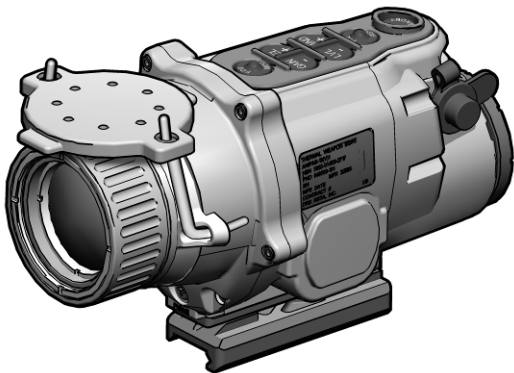




Warrior Systems

OPERATOR MANUAL
FOR THE
Light Weapon Thermal Sight
(LWTS)



SAFETY SUMMARY

GENERAL

This manual contains operating instructions and maintenance procedures which may cause injury or death to personnel, or damage to equipment if not properly followed. Prior to performing any task, the WARNINGS, CAUTIONS and NOTES included in that task shall be reviewed and understood.

DEFINITIONS

WARNING

Highlights an essential operating or maintenance procedure, practice, condition or statement, which, if not strictly observed, could result in injury to, or death of, personnel or long term health hazards.

CAUTION

Highlights an essential operating or maintenance procedure, practice, condition or statement, which, if not strictly observed, could result in damage to, or destruction of, equipment or loss of mission effectiveness.

NOTE

Highlights an essential operating or maintenance procedure, condition or statement.

SAFETY PRECAUTIONS

The following general safety precautions supplement the specific WARNINGS, CAUTIONS and NOTES that appear elsewhere in this manual.

WARNING

- Do not short circuit, puncture, incinerate, or disassemble batteries.
- Do not attempt to recharge batteries.
- Prior to use, inspect all batteries for cracks, dents, leakage, or bulging. Never install a defective battery in the LWTS.

WARNING

Lithium batteries can explode or cause burns if disassembled, shorted, recharged, or exposed to water, fire, or high temperatures (above 100°C or 212°F). Do not place loose batteries in a pocket or other container containing metal objects. Do not store batteries with hazardous or combustible materials. Store in a cool, dry, ventilated area.

WARNING

Use of off-brand batteries poses a risk of fire or explosion. Ensure that only batteries produced by a well-known battery manufacturer are installed in the LWTS. These batteries are specifically designed for use in high performance, high-drain devices, and contain built-in fault and heat protection features.

WARNING

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

WARNING

Emission of stray light from the eyepiece (even with the eyecup installed) may be detectable by the enemy.

WARNING

Do not touch, ingest, or inhale particles or fragments of a broken thermal objective lens. Thermal lenses contain material that may 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 cupfuls of milk or water. Fragments of the lens may be sharp enough to cut personnel if touched.

WARNING

Isopropyl alcohol is flammable and toxic. To avoid injury, keep away from open fire and use in a well ventilated area.

WARNING

When using the LWTS in-line with a day optic (e.g., CCO, RCO), normal procedure is to place the LWTS in CLIP ON mode. If using STAND ALONE mode while in a clip on configuration, ensure that WFOV is selected. Using NFOV in this instance will induce an error in the aiming function of the day optic, and LWTS display symbology (including the Main Menu) will not be visible to the operator.

CAUTION

Do not ship or store the LWTS with batteries installed.

CAUTION

Pointing the LWTS at the sun (even when powered off) without the lens cover installed may damage internal imaging components.

CAUTION

Use of acetone or gun cleaning agents containing perchloroethylene or methylene chloride may permanently damage the LWTS system.

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CHAPTER 1 INTRODUCTION

SECTION I GENERAL INFORMATION

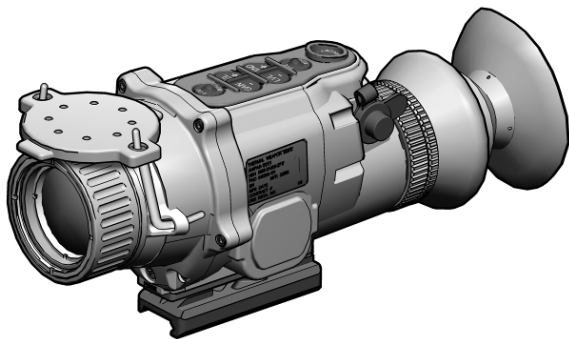


Figure 1-1. Light Weapon Thermal Sight (LWTS).

1.1 SCOPE

This manual is intended for use by operators of the Light Weapon Thermal Sight (LWTS). It provides a system description, operational procedures, and maintenance responsibilities. Complete familiarization with this manual prior to using the equipment will ensure safe operation and maximum effectiveness of the LWTS.

1.2 MODEL NUMBER AND EQUIPMENT NAME

TWB-001-A3, Light Weapon Thermal Sight (LWTS)

1.3 MANUFACTURER

L-3 Communications Corporation
Warrior Systems Division
Insight Operations
9 Akira Way
Londonderry, NH 03053 USA

1.4 PURPOSE OF EQUIPMENT

The LWTS is a handheld or weapon-mounted thermal imaging device that allows for observation, target identification, and passive target acquisition during the day or in adverse conditions such as light rain, light snow, dry smoke, and low light to total darkness.

1.5. ABBREVIATIONS AND ACRONYMS

Abbreviations and acronyms used in this manual are listed as follows:

AGC	Automatic Gain Control
ARC	Automatic Reticle Color (menu item)
AZ	Azimuth
BIT	Built-In Test
BLK HOT	Black Hot (polarity)
C	Celsius
CAL	Calibration (menu item)
CCO	Close Combat Optic
cm	Centimeter
EL	Elevation
F	Fahrenheit
FOV	Field of View
I/O	Input / Output (menu item)
ITAR	International Traffic in Arms Regulations

1.5 ABBREVIATIONS AND ACRONYMS (Continued)

LED	Light Emitting Diode (menu item)
LVL	(Thermal Brightness) Level
LWTS	Light Weapon Thermal Sight
m	Meter
NFOV	Narrow Field of View
PBIT	Power-Up Built-In Test
POL	Polarity
RCO	Rifle Combat Optic
RET	Reticle (menu item)
RMA	Return Material Authorization
STAD	Stadiametric
V	Volt
WFOV	Wide Field of View
WHT HOT	White Hot (polarity)
WND	Windage

SECTION II EQUIPMENT DESCRIPTION

1.6 SYSTEM DESCRIPTION

The LWTS is a battery operated thermal imaging device. It may be used as a handheld device, mounted to a weapon in a stand-alone configuration, or used in-line with a magnified day optic.

The thermal imaging capability of the LWTS allows for observation, target identification, and target acquisition during the day or in adverse conditions such as light rain, light snow, dry smoke, and low light to total darkness. The unit will not allow the user to see through glass, water, or heavy rain / snow.

The LWTS detects and displays available thermal signatures to provide rapid cueing to the operator of potential targets or danger. The sight is passive and does not emit visible or infrared light (except from the eyepiece) that can be detected by the enemy.

The LWTS can be mounted to weapons equipped with a MIL-STD-1913 rail.

It is a ruggedized system designed for operation in battlefield environments.

1.7 TECHNICAL SPECIFICATIONS

Table 1-1. Technical Specifications.

WEIGHT AND DIMENSIONS	
Weight (with full battery pack)	25.6 ounces
Length	6.7 inches
Width	3.4 inches
Height	3.8 inches
POWER	
Batteries	2 to 4 AA lithium batteries
* Battery Life	7 hours continuous operation
OTHER PARAMETERS	
Field of View (WFOV)	14.2° horizontal
Field of View (NFOV)	7.1° horizontal
Operating Temperatures	-40° F (-40°C) to +120°F (+49°C)
Storage Temperatures	-51° F (-46°C) to +160°F (+71°C)
Immersion	1m for 2 hours

* Performance will vary depending on environmental conditions.

1.8 LIST OF MAJOR COMPONENTS

The LWTS is available with a wide array of accessory items. Figure 1-2 shows components and parts for the entire family of LWTS configurations. Therefore, some of the items shown may not be applicable to your specific configuration. Table 1-2 provides a brief functional description of each item. The “Key” column in Table 1-2 corresponds to the label numbers in Figure 1-2.

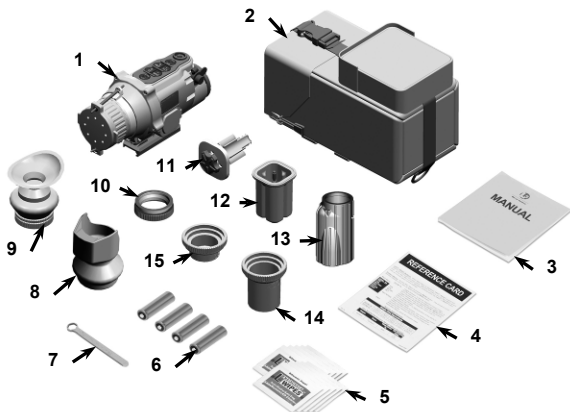


Figure 1-2. Major Components.

1.8 MAJOR COMPONENTS (Continued)

Table 1-2. List of Major Components.

