (Fig.3/2), the Main Housing (Fig.3/3), the Thermal Engine (not shown) and the Collimator Lens (Fig.3/6). The Hood (Fig.3/5) is attached at the back of the Collimator Lens (Fig.3/6) to prevent exposure of the operator due to the OLED Display's light and to prevent any stray light from entering the Day Sight. The Main Housing (Fig.3/3) includes the Keyboard (Fig.3/4), the Battery Compartment (Fig.3/8), the Battery Pack with its Knob (Fig.3/7), the Mounting Interface (Fig.3/9) with its Locking Knobs (Fig.3/11) and the External Power/Communicator Connector with its Protective Cap (Fig.3/10). The Mounting Interface (Fig.3/9) with its Locking Knobs (Fig.3/11) is used to mount THERMIS securely on a Picatinny interface of a weapon. The Objective Lens Cover (Fig.3/1) protects the Objective Lens (Fig.3/2) from dirt, dust, scratches and it also protects THERMIS from very intense light sources.

CAUTION

To prevent thermal damage of THERMIS, never point it, either ON or OFF, directly at the sun or any other source of high intensity light that the unprotected human eye cannot tolerate (such as a welding arc). To prevent inadvertent exposure to these types of sources, never leave the equipment with the objective lens cover off.

Depending on the available Day Sights, different Hoods are available: One Hood (Fig.17a) that is suitable for Elcan SPECTER or Trijicon ACOG Day Sights and one Universal Hood (Fig.17b) suitable for the vast majority of the available cylindrical-shaped Day Sights. Depending on the Day Sight and THERMIS model in use, other alternative Hoods may also be available.

CAUTION

Do not ingest, touch, or inhale particles or parts of a broken thermal objective lens. Thermal lenses contain materials that can cause irritation to eyes, skin, upper and lower respiratory tracts, or gastrointestinal tract. If contacted, flush eyes or skin with large amounts of water. If ingested, DO NOT induce vomiting. Rinse mouth with water and give victim 2-4 cups of milk or water. Fragments of the lens may be sharp enough to cut personnel if touched.

- Carrying Bag:** The Carrying Bag (Fig.1/3) is provided for transportation and protection of THERMIS and its accessories. The Carrying Bag (Fig.1/3) may be attached to the soldier's combat harness/load carrying equipment.
- Lens Cleaning Kit:** The Lens Cleaning Kit (Fig.1/5) is available for the cleaning of the external optics of the system. This kit consists of a lens cleaning brush, for the removal of dust/sand (or similar dirt) and a lens cleaning cloth for the subsequent use on the cleaning of the lens. A cleaning kit bag is also provided to store the above. For detailed cleaning instructions see Chapter 3.2.
- Transport and Storage Box Assembly:** THERMIS and its accessories are shipped in a hard Transport and Storage Box Assembly (Fig.1/4) that is waterproof,

CHAPTER 3 TROUBLESHOOTING AND PREVENTIVE MAINTENANCE INSTRUCTIONS

3.1 Troubleshooting Procedures

Table 11 lists common malfunctions that may occur with your equipment. Perform the tests, inspections, and corrective actions in the order they appear in the table.

This table cannot list all the malfunctions that may occur, all the tests and inspections needed to find the fault, or all the corrective actions needed to correct the fault. If the equipment malfunction is not listed or actions listed do not correct the fault, notify the next level of support.

Table 11. Troubleshooting.

MALFUNCTION	TEST FOR INSPECTION	CORRECTIVE ACTION
1. THERMIS fails to activate.	Visual.	Press the "PWR" Button until THERMIS is activated. Replace old batteries with new ones or install correctly the existing ones. Clean Battery Pack contacts or Battery Compartment, if needed.
2. Poor image quality.	Check focus. Check Objective Lens	If defective or damaged, return THERMIS to higher level of maintenance. If THERMIS still fails to activate, refer to higher level of maintenance. Refocus with the Objective Lens Focus Knob. Make sure that the under observation object is at least at a 20 m distance and the Objective Lens is not covered. Clean lens surfaces. Perform a QUICK NUC or EXTERNAL SHUTTER NUC. Reset THERMIS to factory default parameters (MENU→CONFIG→RESET CONFIG).

without the need of any active illumination. THERMIS is a battery-powered portable system of small volume and weighs less than 1.5 kg.

THERMIS is equipped with the capability to select different Regions of Interest (ROIs) for optimum observation, as well as electronic Zoom (1X, 2X or 4X) on the under observation scene (only for observation, not for shooting). It is also equipped with presets of Image Enhancement Modes (three additional presets) that provide advanced processing of the scene, depending on the uniformity of the background, the temperature difference and the desired level of contrast enhancement.

Thermis Models

There are three different THERMIS models (see Figure 2): THERMIS MR which has an Objective Lens of 50 mm EFL(Effective Focal Length), THERMIS LR which has an Objective Lens of 75 mm EFL and THERMIS ELR which has an Objective Lens of 100 mm EFL. The longer the EFL of the Objective Lens, the smaller the Field-of-View of the Lens is, but also the bigger the detection range it can achieve. Furthermore, the longer the EFL of the Objective Lens the heavier and bulkier the whole system gets. Depending on the EFL of the Objective Lens, a different Collimator Lens of equal EFL is selected for each THERMIS model, in order to achieve a system Magnification of 1x, which is very critical for every clip-on afocal sight.