Key	Major Component	Function
1	LWTS Assembly	A thermal imaging device used for observation, target identification, and passive target acquisition during the day or under adverse conditions.
2	Soft Carrying Case	Protects the LWTS and accessories while in a field environment.
3	Operator Manual	Provides detailed operating and maintenance instructions specific to the LWTS.
4	Quick Reference Guide	Provides at-a-glance operating procedures for the LWTS.
5	Lens Cleaning Towelettes	Used to clean the optical lenses of the LWTS.
6	Batteries, AA (lithium)	Four AA lithium batteries used to power the LWTS.
7	Box Wrench, 3/8"	Used to adjust the tension of the throw-lever mounting bracket.
8	Interface Hood	Used to improve light security and image quality when the LWTS is mounted in-line with other optical sights.
9	Eyecup, Removable	When attached, reduces emission of stray light from the eyepiece.

1.8 MAJOR COMPONENTS (Continued)

Table 1-2. List of Major Components (Continued).

Key	Major Component	Function
10	Eyepiece Adapter Ring	Provides a threaded adapter for attachment of eyepiece accessories.
11	Battery Pack, Spare	Provides secure housing for up to four AA lithium batteries that power the LWTS.
12	Battery Pack Protective Case	Used to protect the spare battery pack and batteries from loss or damage.
13	Interface Hood, Long	Used to improve light security and image quality when the LWTS is mounted in-line with other optical sights.
14	Shroud, RCO	Used to improve light security and image quality when the LWTS is mounted in-line with other optical sights. Specifically designed for use with the RCO.
15	Shroud, M68 CCO	Used to improve light security and image quality when the LWTS is mounted in-line with other optical sights. Specifically designed for use with the M68 CCO.

CHAPTER 2 OPERATING INSTRUCTIONS

SECTION I PREPARATION FOR USE

2.1 PREPARATION FOR USE

Unpacking the Equipment

Open the soft carrying case and verify that all major components are present. Check the LWTS device to ensure the following additional items are installed:

- a. Battery Pack
- b. Objective Lens Cover (and straps)
- c. I/O Jack Cover

If any of the major components or items listed above are missing, seek guidance from the equipment issuing authority.

Inspection of the Equipment

Before use, inspect all pieces of equipment for any damage such as cracks, loose parts, faulty cables, or other visible defects. If any damage or defects are noted, seek guidance from the equipment issuing authority.

2.2 BATTERY HANDLING

Battery Inspection

Before installation, inspect the batteries for any cracks, dents, leakage, or bulging. Never install a defective battery in the LWTS.

Battery Installation

CAUTION

Do not ship or store the LWTS with batteries installed.

NOTE

The LWTS may be powered by as few as two AA batteries. If installing only two batteries, they must occupy slots in the battery pack that are diagonally across from each other. Operating the LWTS with less than four batteries will result in significantly reduced battery run time.

1. Turn the thumbscrew located in the center of the battery door counterclockwise until the battery pack releases.
2. Lift the battery pack out of the battery compartment.
3. Install four AA batteries with the positive terminals facing the battery door as shown in Figure 2-1. Proper battery orientation is clearly marked on the LWTS and battery pack housings.

2.2 BATTERY HANDLING (Continued)

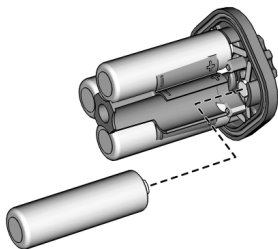


Figure 2-1. Battery Installation.

4. Reseat the battery pack in the battery compartment.
5. Tighten the thumbscrew by turning clockwise until snug.

Battery Capacity

A battery symbol and bars are prominently visible in the eyepiece display and provide a graphical representation of remaining battery life. As battery life decreases, the number of bars will also decrease. Each time the battery level drops, the battery symbol will flash five times to alert the operator.

A low battery message will appear in the eyepiece display when 5 - 40 minutes of continuous operation remain. If the batteries are not replaced promptly when the "LOW BATT" message appears, the display quality will deteriorate rapidly. Just prior to complete battery drain, the LWTS will automatically power down.

2.3 STAND-ALONE MOUNTING INSTRUCTIONS

Mounting Bracket

The LWTS is equipped with a throw-lever mounting bracket that is designed for direct attachment to weapons with a MIL-STD-1913 rail.

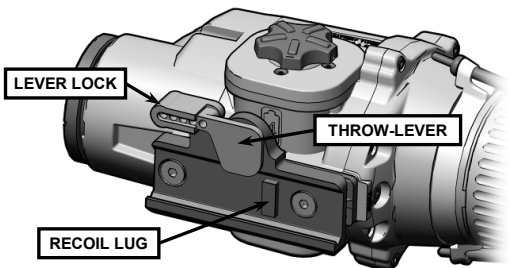


Figure 2-2. Throw-Lever Mounting Bracket.

Mounting Procedures

The following procedures are used when mounting the LWTS to a weapon in a stand-alone configuration (not in-line with a day optic).

WARNING

Be sure the weapon is CLEAR and SAFE before proceeding.

2.3 STAND-ALONE MOUNTING INSTRUCTIONS

(Continued)

NOTE

The LWTS may be placed at any position (forward and aft) on the rail that is most convenient for the operator. If, however, the LWTS is removed from the rail, the operator should note the position at which it was zeroed, and return it to that same position to ensure that zero is retained.

1. Pull the lever lock out to the full open position.
2. Swing the throw-lever toward the front (objective lens) of the LWTS to allow the mounting bracket sufficient space to fit over the MIL-STD-1913 rail.
3. Position the mounting bracket over the rail ensuring that the recoil lug is properly seated in the desired recoil groove of the rail.

CAUTION

If too much or too little force is required to perform step 4, the throw-lever must be adjusted to properly secure to the rail of the host weapon. See section 3.3 for adjustment procedures.

4. While pushing down and forward on the LWTS, swing the throw-lever toward the back (eyepiece) of the LWTS until it is snug against the mounting bracket.
5. Push the lever lock in to engage the locking mechanism.

2.4 MOUNTING IN-LINE WITH OTHER OPTICS

When the LWTS is mounted in line with another optical sight, either an interface hood or shroud may be used to improve light security and image quality. Several different interface hoods and shrouds are available to accommodate a variety of clip-on configurations.

Using a Shroud

Shrouds are equipped with an integral threaded connector that attaches directly to the LWTS eyepiece assembly and are used as follows:

1. Mount the day optic to the weapon rail per manufacturer's operating instructions.
2. Screw the appropriate shroud onto the LWTS eyepiece assembly by turning clockwise until tight.
3. With the LWTS held in one hand, slide the free end of the shroud into the objective lens of the day optic.
4. Position the LWTS over the weapon rail to identify the recoil groove that will provide the best mounting location. The best mounting location will ensure that the shroud is inserted as far as possible into the objective assembly of the day optic without collapsing the shroud.
5. Mount the LWTS to the weapon rail by performing the steps contained in section 2.3.

2.4 MOUNTING IN-LINE WITH OTHER OPTICS

(Continued)

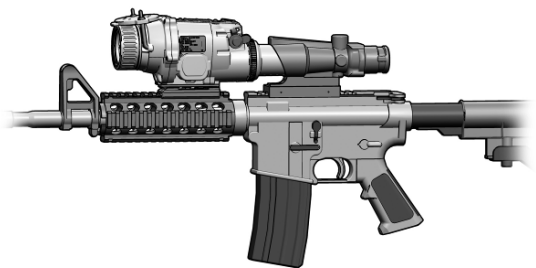


Figure 2-3. LWTS with Shroud.

Using an Interface Hood

Interface hoods require the use of an eyepiece adapter ring to provide a threaded connector that attaches directly to the LWTS eyepiece assembly. Interface hoods (and the eyepiece adapter) are used as follows:

1. Mount the day optic to the weapon rail per manufacturer's operating instructions.
2. Pull the narrow, circular end of the interface hood over the eyepiece adapter ring so that the lip of the interface hood is seated in the molded groove (see Figure 2-4).

2.4 MOUNTING IN-LINE WITH OTHER OPTICS (Continued)

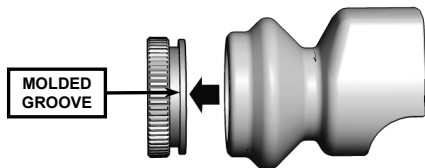


Figure 2-4. Attaching Interface Hood to Eyepiece Adapter Ring.

3. Screw the eyepiece adapter ring onto the LWTS eyepiece assembly by turning clockwise until tight.
4. Mount the LWTS to the weapon rail by performing the steps contained in section 2.3. Ensure the interface hood covers the objective lens of the day optic as shown in Figure 2-5.



Figure 2-5. LWTS with Interface Hood.

2.5 OBJECTIVE LENS AND EYEPiece

Objective Lens Cover

When the LWTS is not being used, the objective lens cover should be pulled down over the objective lens to protect it and internal imaging components, from possible damage. The objective lens cover should also be installed when performing a shutterless calibration of the LWTS (see section 2.27).

Eyepiece

When attached, the eyepiece reduces emission of stray light from the eyepiece. The eyepiece should be installed when using the LWTS as a handheld device or when mounted to a weapon in a stand-alone configuration.

1. Screw the eyepiece onto the eyepiece assembly by turning clockwise until snug.
2. Rotate the adjustment ring of the eyepiece to obtain a proper eye socket and cheek weld.

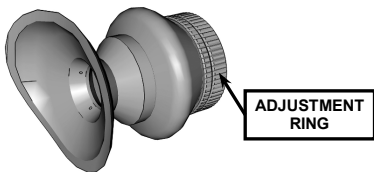


Figure 2-6. Installing the Eyepiece.

3. Finish screwing the eyepiece onto the eyepiece assembly by turning clockwise until tight.

SECTION II

OPERATING INSTRUCTIONS

2.6 CONTROLS AND ADJUSTMENTS

Figure 2-7 shows the features and controls for the LWTS. LWTS buttons and switches are multifunctional and produce different results depending on how they are pressed and whether or not the Main Menu is displayed. The uses and effects of each button and switch are addressed throughout this Section.

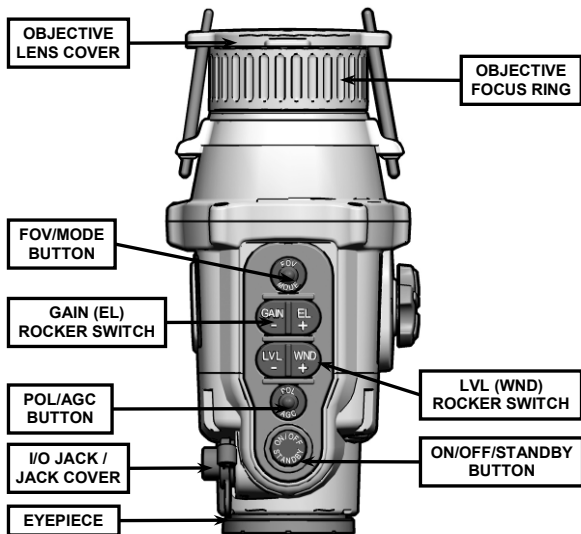


Figure 2-7. LWTS Features and Controls.

2.7 POWER

Power On

Pressing the ON/OFF/STANDBY button will initiate an approximate 3 second warm-up period, after which the LWTS display turns on. The LWTS will power up with the same settings selected as when the system was last turned off, except that:

- a. CAL is set to AUTO CAL ON (see section 2.19)
- b. FOV is set to WFOV (see section 2.14)
- c. AGC is set to AGC ON (see section 2.11)
- d. Reticle mode is set to ARC (see section 2.20)
- e. Video I/O is set to I/O OUT (see section 2.23)

Standby Mode

NOTE

In Standby Mode, the LWTS will continue to draw power that will eventually drain the batteries. Turn off the unit if it is not expected to be used.

With the system powered on, the LWTS can be placed in a Standby Mode for purposes of light discipline, as follows:

1. Press and hold the ON/OFF/STANDBY button. The following messages will sequentially appear in the display:
 - a. STANDBY?
 - b. STANDBY!
2. When the STANDBY! message is displayed (about 2 seconds), release the ON/OFF/STANDBY button. The LWTS is now in Standby Mode.

2.7 POWER (Continued)

Pressing any button will reactivate the unit. Upon “waking” from Standby Mode, the unit will retain all settings entered by the operator prior to being placed in standby.

Power Down

To power down the LWTS, press and hold the ON/OFF/STANDBY button. The device will shut down in approximately 4 seconds after the STANDBY?, STANDBY!, and POWER OFF messages appear sequentially in the eyepiece display. Release the button when the eyepiece display turns dark.

2.8 SYSTEM RESET

Simultaneously pressing both the FOV/MODE and POL/AGC buttons resets the LWTS to the following default parameters:

- a. Operational mode is set to CLIP ON (see section 2.24)
- b. Polarity is set to WHT HOT (see section 2.13)
- c. FOV is set to WFOV (see section 2.14)
- d. Display brightness (LED) is set to mid-scale (see section 2.21)
- e. Thermal brightness (LVL) is set to mid-scale (see section 2.9)
- f. Video I/O is set to I/O OUT (see section 2.23)
- g. AGC is set to AGC ON (see section 2.11)
- h. Reticle mode is set to ARC (see section 2.20)
- i. CAL is set to AUTO CAL ON (see section 2.19)

Note that reticle type and reticle adjustment settings (EL/WND) are not changed during system reset.

2.9 THERMAL BRIGHTNESS ADJUSTMENT

When the system menu is not displayed, pressing either side of the LVL/WND rocker switch calls up the thermal brightness scale. The thermal brightness scale is presented in the eyepiece display as shown in Figure 2-8.

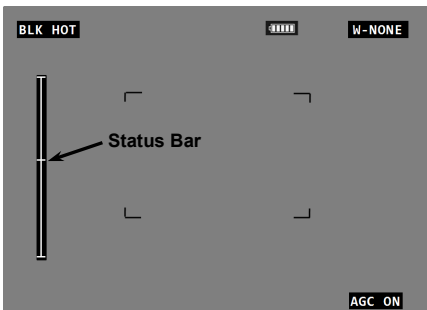


Figure 2-8. Thermal Brightness Control.

The thermal brightness setting is adjusted by pressing the + or - sides of the LVL/WND rocker switch to move the status bar between the top and bottom of the scale. Repeatedly pressing the + or - buttons will move the status bar in single increments. Pressing and holding the + or - buttons will auto-scroll the status bar in multiple increments.

If the + or - buttons are not pressed within 3 seconds, the brightness scale will disappear and the LWTS will revert to normal viewing mode. Once adjusted, the thermal brightness will remain at the applied setting until readjusted by the operator or the system reset feature is initiated.

2.10 GAIN ADJUSTMENT

When the system menu is not displayed, pressing either side of the GAIN/EL rocker switch calls up the gain control scale. The gain control scale is presented in the eyepiece display as shown in Figure 2-9.

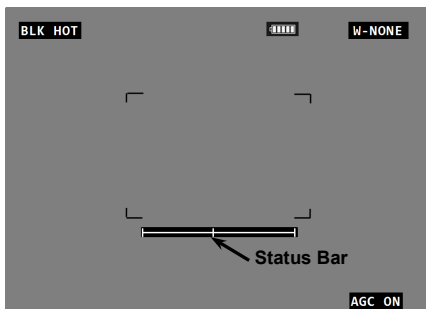


Figure 2-9. Gain Control.

The gain control setting is adjusted by pressing the + or - sides of the GAIN/EL rocker switch to move the status bar between the left and right ends of the scale. Repeatedly pressing the + or - buttons will move the status bar in single increments. Pressing and holding the + or - buttons will auto-scroll the status bar in multiple increments.

If the + or - buttons are not pressed within 3 seconds, the gain control scale will disappear and the LWTS will revert to normal viewing mode. Once adjusted, gain will remain at the applied setting until readjusted by the operator or the system reset feature is initiated.

2.11 AUTOMATIC GAIN CONTROL (AGC)

The LWTS provides an Automatic Gain Control (AGC) feature that, when turned on, automatically adjusts both the thermal brightness and gain levels based on the contrast visible in the viewed scene.

AGC is toggled on or off by pressing (and holding) the POL/AGC button. AGC status (AGC ON or AGC OFF) is presented in the lower right corner of the eyepiece display (see Figure 2-9).

With AGC OFF, continual adjustments to both thermal brightness and gain must be made manually as described in sections 2.9 and 2.10, to improve and maintain image quality.

Operating the LWTS with AGC ON usually provides the best thermal image. Manual adjustments to thermal brightness and gain can still be made with AGC ON, but to a smaller degree (fine tuning only).

2.12 FOCUS ADJUSTMENT

The objective lens must be focused for the viewing distance being observed. Rotate the objective focus ring for best image clarity. A change in viewing distance requires that the lens be refocused. However, if already focused for a distance of at least 90m, no change in focus is required between this distance and infinity.

2.13 POLARITY

NOTE

In CLIP ON mode (see section 2.24), WHOT HOT polarity is displayed as WHT, and BLK HOT polarity is displayed as BLK.

Pressing the POL/AGC button toggles the polarity setting between white hot and black hot modes. The selected mode (WHT HOT or BLK HOT) is presented in the upper left corner of the eyepiece display (see Figure 2-10). In WHT HOT mode, objects with the hottest thermal signature will appear white and those with the coolest signature will appear black. In BLK HOT mode, the reverse is true.

2.14 FIELD OF VIEW (FOV)

NOTE

In CLIP ON mode (see section 2.24), the field of view option is automatically set to WFOV. When in CLIP ON mode, pressing the FOV/MODE button has no effect on the field of view setting.

When in STAND ALONE mode (see section 2.24) only, pressing the FOV/MODE button toggles between the wide field of view (WFOV) and narrow field of view (NFOV) settings. An FOV Indicator is presented in the upper right corner of the eyepiece display as shown in Figure 2-10. The FOV Indicator consists of the letter W (WFOV) or N (NFOV) preceding the selected weapon reticle.