For simplicity reasons all the images in this manual will be presenting THERMIS MR model, taking into consideration that all the guidelines and procedures apply also to the other THERMIS models. All the electrical and mechanical functions of THERMIS remain the same.

In terms of compatibility with Day Sights, THERMIS MR has been designed to fit with close/medium range day sights (such as Elcan SPECTER or Trijicon ACOG), THERMIS LR has been designed for medium/long range day sights (sniper sights) and THERMIS ELR has been designed for long / extra long range day sights (long range sniper sights). Furthermore, to ensure light security and to prevent stray light from entering the Day Sight, different Hoods may be available for each THERMIS model in combination with each available Day Sight.

In terms of weapons, THERMIS MR is suitable for short/medium-range rifles and machine guns (such as M16, M4, AK-47, FN Minimi, MG3, MI16), THERMIS LR for medium/long range rifles and machine guns (such as M249, M240B) and THERMIS ELR for long range Sniper Rifles and heavy machine guns (such as M2 HB, MK19, M24, M107).

Table 11. Troubleshooting--continued

MALFUNCTION	TEST FOR INSPECTION	CORRECTIVE ACTION
8. The OLED Display shows no Thermal Image and Status Screen when THERMIS is activated.	Check if "AV" is activated in MENU.	Change AV Setting to "DUAL" or "OLED" setting and try again. Restart THERMIS and if THERMIS shows still no thermal image, refer to higher level of maintenance.
9. Status Screen is visible but no Thermal Image is visible or it is of very low quality.	Check if Objective Lens Cover is installed on Objective Lens.	Remove the Objective Lens Cover.

Objective Lens isn't focused.

Refocus with the Objective Lens Focus Knob. Make sure that the under observation object is at least at a 20 m distance.

Non-Uniformity Calibration (NUC) is needed.

THERMIS not properly configured.

Perform a QUICK NUC or EXTERNAL SHUTTER NUC.

Factory Reset THERMIS by choosing MENU→CONFIG→RESET_CONFIG

If problem persists, refer to higher level of maintenance.

CHAPTER 1 GENERAL INFORMATION, EQUIPMENT DESCRIPTION AND DATA

1.1 General Information

Scope

This manual provides information regarding the operation and preventive maintenance of the THERMIS Thermal Clip-On Sight family. There are three THERMIS models: THERMIS Medium Range (MR), THERMIS Long Range (LR) and THERMIS Extra Long Range (ELR) (for differences see Figure 2 and paragraph "THERMIS Models" in Chapter 1.2). Throughout the manual all the above models of Thermal Clip-On Sights will be referred to as "THERMIS", unless a differentiation has to be mentioned.

Reporting errors and recommending improvements

You can help improve this manual. If you find any mistakes, or if you know of a way to improve the procedures, please let us know. Mail your letter to THEON SENSORS S.A. (full address on the back cover page of this manual). You may also send in your recommended changes via e-mail or by fax. A formal reply will be furnished to you.

1.2 THERMIS Description and Data

Configuration

The Thermal Clip-On Sight, THERMIS, in its basic configuration is accompanied by a set of accessories. Before use, check the content for completeness and good condition.

CAUTION

Do not attempt to operate THERMIS before reading carefully and understanding all the instructions given in this manual.

CAUTION

THERMIS is a precision electro-optical instrument, so handle it carefully.

The basic THERMIS configuration kit (including standard accessories) consists of:

- Thermal Clip-On Sight, THERMIS (1)
- Battery AA (4)
- Carrying Bag (1)
- Transport and Storage Box Assembly (1)
- Lens Cleaning Kit (1)
- Operator's Technical Manual (1)
- Hood (1)

In addition, the following optional accessories may be included:

450-016

3.2 Preventive Maintenance Checks and Services (PMCS) Table

General

To ensure the readiness of THERMIS, perform the preventive maintenance procedures in accordance with Table 12, prior to each mission. Preventive maintenance procedures include inspection, cleaning, and performance of the checkout procedures.

Warnings and Cautions.

Always observe the **WARNINGS** and **CAUTIONS** appearing in the table. **Warnings** and **Cautions** appear before applicable procedures. You must observe the warnings and cautions to prevent serious injury to yourself and others, or to prevent your equipment from being damaged.

Cleaning

External Surfaces (NOT Optical Surfaces)

- Use a soft brush to remove excessive dirt, soil or sand.
- Make sure that the o-ring of the Battery Pack is present and that the Battery Pack is secured on the Battery Compartment of THERMIS.
- If necessary, use soap water and a fibreless cloth in order to clean the external surfaces of THERMIS and its accessories.
- Dry thoroughly the external surfaces using a dry fibreless cloth.
- After using THERMIS in salty environments wash thoroughly THERMIS and its accessories with fresh water.
- Before the storage of THERMIS make sure that all surfaces are dry.