Additional confirmation that the LWTS is placed in WFOV is provided by the WFOV Brackets shown in Figure 2-10. The area contained within the WFOV Brackets provides an approximation of the field of view that will be visible in the eyepiece display when switching to NFOV. In NFOV, the WFOV Brackets are not displayed.

2.14 FIELD OF VIEW (FOV) (Continued)

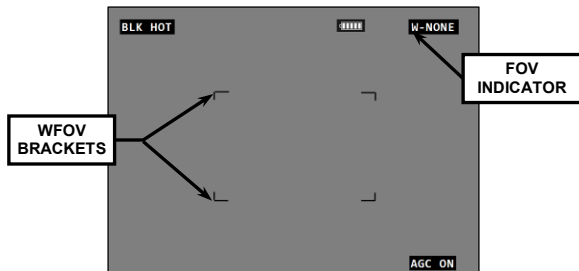


Figure 2-10. Field of View Indicator.

2.15 STARTUP PROCEDURES

For optimal performance and image clarity, the following procedures should be accomplished in the order presented, each time the LWTS is to be placed into operation:

1. Install batteries per section 2.2.
2. Turn on the LWTS by pressing the ON/OFF/STANDBY button. Wait about 3 seconds until the system begins imaging.
3. Make the following selections/adjustments via the Main Menu:
 - a. Adjust the display brightness (LED) setting to a comfortable viewing level as described in section 2.22.
 - b. Select the desired operational mode (STAND ALONE or CLIP ON) as described in section 2.24.
 - c. Select the desired reticle and reticle mode as described in section 2.20.
 - d. Turn automatic shuttered calibrations on or off as described in section 2.19.

2.15 STARTUP PROCEDURES (Continued)

4. Exit the Main Menu and select AGC ON or AGC OFF as described in section 2.11, as desired.
5. If desired, adjust the thermal brightness setting as described in section 2.9.
6. If desired, adjust the gain setting as described in section 2.10.
7. Select the desired polarity setting as described in section 2.13.
8. While looking through the eyepiece at an object at least 45m away, rotate the objective focus ring until the best (sharpest) thermal image is obtained.

2.16 SHUTDOWN PROCEDURES

1. Press and hold the ON/OFF/STANDBY button. The device will shut down in approximately 4 seconds after the STANDBY?, STANDBY!, and POWER OFF messages appear sequentially in the eyepiece display. Release the button when the eyepiece display turns dark.
2. Install the objective lens cover over the objective lens.
3. Remove battery pack; place battery pack and the LWTS in the soft carrying case.

2.17 I/O JACK

With optionally available cables and equipment, the LWTS is capable of receiving external power, exporting RS-170 data to an external monitor or viewer, and importing RS-170 data from a compatible device, via the I/O jack.

SECTION III SYSTEM MENUS

2.18 GENERAL

The LWTS menu structure is multi-tiered, consisting of a Main Menu and various sub-menus. In most cases, activation of a Main Menu item will result in the display of menu options or a sub-menu.

With the LWTS turned on, access the Main Menu (Figure 2-11) by pressing and holding the FOV/MODE button.

NOTE

When the LWTS is placed in CLIP ON mode, the Main Menu will appear slightly different than shown in Figure 2-11. Differences are addressed throughout this Section.

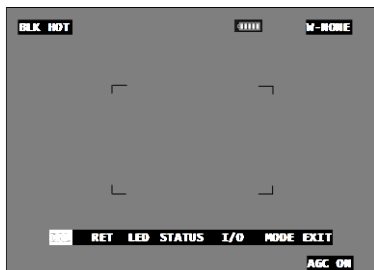


Figure 2-11. Main Menu.

2.18 GENERAL (Continued)

Menu items, sub-menu items, and menu options are selected (highlighted) by scrolling with the + or - buttons. Activation of a selected item is accomplished by pressing the FOV/MODE button.

Activated menu items are saved as follows:

- Through selection and activation of the EXIT menu item from the Main Menu.
- By entering Standby Mode while the Main Menu or any sub-menu is displayed.
- Through a normal shutdown of the LWTS.
- By an automatic shutdown of the LWTS just prior to complete battery drain (see section 2.2).

All menu adjustments and settings made in one FOV are also reflected in the opposite FOV.

2.19 CALIBRATION (CAL)

At initial power up, after prolonged use, or after transitions from one temperature extreme to another, a degradation of the thermal scene may be noticed. This is corrected by calibrating the LWTS.

The CAL menu item governs the behavior of shuttered calibrations. When initiating a shuttered calibration, it is normal to hear the internal shutter closing and opening. The LWTS is also capable of performing silent, shutterless calibrations if required by the tactical situation. For more information regarding shutterless calibrations, see section 2.27.

2.19 CALIBRATION (CAL) (Continued)

Activating the CAL menu item from the Main Menu allows the operator to turn automatic shuttered calibrations on or off as shown in Figure 2-12.

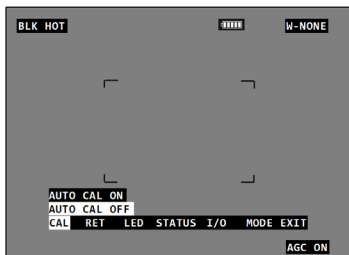


Figure 2-12. CAL Menu Options.

AUTO CAL ON

With AUTO CAL ON activated, a shuttered calibration is automatically initiated upon selection, at least once every 30 minutes, and when the LWTS senses a significant ambient temperature change; but not more often than once every 30 seconds.

The operator may want to optimize the thermal image more frequently than the AUTO CAL ON parameters allow. For this reason, even with AUTO CAL ON enabled, a manual shuttered calibration can be initiated at any time by simultaneously pressing the + sides of both the GAIN/EL and LVL/WND rocker switches.

AUTO CAL OFF

With AUTO CAL OFF activated, all calibrations of the LWTS must be manually initiated as described above.

2.20 RETICLE (RET)

NOTE

The RET menu item is not available when the LWTS is placed in CLIP ON mode.

Activating the RET menu item via the Main Menu calls up the RET Sub-Menu shown in Figure 2-13.

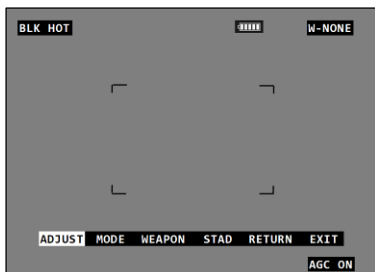


Figure 2-13. RET Sub-Menu.

2.20 RETICLE (RET) (Continued)

ADJUST

NOTE

If NONE or 5 MIL are selected as the weapon reticle, the message NOT ADJUSTABLE will be displayed when activating the ADJUST sub-menu item.

Activating the ADJUST sub-menu item calls up the WND/EL Adjustment Screen shown in Figure 2-14.

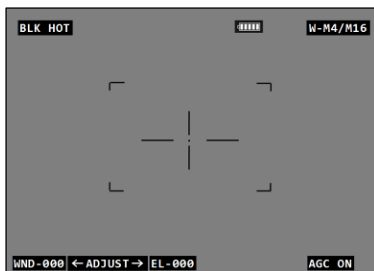


Figure 2-14. WND/EL Adjustment Screen.

The WND/EL Adjustment Screen allows for moving the position of the reticle in the eyepiece display. Adjustments in windage are made by pressing the + or - sides of the LVL/WND rocker switch. Adjustments in elevation are made by pressing the + or - sides of the GAIN/EL rocker switch.

In WFOV, each press of the rocker switch equates to a change in reticle position of 2 units, as shown on the display. In NFOV, each press of the rocker switch equates to a change in reticle position of 1 unit, as shown on the display.

2.20 RETICLE (RET) (Continued)

MODE

Activating the MODE sub-menu item allows the operator to change the reticle mode as shown in Figure 2-15.

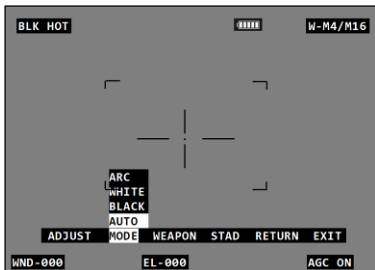


Figure 2-15. Reticle MODE Menu Options.

- **ARC** – Reticle color will automatically toggle between white and black to provide the best contrast with the predominant color range of the viewed scene.
- **WHITE** – White is selected as the reticle color.
- **BLACK** – Black is selected as the reticle color.
- **AUTO** – Reticle color is determined by the polarity (POL) setting selected (see section 2.13). If WHT HOT polarity is selected, the reticle color will be black. If BLK HOT polarity is selected, the reticle color will be white.

2.20 RETICLE (RET) (Continued)

WEAPON

Activating the WEAPON sub-menu item allows the operator to select the proper reticle appropriate to the host weapon being used or the desired application, as shown in Figure 2-16. Note that the reticles appear differently in WFOV and NFOV.

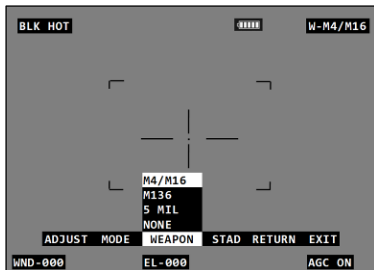


Figure 2-16. WEAPON Reticle Options.

- M4/M16 – This selection is appropriate when the LWTS is mounted to an M4/M16 (series) rifle.
- M136 – This selection is appropriate when the LWTS is mounted to an M136 anti-tank weapon.
- 5 MIL – This selection is used for range estimation purposes only.
- NONE – This selection is appropriate when the LWTS is being used for observation purposes only. When selected, no reticle or WND/EL values are shown in the eyepiece display.

2.20 RETICLE (RET) (Continued)

Figure 2-17 shows the M4/M16 reticle when the LWTS is placed in WFOV.

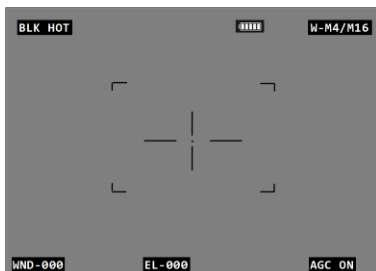


Figure 2-17. M4/M16 Reticle (WFOV).

Aim points and range estimation features of the M4/M16 reticle (WFOV) are shown in Figure 2-18.

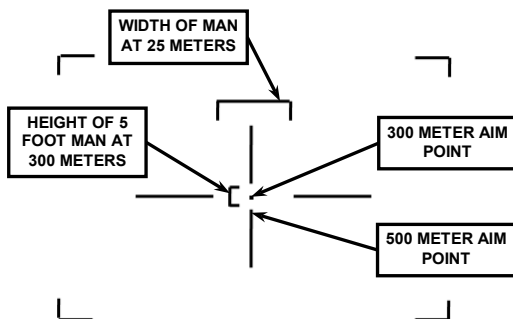


Figure 2-18. Aim Points – M4/M16 Reticle (WFOV).

2.20 RETICLE (RET) (Continued)

Figure 2-19 shows the M4/M16 reticle when the LWTS is placed in NFOV.

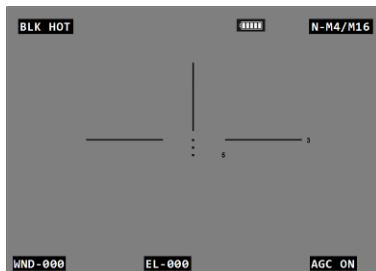


Figure 2-19. M4/M16 Reticle (NFOV).

Aim points and range estimation features of the M4/M16 reticle (NFOV) are shown in Figure 2-20.

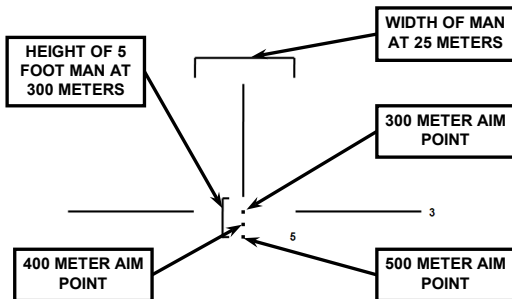


Figure 2-20. Aim Points – M4/M16 Reticle (NFOV).

2.20 RETICLE (RET) (Continued)

Figures 2-21 and 2-22 show the M136 reticle in WFOV and NFOV.

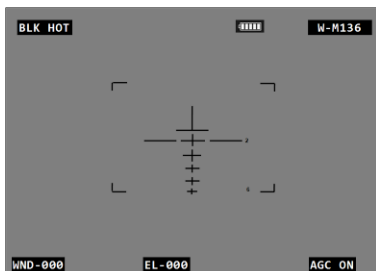


Figure 2-21. M136 Reticle (WFOV).

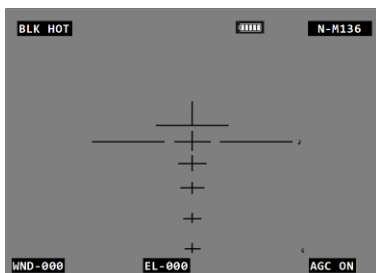


Figure 2-22. M136 Reticle (NFOV).

2.20 RETICLE (RET) (Continued)

Aim points and range estimation features of the M136 reticle are shown in Figure 2-23.

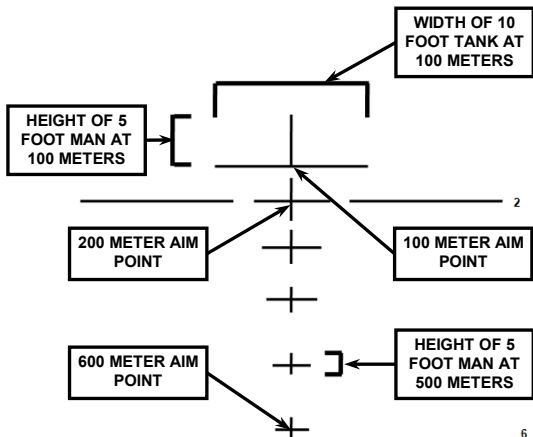


Figure 2-23. Aim Points – M136 Reticle.

2.20 RETICLE (RET) (Continued)

Figures 2-24 and 2-25 show the 5 MIL reticle in WFOV and NFOV. Each graduated mark in the reticles shown below equates to 5 mils.

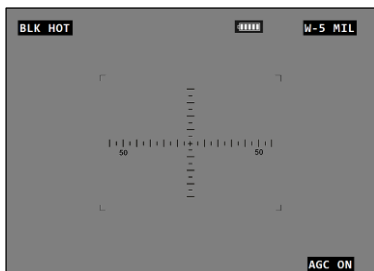


Figure 2-24. 5 MIL Reticle (WFOV).

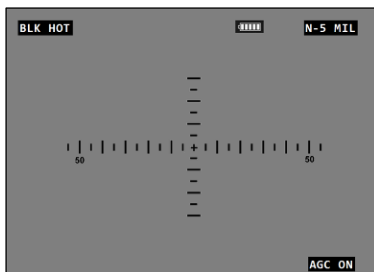


Figure 2-25. 5 MIL Reticle (NFOV).

2.20 RETICLE (RET) (Continued)

STAD

Activating the STAD sub-menu item allows the operator to enable or disable the stadiametric scale in the eyepiece display, as shown in Figure 2-26.

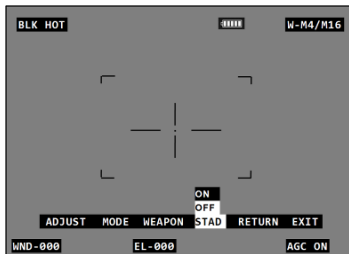


Figure 2-26. STAD Menu Options.

When turned on, the stadiametric scale is presented in the eyepiece display along with the selected weapon reticle as shown in Figure 2-27.

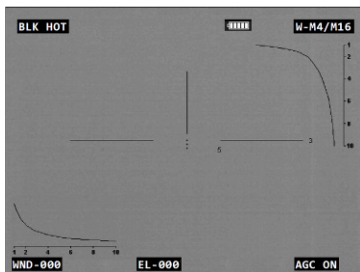


Figure 2-27. Stadiametric Reticle.

2.20 RETICLE (RET) (Continued)

The stadiametric scale is used for range estimation purposes from 100 to 1,000m. The vertical axis is designed to show the width of a 10 foot tank at various range intervals. The horizontal axis is designed to show the height of a 5 foot man at various range intervals.

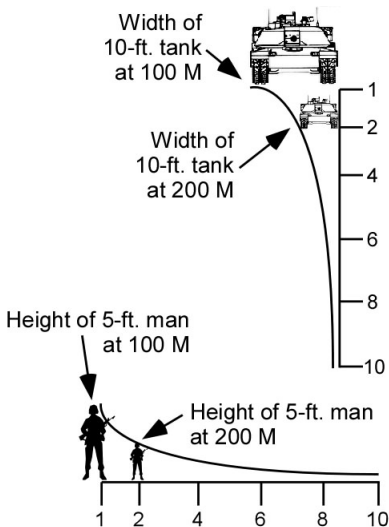


Figure 2-28. Range Estimation – Stadiametric Scales.

2.20 RETICLE (RET) (Continued)

RETURN

Activating the RETURN sub-menu item returns the display to the Main Menu.

EXIT

Activating the EXIT sub-menu item saves all changed settings and returns the LWTS to normal viewing mode.

2.21 LED

Activating the LED menu item allows for adjusting the brightness of the entire display (thermal image and symbology). Once activated, the display brightness scale is presented in the eyepiece display as shown in Figure 2-29.

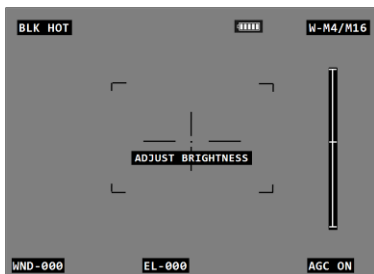


Figure 2-29. LED (Display Brightness) Scale.

The display brightness setting is adjusted by pressing the + or - sides of the LVL/WND rocker switch to move the status bar between the top and bottom of the scale. Repeatedly pressing the + or - buttons will move the status bar in single

2.20 RETICLE (RET) (Continued)

increments. Pressing and holding the + or - buttons will auto-scroll the status bar in multiple increments.