Optical Surfaces (Objective Lens, Collimator lens)

CAUTION

Do not ingest, touch, or inhale particles or parts of a broken thermal objective lens. Thermal lenses contain materials that can cause irritation to eyes, skin, upper and lower respiratory tracts, or gastrointestinal tract. If contacted, flush eyes or skin with large amounts of water. If ingested, DO NOT induce vomiting. Rinse mouth with water and give victim 2-4 cups of milk or water. Fragments of the lens may be sharp enough to cut personnel if touched.

NOTE

Do NOT clean the optical surfaces of THERMIS unless it is necessary.

- Although the external side of the Objective Lens is coated with a durable / erosion resistant coating (according to MIL standards), cleaning dust, sand and other particles might scratch the coating and eventually degrade the performance of the Objective Lens.
- Do not use tools or sharp objects when cleaning the optical surfaces.

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Explanation of Table Entries.

(1) **Item Number Column.** Numbers in this column are for reference. When completing Equipment Inspection and Maintenance Worksheet, include the item number for the check/service indicating a fault. Item numbers also appear in the order that you must do checks and services for the intervals listed.

(2) **Interval Column.** This column tells you when you must do the procedure in the

procedure column. BEFORE procedures must be done before you operate or use the equipment for its intended mission. DURING procedures must be done during the time you are operating or using the equipment for its intended mission. AFTER procedures must be done immediately after you have operated or used the equipment.

(3) **Location, Check/Service Column.** This column provides the location and the item to be checked or serviced. The item location is underlined.

(4) **Procedure Column.** This column gives the procedure you must do to check or service the item listed in the Check/ Service column to know if the equipment is ready

or available for its intended mission or for operation. You must do the procedure at the time stated in the interval column.

(5) **Not Fully Mission Capable If:** Column. Information in this column tells you what faults will keep your equipment from being capable of performing its primary mission. If you make check and service procedures that show faults listed in this column, do not operate the equipment. Follow standard operating procedures for maintaining the equipment or reporting equipment failure.

Other Table Entries.

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

WARNING

Aiming through the Day Sight's Reticle must only be done when the Digital Zoom of THERMIS is 1X. The 2X or 4X Digital Zoom options must only be used for observation.

Table 12. Preventive Maintenance Checks and Services.-continued

ITEM NO	INTERVAL	LOCATION	PROCEDURE	NOT FULLY MISSION CAPABLE IF:
		ITEM TO BE INSPECTED		
5.	Before/ After	Objective Lens Cover	Inspect for cracked, not-fitting, or missing Objective Lens Cover.	Objective Lens Cover is missing, damaged or defective.
6.	Before/ After	Keyboard	Inspect for cracked Keyboard and/or missing or torn buttons. Activate THERMIS and ensure that all buttons can be pressed and function well.	Cracked Keyboard parts, or Keyboard Buttons are missing/ torn or cannot be pressed or do not function properly.
7.	Before/ After	Hood	Inspect for dirt, dust, cracked or torn hood. Inspect if it is improperly fitting or if it allows light to escape from it when THERMIS is activated and Hood is installed on Collimator Lens and Day Sight. If necessary, clean with water.	Damaged, torn, allowing light escape from it when THERMIS is activated or will not fit properly.
8.	Before/ After	Mounting Interface	Inspect mating surfaces for dust, dirt or corrosion. If necessary, clean with water.	Damaged, will not mount THERMIS on Weapon's Picatinny Rail.

WARNING SUMMARY

CAUTION

Do not attempt to operate THERMIS before reading carefully and understanding all the instructions given in this manual.

CAUTION

THERMIS is a precision electro-optical instrument, so handle it carefully.

CAUTION

Do not install batteries that have signs of leakage.

WARNING

Do not use THERMIS with a mix of old and new batteries, or batteries of different brands.

WARNING

Do not dispose batteries in fire due to explosion hazard.

WARNING

Danger of Explosion

- Lithium batteries may explode if overheated.
- 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.
- Do not use batteries which look bulged or have burst.
- Do not discard batteries. Turn defective batteries in for proper disposal.

CAUTION

Any undesirable emission of light from the Collimator Lens (even with the Hood installed) can be detected by the enemy.

CAUTION

THERMIS operates only with four (4) AA type (1.5 V) primary (lithium or alkaline) or rechargeable (Ni-MH) batteries. Do not use batteries of any other type. Batteries of higher voltage, than the ones recommended, will cause damage to THERMIS.

CAUTION
Do not ingest, touch, or inhale particles or parts of a broken thermal objective lens. Thermal lenses contain materials that can cause irritation to eyes, skin, upper and lower respiratory tracts, or gastrointestinal tract. If contacted, flush eyes or skin with large amounts of water. If ingested, DO NOT induce vomiting. Rinse mouth with water and give victim 2-4 cups of milk or water. Fragments of the lens may be sharp enough to cut personnel if touched.

CAUTION
Operation of THERMIS in dusty or sandy areas can pit and scratch the optical elements and damage the mechanical components unless the precautions given in this manual are taken.

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