Return to the Main Menu by pressing and releasing the FOV/MODE button.

2.22 STATUS

NOTE

The STATUS menu item is displayed as STS when the LWTS is placed in CLIP ON mode.

Activating the STATUS menu option calls up the Status Screen which displays the following:

- a. Current software version;
- b. Current firmware version;
- c. Battery voltage;
- d. Shot counter information;
- e. AZ and EL adjustment values.

Items a. through c. above are used by maintenance personnel for diagnostic purposes. Note that the battery voltage value is not an accurate predictor of remaining battery life.

The LWTS has a built-in shock sensor that is used to detect when a round of ammunition has been fired from the host weapon. The shot counter information represents the total number of rounds fired, regardless of weapon type.

2.23 I/O

NOTE

The I/O menu item is displayed as IO when the LWTS is placed in CLIP ON mode.

Activating the I/O menu item allows for selecting one of three I/O options as shown in Figure 2-30.

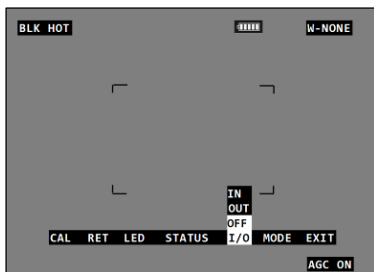


Figure 2-30. I/O Menu Options.

With optionally available cables and equipment, the LWTS is exporting RS-170 data to an external monitor or viewer, and importing RS-170 data from a compatible device, via the I/O jack.

- IN – Allows external RS-170 video from a compatible device to be viewed in the LWTS eyepiece display.
- OUT – Allows LWTS RS-170 video to be exported to an external device via the I/O port.
- OFF – Prevents RS-170 video from being imported or exported.

2.24 MODE

Activating the MODE menu item allows the operator to place the LWTS in either a STAND ALONE or CLIP ON mode of operation as shown in Figure 2-31.

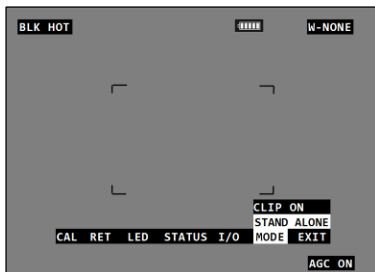


Figure 2-31. LWTS MODE Menu Options.

STAND ALONE

WARNING

When using the LWTS in-line with a day optic (e.g., CCO, RCO), normal procedure is to place the LWTS in CLIP ON mode. If using STAND ALONE mode while in a clip on configuration, ensure that WFOV is selected. Using NFOV in this instance will induce an error in the aiming function of the day optic, and LWTS display symbology (including the Main Menu) will not be visible to the operator.

The STAND ALONE option is appropriate when the LWTS is being used as a handheld device or when mounted to a weapon in a stand-alone configuration.

2.24 MODE (Continued)

CLIP ON

The CLIP ON option is appropriate when the LWTS is mounted in-line with a magnified day optic. Selecting the CLIP ON mode automatically accomplishes the following:

- Sets NONE as the weapon reticle. When in CLIP ON mode, no other reticle can be selected and the RET sub-menu is not available.
- Sets the FOV option to WFOV. When in CLIP ON mode, pressing the FOV/MODE button has no effect on the FOV setting.
- Brings all display symbology toward the center of the display so that it is visible when viewed through the in-line day optic as shown in Figure 2-32.

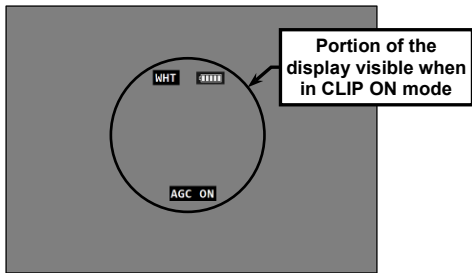


Figure 2-32. Display in CLIP ON Mode.

2.25 EXIT

NOTE

The EXIT menu item is displayed as X when the LWTS is placed in CLIP ON mode.

Activating the EXIT menu item saves all changed settings and returns the LWTS to normal viewing mode.

SECTION IV ALIGNMENT / ZEROING

2.26 ALIGNMENT / ZEROING PROCEDURES

At 25 yards, each click of the LWTS reticle moves the shot group about 1.0cm when in WFOV, and 0.5cm when in NFOV. Changing the position of the reticle corresponds to a subsequent change in shot group movement (i.e., moving the reticle up will also move the strike of the round up).

Stand-Alone

When being used as a stand-alone device, the example below shows how to align the LWTS to be parallel with the rail of the host weapon on a 25-meter range. This “infinite parallel” configuration is appropriate for many mission profiles. Once parallel, the LWTS / weapon combination may be zeroed in accordance with established unit, departmental, or agency procedures.

1. Once mounted to a weapon, the distance from the top of the rail to the centerline of the LWTS objective lens is 5.8cm. Calculate the designated strike point by adding this value to the distance from the center of the weapon barrel to the top of the weapon rail (3.1cm for an M4/M4A1). Therefore, in this example, the designated strike point is $5.8\text{cm} + 3.1\text{cm} = 8.9\text{cm}$ **down** from the center of the target.

2.26 ALIGNMENT / ZEROING PROCEDURES (Continued)

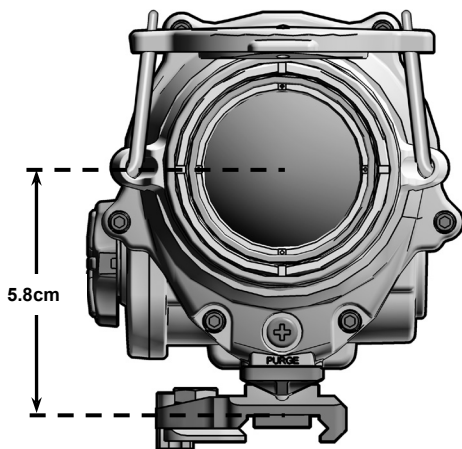
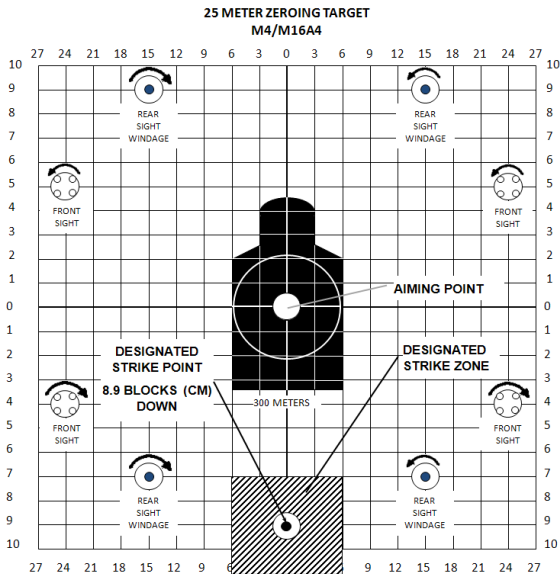


Figure 2-33. Strike Point Calculation.

2. Mark the designated strike point on a standard 25-meter zeroing target (see Figure 2-34).
3. Draw a designated strike zone around the strike point that corresponds in size to an acceptable degree of desired accuracy.

2.26 ALIGNMENT / ZEROING PROCEDURES (Continued)



4. Mount the target on an "E" silhouette or other suitable surface at 25 meters.
5. Mount the LWTS to the weapon.
6. Turn on the LWTS using the startup procedures in section 2.15.

2.26 ALIGNMENT / ZEROING PROCEDURES

(Continued)

7. Align the LWTS reticle with the center of the target per section 2.20, ADJUST.
8. Fire a 3-round shot group and note the center of the shot group relative to the designated strike point.
9. Adjust the position of the reticle to move the center of the shot group to the designated strike point.
10. Fire another 3-round shot group and again observe the center of the new shot group relative to the designated strike point.
11. When 2 out of 3 rounds are in the designated strike zone, the LWTS is aligned to be parallel with the rail of the host weapon.

Clip-On

When being used in-line with an optical sight, the LWTS should be placed in CLIP ON mode (see section 2.24) and zeroing procedures associated with the primary sight should be used. Placing the LWTS in front of an already zeroed optic / weapon combination does not necessitate rezeroing.

SECTION V

OPERATION UNDER UNUSUAL CONDITIONS

2.27 SHUTTERLESS CALIBRATION

Shutterless calibrations are performed without the use of the LWTS' internal shutter and are silent. They are performed with the objective lens cover installed and must, therefore, be manually initiated.

NOTE

Failure to cover the objective lens prior to initiating a shutterless calibration may result in a distorted picture or the presence of ghost images in the eyepiece display.

Shutterless calibrations are initiated by simultaneously pressing the - sides of both the GAIN/EL and LVL/WND rocker switches. A shutterless calibration may be manually initiated any time the system menus are not displayed, regardless of whether AUTO CAL ON or AUTO CAL OFF is activated via the Main Menu (see section 2.19).

2.28 PBIT FAIL

The LWTS is equipped with Built-In Test (BIT) software that continually queries internal components and circuitry to ensure that the device is operating properly. If the BIT software detects a problem, a System Failure Indicator (PBIT FAIL) will be displayed in the upper left corner of the eyepiece display as shown in Figure 2-35.

2.28 PBIT FAIL (Continued)

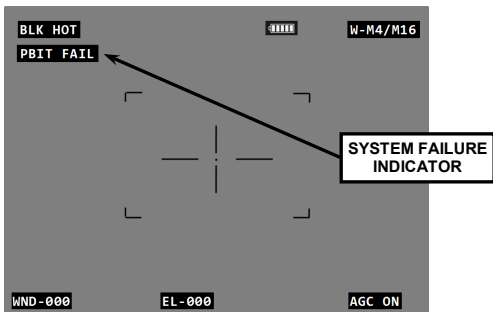


Figure 2-35. System Failure Indicator.

If the System Failure Indicator appears in the eyepiece display during the course of normal LWTS operation, allow the device to operate for an additional 20 minutes. If the System Failure Indicator persists, refer to section 3.4 for additional guidance.

2.29 UNUSUAL ENVIRONMENT / WEATHER

Extreme Cold

The LWTS may exhibit degradation of performance or failure to operate in temperatures below -40°F (-40°C). To maximize performance, minimize exposure time.

In addition, battery life will be reduced in extremely cold temperatures. Periodically removing batteries and warming them with body heat can increase battery run time.

2.29 UNUSUAL ENVIRONMENT / WEATHER (Continued)

Extreme Heat

The LWTS may exhibit degradation of performance or failure to operate in temperatures above 120°F (49°C). Operating the LWTS above this temperature may result in the System Failure Indicator (see section 2.28) appearing on the display. If due to extreme heat the System Failure Indicator appears, immediately power down LWTS and allow it to cool below 120°F (49°C) before operating. Operating the LWTS for extended periods in extremely hot temperatures or in direct sunlight may reduce the reliability and/or service life of the device.

Salt Air and Sea Spray

After operating in these environments, perform all of the Inspection / Cleaning procedures described in section 3.2. To prevent corrosion, allow the soft carrying case to dry thoroughly before placing the imaging system inside.

Dust Storms and Sand Storms

Blowing sand and dust may damage the optical surfaces of the LWTS. The objective lens cover should be installed under these conditions and removed just prior to operational use.

CHAPTER 3 MAINTENANCE AND SERVICING

SECTION I MAINTENANCE AND TROUBLESHOOTING

3.1 TROUBLESHOOTING

The procedures below will help correct some of the basic problems that may arise with the LWTS. If the equipment malfunction is not listed, or the actions listed do not correct the fault, refer to section 3.4 for additional guidance.

Table 3-1. Troubleshooting Procedures.

Symptom	Malfunction	Corrective Action
1. No display is present upon start-up.	a. LWTS is in Standby Mode.	a. Press any button to “wake” from Standby Mode (section 2.7).
	b. Improperly adjusted settings.	b. Reset LWTS to factory default parameters (section 2.8).
	c. Software overload.	c. Cycle LWTS power on/off (section 2.7).
	d. Battery power is low or batteries not properly installed.	d. Install fresh batteries (section 2.2).
	e. Battery compartment requires cleaning.	e. Clean battery compartment (section 3.2).
	f. Battery contacts of battery pack require cleaning.	f. Clean battery contacts of battery pack (section 3.2).

3.1 TROUBLESHOOTING (Continued)

Table 3-1. Troubleshooting Procedures (Continued).

Symptom	Malfunction	Corrective Action
2. Poor or degraded image.	a. Battery power is low.	a. Install fresh batteries (section 2.2).
	b. Not focused for viewing distance being observed.	b. Focus objective lens (section 2.12).
	c. Improperly adjusted settings.	c. Reset LWTS to factory default parameters (section 2.8).
	d. LWTS requires calibration.	d. Perform a calibration (section 2.19).
	e. Objective lens and/or eyepiece obscured by dirt, dust or grime.	e. Clean objective lens and eyepiece (section 3.2).
3. Display is on but no thermal image is present.	a. Objective lens cover installed over objective lens.	a. Flip up objective lens cover (section 2.5).
	b. Not focused for viewing distance being observed.	b. Focus objective lens (section 2.12).
	c. Improperly adjusted settings.	c. Reset LWTS to factory default parameters (section 2.8).
	d. LWTS requires calibration.	d. Perform a calibration (section 2.19).
4. No reticle is visible.	a. Display brightness set too low.	a. Adjust display brightness (section 2.21).
	b. NONE reticle is selected.	b. Ensure the 5 MIL or M4/M16 reticle type is selected (section 2.20).

3.2 INSPECTION / CLEANING

WARNING

Isopropyl alcohol is flammable and toxic. To avoid injury, keep away from open fire and use in a well ventilated area.

The operator should inspect the LWTS before each use and after it has been in extreme conditions, such as prolonged exposure to intense temperatures. The following procedures will prolong the life of the LWTS and help ensure safe operation.

LWTS Housing

Inspect the LWTS housing for any signs of damage including cracks, missing parts, and any other visible defects. To clean the housing, rinse with water and wipe clean with a soft cloth. Clean around buttons and housing details with a cotton swab.

Battery Compartment

Inspect the battery compartment for dirt, dust, or corrosion. Dirt or debris that cannot be shaken loose from the battery compartment may be removed using a cotton swab. If necessary, clean battery contacts with a cotton swab and isopropyl alcohol.

3.2 INSPECTION / CLEANING (Continued)

Battery Pack

Inspect the battery pack for dirt, dust, or corrosion. If necessary, clean the battery contacts with isopropyl alcohol and a cotton swab. Periodically lubricate the battery pack o-ring with fluorinated grease. Replace the o-ring if it becomes cut, nicked, or dried out (see section 3.3).

Objective Lens and Eyepiece

Inspect the objective lens and eyepiece for dirt, grime, scratches, and cracks. Remove any large particles or loose dirt using air or a soft cloth. Fine cleaning should be performed using lens cleaning towelettes. Avoid using excessive force as this may scratch the lenses.

I/O Jack

Inspect the I/O jack for corrosion, dirt and damage. Gently remove any large particles of foreign matter and clean the contacts with a cotton swab dipped in isopropyl alcohol.

3.3 CORRECTIVE MAINTENANCE

The LWTS has no internal parts or assemblies replaceable by the user or organizational level personnel. Refer to section 3.4 regarding maintenance and/or repair actions beyond those described in this manual.

Throw-Lever Tension Adjustment

The throw-lever mounting bracket has a locknut that adjusts the tension required to clamp it to the weapon rail. It is preset at the factory but may need adjustment when initially mounted to the rail of the host weapon. If adjustment is required, the following procedures apply and are performed with the LWTS removed from the host weapon:

CAUTION

Creating too much tension with the locknut may result in damage to the mounting bracket when the throw-lever is forced against the weapon rail. Creating too little tension with the locknut may allow for movement of the LWTS on the rail. Never completely remove the locknut from the mounting bracket.

1. Swing the throw-lever closed (against the body of the LWTS), then push in the lever lock to engage the locking mechanism.
2. Using the provided 3/8" box wrench, adjust the locknut using *slight* movements (2 or 3 degrees). Turning the locknut counterclockwise will decrease tension on the throw-lever. Turning it clockwise will increase tension on the throw-lever.

3.3 CORRECTIVE MAINTENANCE (Continued)

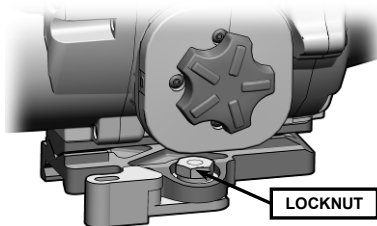


Figure 3-1. Adjusting Throw-Lever Tension.

3. Test each adjustment by attempting to mount the LWTS to the weapon rail per section 2.3.

Objective Lens Cover / Straps Replacement

1. Review Figure 3-2 to gain familiarity with components referred to in this procedure.

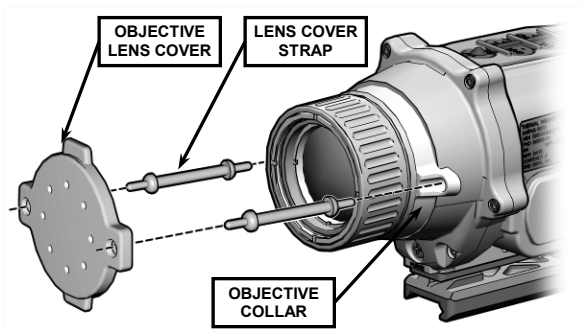


Figure 3-2. Replacing Objective Lens Cover / Straps.

3.3 CORRECTIVE MAINTENANCE (Continued)

2. Grasp the middle of one lens cover strap and pull it free from the objective lens cover.
3. Repeat step 2 for the other lens cover strap.
4. With fingers, pull lens cover straps free from the eyelets on the objective collar.
5. Moisten and thread replacement lens cover straps through the eyelets on the objective collar and pull through using fingers.

NOTE

Step 6 is performed with the flat side of the objective lens cover facing out, away from the objective lens.

6. Moisten and thread opposite end of the lens cover straps through the eyelets on the objective lens cover and pull through using fingers.
7. Flip the objective lens cover down and over the objective lens.

3.3 CORRECTIVE MAINTENANCE (Continued)

Objective Collar Replacement

1. Remove objective lens cover straps (page 3-6).
2. Using thumbs, push and roll the eyelets of the objective collar up and out of the objective collar retaining groove.

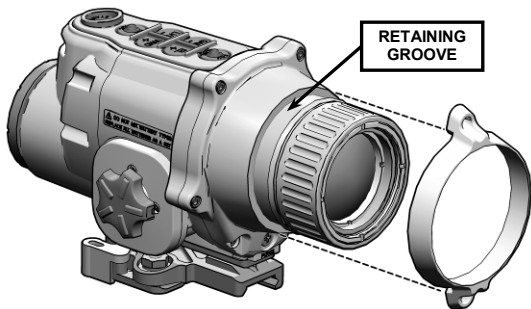


Figure 3-3. Replacing Objective Collar.

3. Work the objective collar over and off the objective focus ring.
4. Slide the replacement objective collar over the objective focus ring.
5. While pushing on the eyelets, work the objective collar past the objective focus ring until it seats in the objective collar retaining groove.
6. Reinstall the objective lens cover straps (and lens cover) (page 3-6).

3.3 CORRECTIVE MAINTENANCE (Continued)

Battery Pack O-Ring Replacement

1. Remove battery pack from the LWTS housing per section 2.2.
2. If installed, remove batteries from battery pack.
3. Carefully wedge the blade of a small jeweler's screwdriver under the battery pack o-ring to lift it up and out of its retaining groove.

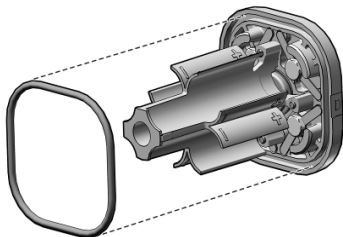


Figure 3-4. Replacing Objective Collar.

4. Apply a few drops of isopropyl alcohol to a cotton swab and clean the retaining groove of any dirt, grease, or debris.
5. Apply a thin, even coat of fluorinated grease to the replacement o-ring.
6. Being careful not to stretch or damage the o-ring, press it into the retaining groove.
7. If necessary, use a cotton swab to remove any excess grease from the o-ring and battery pack to prevent accumulation of debris.

3.3 CORRECTIVE MAINTENANCE (Continued)

I/O Jack Cover Replacement

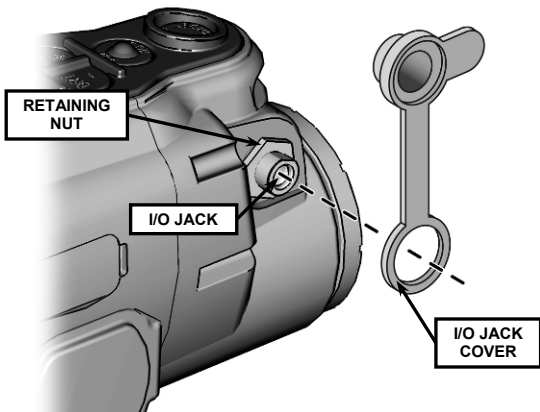


Figure 3-5. Replacing I/O Jack Cover.

1. Open the I/O jack cover.
2. Stretch and pull the I/O jack cover around the retaining nut and off the I/O jack.
3. Place the hole of the replacement I/O jack cover over the I/O jack, then work the cover material beneath the retaining nut.
4. Once installed, the cover material should lay flat and seat neatly in the groove between the retaining nut and LWTS housing.

SECTION II

SERVICE / PACKING AND UNPACKING

3.4 RETURN INSTRUCTIONS

For service, repair, or replacement, first e-mail returns.insight@l-3com.com or call toll-free 1-877-744-4803.

To assist with determining if the item is repairable, the following information will be requested:

- a. Serial number of the defective item;
- b. Thorough description of the malfunction, defect, or damage; and
- c. If known, an explanation as to how the malfunction, defect or damage occurred.

If the item is determined to be beyond economical repair, follow applicable replacement procedures through your Property Officer. If it is determined that the item is under warranty, or should be returned for repair, a Return Material Authorization (RMA) number will be provided.

When returning the LWTS for service / repair, the following procedures should be followed to prevent any additional damage:

1. Be sure that the LWTS is free of all contaminants such as dirt or any other foreign material.
2. Remove batteries.
3. Place the LWTS in the soft carrying case.

3.4 RETURN INSTRUCTIONS (Continued)

Place the item and a copy of the test report or detailed description of the failure in a suitable packing container. Mark the package with “Field Return” and the RMA number. Ship via fastest, traceable, pre-paid means to:

L-3 Communications Corporation
Warrior Systems Division
Insight Operations
9 Akira Way
Londonderry, NH 03053

3.5 WARRANTY INFORMATION

The LWTS is under warranty from defects in material and workmanship for a minimum of one (1) year from the date of manufacture. This warranty does not protect against damage due to misuse, mishandling, or battery leakage. Additional warranty coverage may have been provided through the contract or via subsequent contract extension. Specific warranty terms can be obtained from your procurement agent, Contracting Officer or L-3 Warrior Systems, Insight.

3.6 NON-WARRANTY INFORMATION

Non-warranty repairs are subject to an evaluation fee. The item will be tested and evaluated for failure, then customer permission and payment terms are obtained prior to any repairs being performed.

APPENDIX A

END ITEM COMPONENTS AND REPAIR PARTS

A.1 SCOPE

This Appendix lists end item components and repair parts for the LWTS.

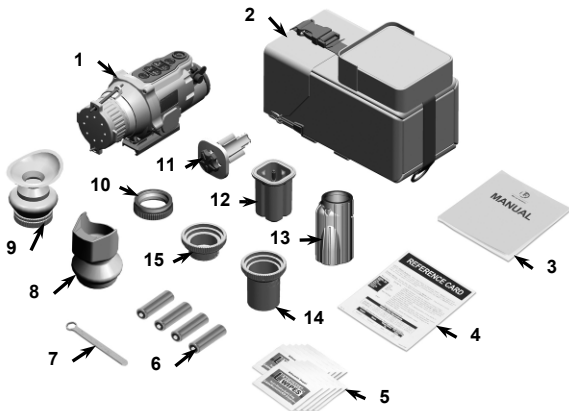


Figure A-1. End Item Components.

A.1 SCOPE (Continued)

Table A-1. List of End Item Components.

ITEM NO.	NATIONAL STOCK NUMBER	PART NUMBER	DESCRIPTION	QTY RECM
1	-	TWB-002-A3	LWTS Assembly (see Figure A-2 for parts breakdown)	1
2		TWB-580	Soft Carrying Case	1
3	N/A	TWB-TM-ITI	Operator Manual	1
4	N/A	TWB-QRG-ITI	Quick Reference Guide	1
5	-	ITI-730	Lens Cleaning Towelettes	10
6	3120-00-837-0887	EVRL91V9	Battery, 1.5V, AA Lithium	4
7	5120-01-582-2832	ITI-150	Box Wrench, 3/8"	1
8	5855-01-561-8116	CQB-630-02	Interface Hood	1
9	-	TWB-036-A1	Eyecup, Shuttered	1
10	-	SPN-020-A1	Eyepiece Adapter Ring	1
11	-	TWB-014-A1	Battery Pack	1
12	-	TWB-605	Protective Case, Battery Pack	1
13	-	SPN-401	Interface Hood, Long	1
14	-	TWB-544-01	Shroud, RCO	1
15	-	TWB-543-01	Shroud, M68 CCO	1

A.1 SCOPE (Continued)

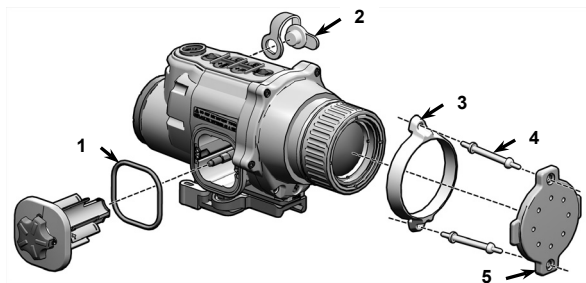


Figure A-2. LWTS Assembly.

Table A-2. List of Repair Parts.

ITEM NO.	NATIONAL STOCK NUMBER	PART NUMBER	DESCRIPTION	QTY RECM
1	-	TWB-486	O-Ring, Battery Pack	1
2	-	TWB-525	Cover, I/O Jack	1
3	-	TWB-437-02	Objective Collar	1
4	5855-01-561-8564	IWT-065-01	Strap, Objective Lens Cover	2
5	-	TWB-414-02	Objective Lens Cover	1

The **LWTS**
Is designed and produced by:



Warrior Systems

L-3 Communications Corporation
Warrior Systems Division
Insight Operations

9 Akira Way
Londonderry, NH 03053
USA

Phone 603.626.4800 / Fax 603.626.4888
www.l3warriorsystems.com

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